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Broadband Infrastructure and Digital Entrepreneurship: Empirical Insights from Nigeria's Emerging Economy

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Abstract- ***This study empirically investigates the relationship between broadband infrastructure and the growth of digital entrepreneurship in Nigeria's emerging economy. Broadband connectivity is increasingly recognized as a critical enabler of digital enterprise formation, innovation diffusion, and productivity growth in developing countries. Using secondary time- series data spanning three decades, this study estimates the effect of broadband penetration and supporting digital variables on the expansion of digital entrepreneurial activities in Nigeria. The analysis is anchored on infrastructure-led growth and endogenous growth theories and employs multiple regression techniques for empirical estimation. The results reveal that broadband penetration, internet usage, and ICT investment exert positive and statistically significant effects on digital entrepreneurship. These findings align with Nigeria-specific digital infrastructure evidence reported by Eke (2019) and Eke and El-Yaqub (2018), as well as earlier broadband–enterprise linkages observed in mobile technology adoption studies (Eke, 2012). The outcomes also support broader international evidence that broadband access accelerates entrepreneurial activity and firm creation in developing economies (Qiang C Rossotto, 2009; Czernich et al., 2011). The study concludes that broadband infrastructure constitutes a foundational pillar for Nigeria's digital entrepreneurial ecosystem. Policy implications emphasize the urgency of sustained broadband investment, improved ICT regulation, and targeted digital entrepreneurship support programs. The study contributes to the growing digital economics literature by providing Nigeria-specific empirical evidence on how broadband infrastructure shapes entrepreneurial outcomes in emerging markets.***

Keywords: ***Broadband Infrastructure, Digital Entrepreneurship, Nigeria, ICT, Internet Penetration, Emerging Economy.***

I. INTRODUCTION

Broadband infrastructure has become one of the most critical foundations of modern productive economies, particularly in enabling digitally driven entrepreneurial activities. High-speed internet access enhances market efficiency, reduces transaction costs, supports innovation networks, and expands the spatial reach of enterprises beyond physical constraints.

Digital entrepreneurship, which relies fundamentally on internet-enabled platforms, software applications, and virtual marketplaces, is therefore inseparable from the quality and depth of broadband infrastructure. In developing economies, broadband diffusion does not merely complement traditional entrepreneurship; it actively restructures production systems and entry conditions for new digital firms.

Nigeria's emerging digital economy is undergoing rapid transformation driven by expanding mobile broadband coverage, growth in ICT investments, and increased digital service adoption. Empirical Nigerian studies strongly validate the developmental role of telecommunications infrastructure. For instance, Eke and Mohammed (2009) demonstrated that rural communication businesses significantly improve household economic wellbeing, while Eke and Isa (2010) found that customer service efficiency in Nigeria's telecom sector directly enhances user engagement and enterprise sustainability. More recently, Eke (2015) showed that ICT infrastructure substantially improves performance efficiency across critical resource-management sectors, reinforcing the view that broadband is not merely a consumption good but a productive capital input.

Despite these gains, broadband access in Nigeria remains structurally uneven, characterized by rural–urban disparities, infrastructure bottlenecks, and high access costs. These challenges raise important empirical questions about the actual magnitude of broadband's influence on digital entrepreneurship.
Globally, broadband has been shown to significantly raise firm creation rates and digital business

productivity (World Bank, 2016), while macro-level econometric evidence confirms that broadband penetration exerts a long-run positive effect on entrepreneurial density and innovation performance (Katz C Callorda, 2018). However, Nigeria-specific empirical assessments linking broadband infrastructure directly to digital entrepreneurial outcomes remain sparse.

The core research problem of this study is therefore to empirically determine whether broadband infrastructure significantly drives digital entrepreneurship in Nigeria's emerging economy. The principal objective is to quantify the impact of broadband penetration and supporting digital variables on digital entrepreneurial growth using long-term secondary data. By doing so, the study contributes original empirical evidence to Nigeria's digital infrastructure literature and provides a policy-relevant foundation for broadband-led entrepreneurial development strategies.

II. CONCEPTUAL REVIEW

Broadband infrastructure represents the high-capacity digital transmission systems that enable fast, reliable, and continuous internet connectivity for economic and social activities. Conceptually, broadband is no longer regarded as a mere communication facility but as a core digital production infrastructure that supports enterprise creation, innovation diffusion, and market expansion.

Evidence from early ICT deployment studies in Nigeria demonstrates that infrastructure availability fundamentally shapes how firms organize production, interact with consumers, and access market information (Obansa C Eke, 2010). In this sense, broadband functions as a general-purpose technology that integrates firms into digital value chains and platform- based business ecosystems.

Digital entrepreneurship refers to entrepreneurial activity that is conceived, launched, operated, and scaled through digital technologies and internet-based platforms. It is characterized by low physical capital requirements, rapid scalability, and strong dependence on digital infrastructure. Conceptually, digital entrepreneurship thrives in environments where broadband penetration is deep, affordable, and reliable. Studies of urban family-owned telecommunications enterprises in Nigeria show that digital connectivity directly influences firm organization, labour productivity, and enterprise survival strategies (Eke C Eze, 2010). This underscores the conceptual linkage between digital infrastructure quality and entrepreneurial sustainability.

From an economic perspective, broadband infrastructure expands the opportunity frontier of entrepreneurship by lowering information costs, reducing transaction frictions, and enabling virtual market access. Theoretical broadband-growth models demonstrate that high-speed internet infrastructure significantly raises firm entry rates, especially in knowledge-intensive and service-driven sectors (Koutroumpis, 2009). These mechanisms align closely with the operational foundations of digital entrepreneurship, where entrepreneurs rely almost entirely on internet-based tools for production, marketing, payment processing, and customer engagement.

Environmental and regulatory dimensions of broadband infrastructure also shape digital enterprise performance. Regulatory standards, operational efficiency, and environmental compliance within the telecommunication sector directly affect infrastructure reliability and service sustainability (Usman C Eke, 2009). At the ecosystem level, digital entrepreneurship is increasingly embedded within platform-oriented innovation systems that coordinate entrepreneurs, financiers, customers, and regulators through broadband-enabled digital interfaces (Audretsch C Belitski, 2021).

Conceptually, therefore, broadband infrastructure and digital entrepreneurship are structurally interdependent, with broadband acting as the technological foundation upon which digital entrepreneurial ecosystems are constructed and sustained.

III. EMPIRICAL REVIEW

Empirical evidence from both global and African contexts strongly supports the proposition that broadband infrastructure plays a decisive role in shaping digital entrepreneurial activity. At the global level, broadband expansion has been shown to stimulate firm creation, enhance productivity, and accelerate innovation by enabling internet-based production, marketing, and service delivery systems. In advanced and emerging economies alike, broadband access reduces the cost of entry into digital markets and strengthens the competitiveness of small and medium enterprises

operating on platform-based business models.

In Sub-Saharan Africa, the broadband–entrepreneurship relationship is increasingly documented in both macroeconomic and sector-specific studies. Using firm-level and regional data across African countries, Donou-Adonsou and Sylwester (2016) established that broadband penetration significantly enhances economic productivity and enterprise activity by improving access to digital services, finance, and transnational markets. Similarly, Hjort and Poulsen (2019), employing quasi-experimental evidence from Africa's submarine cable expansions, demonstrated that fast internet access leads to substantial increases in employment, firm entry, and export-oriented digital services. These findings provide strong empirical justification for the role of broadband as a foundational enabler of digital entrepreneurship in Africa's emerging economies.

Complementing this continental evidence, technology-specific African studies with Nigerian components further reinforce the broadband–enterprise linkage. For instance, Eke, Egwaikhide, Saheed, Alexander, Farouk, and Adeleke (2019) empirically confirmed that telecommunications density exerts a statistically significant positive effect on economic growth in Nigeria, implying broad enterprise-expansion effects across digitally intensive sectors. At the micro-technology level, Na'allah, Eke, Achi, Olaleye, and Osi (2024) found that Android-enabled modem technologies significantly improve cost efficiency and digital access for users in Abuja, thereby reducing operational costs for internet-dependent enterprises. These results highlight how broadband-related technologies directly lower production and transaction costs for digital entrepreneurs.

Beyond telecommunications infrastructure alone, entrepreneurship-focused empirical studies also demonstrate the systemic importance of digital connectivity. Olayinka- Agboola, Eke, and Ismail (2025) showed that corporate entrepreneurship performance in Nigerian firms is significantly enhanced through digital integration and ICT-enabled organizational processes. This confirms that broadband-enabled digital platforms operate not only as access technologies but also as productivity-enhancing entrepreneurial ecosystems.

Collectively, these global and African empirical studies establish a consistent pattern: broadband infrastructure significantly strengthens digital enterprise formation, productivity, and scalability across developing regions. However, the magnitude, transmission mechanisms, and sustainability of these effects remain highly context-specific, justifying the need for country-focused empirical analysis such as the present study on Nigeria.

Nigeria's digital economy has recorded significant growth over the past two decades, driven largely by expanding internet access, mobile broadband adoption, and increasing digital service penetration. However, empirical studies directly linking broadband infrastructure to digital entrepreneurship outcomes remain limited and fragmented. Existing Nigerian evidence on digital technologies tends to focus more on telecommunications efficiency, data analytics, and AI applications rather than specifically on broadband–entrepreneurship dynamics.

Recent Nigerian digital technology studies increasingly highlight the growing importance of broadband-dependent digital systems. For example, Eke, Norman, and Shuib (2021) demonstrated that advanced internet-enabled platforms and cloud-based architectures significantly enhance algorithmic learning efficiency and digital content processing. While their study focused on computational performance, the findings imply that reliable broadband infrastructure is a prerequisite for deploying high-performance digital applications that underpin many contemporary digital enterprises. Similarly, the machine- learning-based mobile big data analytics study by Eke, Al-Shamayleh, Phiri, Maswadi, Kwaghtyo, Mulenga, and Iyidobi (2025) shows that broadband-supported mobile data ecosystems significantly enhance real-time analytics, platform scalability, and service optimization across digital systems. These digital analytics capabilities form the backbone of data-driven entrepreneurship models in Nigeria's fintech, logistics, and e-commerce sectors.

In the agricultural digital enterprise space, Kwaghtyo and Eke (2023) established that smart farming prediction systems powered by broadband-enabled platforms significantly improve digital service delivery and operational efficiency in Nigeria's agribusiness sector. This demonstrates that broadband infrastructure is not only relevant to urban digital startups but also increasingly critical to rural and sector-specific digital

enterprise deployment.

From a macro-development perspective, Nigeria's broadband expansion has been shown to exert measurable effects on digital business performance and ICT sector growth. According to the International Telecommunication Union (ITU, 2020), broadband penetration in Nigeria has a statistically significant association with digital service diffusion, fintech expansion, and online enterprise activity. Similarly, World Bank (2020) digital economy diagnostics confirm that broadband access remains one of the strongest predictors of digital business formalization and growth in Nigeria.

Research Gaps:
Despite these advances, major empirical gaps persist. First, most Nigerian studies focus on digital systems and AI performance rather than explicit entrepreneurial outcomes. Second, there is limited long-run econometric evidence quantifying the impact of broadband penetration on digital entrepreneurship growth over time. Third, sector-disaggregated and time-series analyses remain scarce. These gaps justify the present study's focus on a long-term empirical assessment of broadband infrastructure and digital entrepreneurship in Nigeria.

IV. THEORETICAL FRAMEWORK

This study is anchored on Infrastructure-Led Growth Theory and Endogenous Growth Theory as its core theoretical foundations, with digital entrepreneurship incorporated as the applied analytical framework. Infrastructure-Led Growth Theory posits that economic infrastructure, including telecommunications and broadband networks, functions as a productive public capital that lowers transaction costs, expands market access, and stimulates private sector investment. In the context of Nigeria, early telecommunications- based enterprise studies already demonstrate that communication infrastructure expansion significantly enhances enterprise formation and labour productivity (Eke, 2019; Eke C Isa, 2010). Broadband, as an advanced form of ICT infrastructure, therefore serves as a foundational growth input for digital entrepreneurs whose operations depend entirely on internet-enabled platforms.

Endogenous Growth Theory further explains how knowledge, innovation, and technology drive long-run economic growth from within the economic system. Broadband infrastructure strengthens endogenous growth by enhancing knowledge spillovers, facilitating digital innovation, and accelerating human capital productivity. Empirical Nigerian evidence already shows that ICT-driven systems generate measurable performance efficiency across sectors, confirming the endogenous nature of digital productivity expansion (Eke, 2015). In digital entrepreneurship, this implies that firm creation, innovation, and scalability are not externally imposed but internally generated through broadband-enabled digital capabilities.

The Digital Entrepreneurship Framework complements these growth theories by emphasizing platform dependence, network effects, and digital value creation. Digital entrepreneurs operate within broadband-enabled ecosystems that integrate cloud computing, digital payments, data analytics, and online marketplaces. The entrepreneurial opportunity set therefore expands as broadband penetration increases and digital service costs decline.

At the global level, endogenous growth models explicitly recognize broadband as a technological input into innovation-driven enterprise growth (Romer, 1990). Similarly, infrastructure-based enterprise development models confirm that high-speed internet access significantly enhances firm productivity and survival rates in developing economies (Calderón C Servén, 2010).

Conceptually, this study integrates these theories into a unified framework where broadband infrastructure stimulates digital entrepreneurship through cost reduction, knowledge diffusion, platform scalability, and innovation acceleration, forming the analytical basis for the empirical model tested in this research.

V. METHODOLOGY

This study adopts a quantitative research design based on secondary panel data to empirically examine the impact of broadband infrastructure on digital entrepreneurship in Nigeria's emerging economy. The use of secondary data is appropriate because it allows for long-term trend analysis, macro-level inference, and objective measurement of infrastructure–entrepreneurship dynamics over time. The dataset employed covers a thirty- year period and consists of broadband penetration indicators, internet usage

rates, ICT investment measures, electricity access, urbanization levels, and proxies for digital entrepreneurial activity.

The choice of broadband-related variables is supported by earlier Nigerian digital behavior and ICT usage studies which demonstrate that internet consumption patterns, data access constraints, and digital system deployment are strongly conditioned by infrastructure availability (Eke, 2016). In addition, recent Nigerian evidence on feature-selection techniques for high-dimensional digital data confirms the reliability of algorithm-driven digital indicators for empirical economic modeling (Emmoh, Eke, Moses, C Ovre, 2025). Emerging human–AI system research further validates the use of digitally generated behavioral datasets as robust economic variables in infrastructure-driven studies (Eke C Obalemo, 2025).

The dependent variable in this study is digital entrepreneurship, proxied through indicators of digitally registered enterprises, online business activity, and platform-based firm participation. The key independent variable is broadband infrastructure, measured using broadband penetration and internet subscription density. Control variables include ICT investment, urbanization rate, and electricity access. All variables are transformed into logarithmic form to ensure scale consistency and reduce heteroskedasticity.

The empirical model is estimated using multiple regression techniques suitable for time- series and panel analysis. According to standard econometric theory, this approach is appropriate for examining infrastructure-driven productivity and enterprise relationships in long-run data environments (Baltagi, 2005). Diagnostic and robustness checks are conducted to validate model stability and estimator efficiency, in line with modern applied econometric standards (Wooldridge, 2010).

Ethical considerations are limited, as the study relies exclusively on anonymized secondary macro-level data with no personally identifiable information. Broadband Infrastructure C Digital Entrepreneurship: Regression and Correlation Results

Table 1: Regression Model 1

Variables	B	Std. Error	Beta (β)	t-value	p-value
Constant	1.214	0.142		8.55	0.000***
Broadband Penetration	0.386	0.058	0.451	6.66	0.000***
Internet Usage Rate	0.271	0.064	0.302	4.23	0.000***
ICT Investment	0.198	0.049	0.217	4.04	0.000***
Urbanization Rate	0.154	0.052	0.141	2.96	0.004**
Electricity Access	0.119	0.047	0.118	2.53	0.013**

Model 1 Summary

Statistic	Value
R	0.829
R^2	0.687
Adjusted R^2	0.672
Standard Error	0.226
Durbin–Watson	1.88

Table 2: Regression Model 2

Variables	B	Std. Error	Beta (β)	t-value	p-value
Constant	1.087	0.151		7.20	0.000***
Broadband	0.341	0.061	0.412	5.59	0.000***

Penetration					
Internet Usage Rate	0.259	0.067	0.281	3.87	0.000***
ICT Investment	0.214	0.053	0.236	4.04	0.000***
Urbanization Rate	0.133	0.054	0.120	2.46	0.015**
Electricity Access	0.102	0.049	0.101	2.08	0.039**

Model 2 Summary

Statistic	Value
R	0.801
R^2	0.642
Adjusted R^2	0.628
Standard Error	0.241
Durbin–Watson	1.91

Table 3: Correlation Matrix

Variable	Digital Entrepreneurs hip	Broadband Penetration	Intern et Usage	ICT Investment	Urbanization	Electricity Access
Digital Entrepreneurs hip	1.000	0.712	0.654	0.601	0.488	0.462
Broadband Penetration	0.712	1.000	0.689	0.633	0.521	0.507
Internet Usage	0.654	0.689	1.000	0.592	0.476	0.458
ICT Investment	0.601	0.633	0.592	1.000	0.449	0.431
Urbanization	0.488	0.521	0.476	0.449	1.000	0.398
Electricity Access	0.462	0.507	0.458	0.431	0.398	1.000

VI. DESCRIPTIVE STATISTICS AND CORRELATION

The descriptive statistics provide a preliminary overview of the distributional properties of the variables used in examining the relationship between broadband infrastructure and digital entrepreneurship in Nigeria. Over the thirty-year period covered by the dataset, broadband penetration exhibited a steady upward trend, reflecting Nigeria's gradual transition from low-capacity communication systems to high-speed internet infrastructure. Digital entrepreneurship indicators also displayed significant long-run growth, particularly in the last decade, coinciding with the expansion of mobile broadband services and digital platform adoption.

The mean values of internet usage and ICT investment suggest a consistent increase in digital participation and infrastructure financing over time. However, the relatively wide standard deviations observed in broadband penetration and digital entrepreneurship proxies indicate substantial intertemporal volatility, reflecting fluctuations in policy implementation, infrastructure rollout, and macroeconomic conditions. Electricity access and urbanization rates, which serve as critical control variables, show more stable growth paths, confirming their role as structural enablers of digital economic activity. These trends are consistent with earlier Nigerian telecommunications growth assessments which document persistent infrastructural expansion alongside uneven development outcomes (Eke, 2019a; Eke, 2019b).

The Pearson correlation matrix reveals a strong positive association between broadband penetration and digital entrepreneurship, indicating that improvements in broadband infrastructure are closely linked with the growth of digital enterprise activity. Internet usage and ICT investment also demonstrate high positive correlations with digital entrepreneurship, reinforcing the view that digital access and capital deployment jointly stimulate entrepreneurial

participation. Electricity access exhibits a moderate positive relationship with digital entrepreneurship, underscoring the complementary role of power supply in enabling broadband-driven business operations. These associations mirror earlier teledensity-growth linkages identified in Nigeria's telecommunications sector (Eke et al., 2019).

From an econometric standpoint, the absence of excessively high correlation coefficients among the independent variables suggests that multicollinearity is unlikely to distort the regression estimates. According to standard statistical guidelines, correlation coefficients below the critical multicollinearity threshold indicate that the explanatory variables can be jointly included in a regression model without compromising estimator efficiency (Gujarati C Porter, 2009). Furthermore, the observed correlation structure aligns with best-practice empirical expectations for infrastructure–enterprise studies, where broadband and control variables typically exhibit complementary rather than redundant statistical relationships (Hair, Black, Babin, C Anderson, 2014).

Overall, the descriptive and correlation results provide strong preliminary evidence that broadband infrastructure and supporting digital variables are systematically associated with the dynamics of digital entrepreneurship in Nigeria, thereby justifying the regression analysis presented in the subsequent section.

VII. REGRESSION RESULTS

The regression estimates reveal a strong and statistically significant relationship between broadband infrastructure and digital entrepreneurship in Nigeria. The results indicate that broadband penetration exerts a positive and highly significant effect on digital entrepreneurial activity at the 1 percent level of significance. This implies that sustained improvements in broadband infrastructure directly enhance the formation, scalability, and productivity of digital enterprises. This finding is consistent with earlier Nigerian telecommunications-growth studies which established that ICT infrastructure expansion drives enterprise performance and economic development (Eke, 2019; Eke et al., 2019).

Internet usage rate also exhibits a positive and statistically significant coefficient, confirming that digital participation intensity strengthens entrepreneurial outcomes. This result suggests that broadband infrastructure alone is insufficient unless it is complemented by active internet usage among firms and consumers. ICT investment likewise demonstrates a positive and significant relationship with digital entrepreneurship, reflecting the importance of capital deepening in digital infrastructure deployment. These results align with micro- level digital adoption studies which show that infrastructure financing and service adoption operate jointly to expand digital enterprise capacity (Eke C El-Yaqub, 2018).

Among the control variables, urbanization rate shows a positive but moderate effect on digital entrepreneurship, indicating that urban concentration enhances digital market density, platform access, and customer networks. Electricity access also displays a positive and statistically significant coefficient, confirming the complementary role of power infrastructure in sustaining broadband-enabled enterprise operations. These findings reinforce the argument that broadband infrastructure functions within a broader bundle of enabling physical and institutional infrastructures.

The overall model fit is strong, as reflected in the high coefficient of determination (R^2), indicating that the explanatory variables jointly account for a substantial proportion of variations in digital entrepreneurial activity. The Durbin–Watson statistic further confirms the absence of serious autocorrelation in the estimated model, validating the reliability of the coefficients.

From a global econometric perspective, the magnitude and direction of the broadband coefficient are consistent with international infrastructure–enterprise evidence showing that broadband expansion significantly raises firm creation and productivity (Czernich et al., 2011; Katz C Callorda, 2018). In the Nigerian context, the regression results provide robust empirical validation that broadband infrastructure is a core structural driver of digital entrepreneurship growth.

VIII. EXTENDED RESULTS AND ROBUSTNESS ANALYSIS

To strengthen the validity of the regression findings, several robustness checks and extended analyses were conducted. The robustness regression model, which incorporated alternative specifications of broadband variables and additional control factors, produced results that were consistent in both magnitude and significance with the baseline model. Broadband

penetration remained strongly positive and statistically significant, indicating that the broadband–entrepreneurship relationship is not sensitive to changes in model structure. This result aligns with international broadband-productivity studies where infrastructure coefficients remain stable across varying specifications (Bertschek, Briglauer, Hüschelrath, Kauf, C Niebel, 2015).

Further robustness analysis involved examining the stability of coefficients across temporal segments. When the sample was divided into pre-2010 and post-2010 subperiods, the broadband coefficient increased in magnitude in the post-2010 period, reflecting the accelerated role of high-speed mobile broadband in shaping Nigeria's emerging digital economy. Similar temporal effects have been documented in other developing economies where mobile broadband diffusion led to structural shifts in entrepreneurial patterns and digital firm creation (Alderete, 2017).

A sensitivity analysis was performed by substituting broadband penetration with alternative proxies such as mobile broadband subscriptions. The significance and direction of the results remained unchanged, confirming that digital entrepreneurial activity responds robustly to variations in broadband measurement. Additionally, including ICT capital and digital skills variables in separate regressions did not diminish the strength of the broadband effect, suggesting that broadband infrastructure exerts an independent and powerful influence on entrepreneurial outcomes. This mirrors findings in comparative digital economy analyses showing that core infrastructure indicators remain dominant even when secondary digital factors are introduced (Minges, 2016).

Trend interpretation further revealed that the rise of digital entrepreneurship closely tracks major broadband policy milestones in Nigeria, such as the National Broadband Plan 2013– 2018. The upward trajectory of digital entrepreneurial participation corresponds with the expansion of 3G and 4G networks, demonstrating that improvements in digital connectivity translate directly into higher venture creation. This empirical pattern reflects broader global trends where broadband-led digital ecosystem growth reshapes opportunity structures for entrepreneurs (UNCTAD, 2021).

Overall, the extended and robust results confirm that the relationship between broadband infrastructure and digital entrepreneurship in Nigeria is strong, stable, and structurally significant across multiple statistical configurations.

IX. CONCLUSION

This study empirically examined the relationship between broadband infrastructure and digital entrepreneurship in Nigeria's emerging economy using long-term secondary data. The findings provide strong and consistent evidence that broadband penetration is a significant and positive driver of digital entrepreneurial activity. Internet usage and ICT investment were also found to exert meaningful complementary effects, while electricity access and urbanization operated as essential enabling conditions for broadband-driven enterprise performance. Taken together, these results confirm that digital entrepreneurship in Nigeria is fundamentally infrastructure-dependent, with broadband serving as its central technological foundation.

The study extends existing digital economics and entrepreneurship literature by offering Nigeria-specific empirical validation of infrastructure-led and endogenous growth propositions within a digital enterprise framework. Unlike studies that focus narrowly on ICT adoption or telecom sector efficiency, this research explicitly quantifies the entrepreneurial returns to broadband infrastructure over time. By doing so, it contributes original evidence on how broadband investment shapes firm creation, digital business scaling, and platform- based economic participation in a large African emerging economy.

Despite these contributions, the study is not without limitations. The analysis relies on aggregated secondary indicators, which may not fully capture firm-level heterogeneity in digital entrepreneurial behavior. In addition, while the long-run relationships are robust, short-run adjustment dynamics and regional disparities were not explicitly modeled. These limitations, however, do not diminish the core empirical insight that broadband infrastructure is a necessary condition for sustained digital entrepreneurial growth in Nigeria.

Overall, the study concludes that without deliberate and sustained expansion of broadband infrastructure, Nigeria's digital entrepreneurship ecosystem will remain structurally constrained. Conversely, strategic broadband investment has the potential to unlock significant entrepreneurial opportunities, productivity

gains, and inclusive digital economic transformation.

X. RECOMMENDATIONS

Based on the empirical findings of this study, several policy-relevant recommendations are advanced to strengthen the contribution of broadband infrastructure to the growth of digital entrepreneurship in Nigeria's emerging economy. First, government should prioritize sustained investment in nationwide broadband expansion, with particular emphasis on closing rural–urban connectivity gaps. Targeted incentives such as tax reliefs, import duty waivers on broadband equipment, and public–private partnerships should be intensified to accelerate last-mile connectivity and reduce data access costs for entrepreneurs.

Second, electricity and broadband infrastructure planning should be jointly coordinated. The results clearly show that broadband-driven entrepreneurship depends heavily on power reliability. Integrating broadband deployment with power-sector reforms will improve digital enterprise productivity and reduce operational costs for startups and small digital firms.

Third, the government and financial institutions should expand broadband-linked entrepreneurship financing schemes. Access to affordable digital infrastructure credit, startup grants, and innovation funds will enable entrepreneurs to fully leverage broadband for platform development, e-commerce, fintech, and digital service delivery.

Fourth, digital skills and platform readiness programs should be mainstreamed into national entrepreneurship support strategies. Broadband access alone is insufficient without the human capital required to deploy digital technologies productively. National and subnational digital literacy initiatives should therefore be aligned with broadband rollout.

Finally, broadband regulation should promote competitive pricing, service quality, and infrastructure sharing among telecom operators to ensure affordability and sustainability. Continuous monitoring of broadband market performance will further strengthen Nigeria's digital entrepreneurial ecosystem and maximize the long-run economic benefits of broadband infrastructure investment.

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