ISSN: 2054-7404
Archives of Business Research; Vol. 14 No. 03 (2026) (25-44)
https://doi.org/10.14738/abr.1403.20132

# Digital Financial Services and Economic Growth in Nigeria

Akeem Adebayo Ogunseni, Peter Ifeanyi Ogbebor, & Charles Ogboi

1. Department of Finance, Babcock University, Ilishan-Remo, Ogun State, Nigeria

**Abstract:** Nigeria's economic trajectory has increasingly been shaped by the expansion of Digital Financial Services (DFS), driven by innovations, and digital banking. DFS is a catalyst for inclusive finance and macroeconomic performance, yet Nigeria's outcomes remain mixed. This study examines the impact of DFS on economic growth, measured through GDP per capita, and explores how digital financial indicators contribute to short- and long-run growth dynamics. Anchored in Human Development Theory and the Unified Theory of Acceptance and Use of Technology (UTAUT), the study employed an ex post facto design using secondary data from 2010–2024, sourced from the World Development Indicators and related databases. Analytical methods included descriptive statistics, Autoregressive Distributed Lag (ARDL) bounds testing, and Error Correction Models (ECM) to capture the effects of DFS on GDP per capita. Robustness was ensured through pre-estimation and post-diagnostic tests. Findings revealed that DFS significantly influence GDP per capita (Adj. $R^2 = 0.824$, $F(5,9) = 12.299$, $p < 0.05$), with account ownership and internet penetration emerging as critical drivers. Both indicators exerted positive short-run effects and sustained long-run impacts, underscoring the transformative role of digital connectivity and financial access in Nigeria. The study concludes that DFS are pivotal to Nigeria's economic growth, though their effects vary across time horizons. Policy recommendations include scaling up equitable financial literacy programs, expanding internet infrastructure, reducing interest spreads, and strengthening regulatory effectiveness. A focused policy framework integrating DFS into Nigeria's growth agenda is essential to maximize their potential as drivers of sustained GDP per capita growth.

**Keywords:** Account ownership, Digital financial services, Economic growth, GDP per capita, Internet penetration.

## INTRODUCTION

Economic growth remains a central pillar of Nigeria's development agenda, but its trajectory has been uneven due to structural challenges, dependence on oil revenues, and weak institutional frameworks (Atanda and Ogboi, 2014; Ogbebor et al., (2023); World Bank, 2023). In recent years, the emergence of Digital Financial Services (DFS) driven by mobile banking, fintech platforms, and digital payment systems, has been predicted as a transformative force capable of reshaping financial intermediation (Ogbebor & Siyanbola, 2018), stimulating growth, and accelerating inclusive development. Globally, DFS is recognized as a catalyst for financial inclusion and a driver of macroeconomic performance, enabling individuals and businesses to access credit, savings, and payment systems more efficiently (Demirgüç-Kunt et al., 2018; Suri & Jack, 2016). However, Nigeria's experience reveals a paradox: while DFS penetration has expanded significantly, its translation into sustained economic growth remains contested.

World Bank (2025) and several studies such as Sarpong and Nketiah-Amponsah (2022), and Gupta and Vegelin (2016) stated that inclusive development indicators comprise economic, social, health and educational measures such as GDP per capita, GNI per capita, poverty gap, income inequality, life expectancy, amongst other measures. Compared to Nigeria, other Sub-Saharan African (SSA) countries that got independence around the same time as Nigeria are performing better in some of these metrics (Adam et al., 2022; Sarpong & Nketiah-Amponsah, 2022). The World Bank (2025), based on 2024 datasets, amended its growth projection for Nigeria to 4.2% (2025) and 4.4% (2027), hence, it is important to unravel the contributing effects of DFS to Nigeria's economic growth.

Research with focus on innovation, technology, and financial inclusion such as Agyekum et al. (2016); Doku et al. (2023); and Tay et al. (2022) conclude that technological advancements, particularly in the realm of digital finance, have emerged as a powerful catalyst for enhancing financial inclusion with potential to drive economic growth. World Development Indicators (WDI) database reveals that 76% of adults globally now own a financial account, up from 51% in 2011 (World bank, 2025). Less than 50% in the SSA and more than 70% of adults aged 15 years and above in Nigeria have accounts with either conventional banks, agent banks, or mobile money operators.

According to studies such as Wezel and Ree (2023); Abdullahi et al. (2025); and Koefer et al. (2024), issues such as digital literacy gap, financial literacy gap, limited internet connectivity, weak institutional quality, and regulatory hurdles hinder the full realization of digital financial services (DFS) benefits in Nigeria. In 2010, based on International Telecommunication Union (ITU), there were less than 40 million internet users in Nigeria at roughly 24% penetration, compared to countries such as Tunisia (34%), South Africa (10%), Rwanda (7%), Kenya (10%), and Ghana (8%) (IMF, 2025; Wezel and Ree, 2023). About 15 years later, the respective countries' policy direction has led to noticeable changes in this key driver of digital financial services. Nigeria's internet penetration increased significantly to 70% (2024) while Tunisia, South Africa, Rwanda, Kenya and Ghana were 77%, 72%, 41%, 63%, and 55% respectively (IMF, 2025). The crucial question remains to what extent has the impressive change translated into adoption of digital financial services and economic growth in Nigeria.

The study's period 2010–2024 is particularly significant for examining the nexus between DFS and economic growth in Nigeria. This timeframe captures the rapid diffusion of mobile technology, the rise of financial technology (fintech) startups, and regulatory reforms introduced by the Central Bank of Nigeria (CBN) to promote financial inclusion and cashless transactions (CBN, 2022). It also coincides with Nigeria's broader economic transitions, including recovery from the 2008–2009 global financial crisis, the oil price shocks of 2014–2016, and the COVID-19 pandemic's disruptions. By situating the analysis within this period, the study provides a comprehensive view of how DFS adoption interacts with macroeconomic fluctuations and structural reforms to influence GDP per capita.

We anchored the study in Human Development Theory and the Unified Theory of Acceptance and Use of Technology (UTAUT), and the research employed ARDL econometric techniques to capture both short-run and long-run dynamics of DFS indicators. The study adopted account ownership, interest spreads, financial literacy, regulatory effectiveness, and internet penetration as DFS indicators while economic growth is proxied by GDP per capita. By focusing explicitly on GDP per capita, the study situates DFS within the broader

discourse of inclusive development which offers insights into whether digital finance can serve as a sustainable driver of Nigeria's economic transformation.

## LITERATURE REVIEW AND HYPOTHESIS

### Conceptual Review

#### *Digital Financial Services (DFS)*

Digital Financial Services (DFS) refer to financial products and services delivered through digital channels such as mobile phones, internet platforms, point-of-sale devices, and fintech applications. DFS encompasses mobile banking, mobile money, electronic payments, and digital credit, all of which expand access to financial systems beyond traditional banking structures (Ozili, 2021). The conceptual foundation of DFS lies in its ability to reduce transaction costs, enhance efficiency, and broaden access to underserved populations. By leveraging technology, DFS facilitatses financial inclusion which is widely recognized as a pathway to economic growth and inclusive development (Demirgüç-Kunt et al., 2020).

In Nigeria, DFS adoption has accelerated since 2010, driven by mobile penetration, fintech innovation, and regulatory reforms by the Central Bank of Nigeria (CBN). The CBN's cashless policy and financial inclusion strategy have promoted digital payments and mobile money operations which position DFS as a critical component of the financial sector (CBN, 2022). Conceptually, DFS is not only a technological innovation but also a socio-economic instrument that connects individuals and businesses to the formal economy that influences aggregate growth outcomes.

#### *Economic Growth (GDP per Capita)*

Economic growth is traditionally measured by Gross Domestic Product (GDP) per capita, which reflects the average income of citizens and sometimes serves as a proxy for welfare improvement (Ogbebor et al., 2023). GDP per capita captures both the expansion of national income and its distribution across the population, making it a key indicator of inclusive development (World Bank, 2023). The conceptual link between DFS and GDP per capita lies in the mechanisms through which digital finance enhances productivity, facilitates investment, and stimulates consumption.

By enabling efficient savings mobilization, credit allocation, and payment systems, DFS contributes to higher levels of economic activity. For instance, mobile money platforms reduce barriers to financial access by allowing households and small businesses to participate more effectively in the economy (Suri & Jack, 2016). In Nigeria, where large segments of the population remain excluded from formal banking, DFS provides an alternative pathway to integrate marginalized groups into the growth process.

### Theoretical Review

#### *Human Development Theory*

Human Development Theory emphasizes that development should be understood not merely in terms of economic growth, but as the expansion of people's capabilities, opportunities,

and welfare (Sen, 1999). It argues that income growth, while important, is only one dimension of development, and that access to education, healthcare, and participation in social and economic life are equally critical.

Applied to *Digital Financial Services (DFS) and Economic Growth in Nigeria*, this theory provides a lens for understanding how DFS can contribute to GDP per capita growth by expanding individual and collective capabilities. For instance, account ownership and internet penetration enable households and businesses to access credit, savings, and payment systems, thereby enhancing productivity and income generation. By reducing barriers to financial participation, DFS strengthens the link between individual empowerment and aggregate economic growth.

In Nigeria's context, where large segments of the population remain excluded from traditional banking, DFS represents a mechanism for broadening opportunities. The theory suggests that when individuals gain access to digital financial access, they are better positioned to invest in education, health, and entrepreneurship, which in turn contributes to higher GDP per capita. Thus, Human Development Theory situates DFS not only as a financial innovation but as a driver of inclusive economic growth.

### *Unified Theory of Acceptance and Use of Technology (UTAUT)*

The Unified Theory of Acceptance and Use of Technology (UTAUT), developed by Venkatesh et al. (2003), explains how individuals adopt and use new technologies. It identifies four key determinants: performance expectancy, effort expectancy, social influence, and facilitating conditions. These factors shape user behavior and determine the extent to which technology is integrated into everyday life.

In relation to *Digital Financial Services and Economic Growth in Nigeria*, UTAUT provides a framework for analyzing how adoption of DFS influences macroeconomic outcomes. Performance expectancy reflects the belief that DFS improves financial transactions and access to credit, which can enhance productivity and income. Effort expectancy relates to the ease of using internet-driven or digital payment platforms, which affects adoption rates. Social influence captures the role of peer networks, community norms, and institutional encouragement in promoting DFS usage. Facilitating conditions include infrastructure, regulation, and literacy, which determine whether DFS can be effectively scaled.

By applying UTAUT, this study conceptualizes DFS adoption as a critical determinant of GDP per capita growth. High adoption rates, driven by positive expectations and supportive conditions, expand financial participation and stimulate economic activity. Conversely, weak infrastructure or low financial literacy can constrain DFS usage, limiting its impact on growth.

Applied jointly, the two theories discussed above, highlight that DFS contributes to GDP per capita growth not only through technological efficiency but also by expanding opportunities for individuals and communities. This integration is particularly relevant for Nigeria between 2010 and 2024, a period marked by rapid DFS expansion, regulatory reforms, and macroeconomic shocks. The theories suggest that while DFS adoption can drive growth, its impact depends on both the enabling environment (infrastructure, regulation, literacy) and its ability to expand human capabilities.

**Empirical Review**

Existing literature has extensively examined DFS in relation to financial inclusion, poverty alleviation, and inequality reduction (Ozili, 2018; Adeleye & Eboagu, 2019). However, few studies have systematically linked DFS to inclusive development measures such as GDP per capita, which serves as a critical indicator of national income growth and welfare improvement. Most prior research has either focused on micro-level impacts, such as household access to mobile money, or treated DFS as a peripheral factor in broader financial sector analyses. This fragmented approach leaves a gap in understanding the direct and multidimensional effects of DFS on Nigeria's economic growth trajectory.

In Nigeria, inclusive development efforts are framed by the Nigeria Agenda 2050 (Aluko et al., 2024), which advocates for economic diversification, human capital development, and financial inclusion. Studies by Yunusa et al. (2022) shows that human capital development, particularly in significantly impacts inclusive growth. Nguyen (2021) explores the global dimensions of financial service inclusion such as availability, affordability and usage to study how the combined effect (composite index) of these dimensions is a reliable instrument for financial inclusions.

Klapper et al. (2025) present findings from their review of global FINDEX database, with the findings focuses on connectivity and financial inclusion in the digital economy. Using primary survey data, the research examined digital connectivity (mobile, internet), financial access (account ownership), financial use (savings, borrowing, payments), and financial health (resilience, confidence). The study reveals that digital connectivity and responsible use are expanding; however, the authors opine that there are gaps in financial capabilities and confidence across the world. These trends confirmed that increased account ownership and digital access support improvements in GDP per capita.

Cornelli et al. (2023) analyze the drivers of digital lending growth by FinTech and Big Tech firms across 79 countries using various regression models, such as Fixed Effects (FE) and system Generalized Method of Moments (GMM). The study finds that digital lending is more prevalent in countries with higher GDP per capita, higher banking sector mark-ups, but with less stringent regulations. The study concludes that digital lending complements traditional credit sources and is particularly strong in areas with fewer bank branches, supports financial inclusion and, by extension, promotes economic growth globally.

Kanga et al. (2022) examine the diffusion of financial technology (FinTec) financial inclusion, and income per capita using cross-country regression and error correction models on data from 137 countries. The study finds that both FinTech diffusion and financial inclusion which relate to digital financial services have significant long-term positive effects on GDP per capita, beyond the contributions of physical and human capital investment. Kanga et al. (2021) explain that GDP per capita is more closely aligned with improvements in individual welfare and is thus a better proxy for assessing the inclusiveness of economic progress.

Panos et al. (2020) discuss the capabilities and challenges of financial literacy and responsible finance in the FinTech era through an inductive essay approach. The study highlights that FinTech can enhance financial wellness and development, especially when financial and digital literacy are acquired early. Furthermore, the authors opine that responsible FinTech adoption and improved financial literacy can support broader financial well-being, which is linked to poverty reduction and inclusive economic development.

From regional perspective, studies such as Abdallah et al. (2023) explore the impact of digital financial services versus traditional financial services on economic growth in the Middle East and North Africa (MENA) region. The study adopts Pooled Mean Group Auto-Regressive Distributed Lag (PMG-ARDL) and system Generalized Method of Moments (GMM) panel estimation. The authors find that digital financial inclusion, measured by internet users and mobile subscriptions, has a significant positive effect on economic growth, and the evidence shows that digital financial inclusion is stronger than traditional financial inclusion in driving economic growth at both macro and micro levels.

Mashrur (2024) investigates the impact of digital financial services on economic growth in South Asian countries using Principal Component Analysis (PCA) for index construction and dynamic panel Generalized Method of Moments (GMM) estimation. The study reveals that digital financial inclusion has a strong positive impact on GDP growth.

Within the Sub-Saharan Africa (SSA) context, Wale-Awe and Evans (2023) examine the impact of digital financial inclusion on economic growth, poverty, and inequality in Africa using panel data from 42 countries and simultaneous-equations models, two-step system Generalized Method of Moments (GMM), and the Toda-Yamamoto causality test. The research finds that digital financial inclusion significantly increases GDP per capita growth. Similarly, Voptia and Stukalina (2024) assess the effect of mobile money on financial inclusion in the SSA using a dynamic panel model and system Generalized Method of Moments (GMM). The research finds that mobile money usage and active accounts significantly improve financial inclusion, while education and GDP per capita also have positive effects. Similarly, Sarpong and Nketiah-Amponsah (2022) highlight that the usage of financial services, rather than mere availability or knowledge, has a significant positive impact on inclusive growth in sub-Saharan Africa. The authors' findings reinforce the argument that micro-level indicators such as GDP per capita, when combined with measures of financial service usage, provide a more comprehensive understanding of how growth is distributed among different segments of the population.

In Nigeria, several studies have examined topics relevant to digital financial services and development though with varied dimensions and depth. Alemu (2024) investigates the effects of financial technology, artificial intelligence, information and communication technology (ICT), and institutional quality on financial sector development across 30 countries using dynamic Generalized Method of Moments (GMM) regression. The study finds that these factors significantly enhance financial sector development, support improvements in access, promote efficiency, and stability, which are key drivers for inclusive development and GDP per capita growth.

Ogbebor et al. (2023) investigated the relationship between liberalization and economic growth in Nigeria, applying the Autoregressive Distributed Lag (ARDL) model and the Error Correction Model (ECM), alongside diagnostic tests for serial correlation, heteroskedasticity, normality, and stability. Their findings revealed that trade openness, as a measure of liberalization, had a statistically significant negative impact on economic growth in the long run.

Obayori and George-Anokwuru (2020) explore the link between financial inclusion and economic growth in Nigeria using descriptive statistics and inferences from Autoregressive Distributed Lag (ARDL) model. The findings reveal that both short-run and long-run access and effective usage of financial services significantly increase economic growth. Babajide et al. (2015) analyse the relationship between financial inclusion and economic growth in Nigeria

using Ordinary Least Squares (OLS) regression. The study finds that financial inclusion, measured by bank account ownership, significantly drives total factor productivity and worker's per capita income.

Ogbebor and Siyanbola (2018) investigated the nexus between financial development and economic growth in Nigeria, with particular emphasis on the role of the stock market. The study employed Generalized Least Squares (GLS) estimation, alongside unit root tests (ADF and PP), the Johansen co integration test, and VAR based Granger causality tests to establish both short and long run relationships. Their findings revealed a long run equilibrium relationship between GDP growth and stock market variables. The study highlights the importance of strengthening Nigeria's stock market institutions and regulatory frameworks to ensure that financial development translates into tangible economic growth outcomes.

Atanda and Ogboi (2014) applied panel cointegration techniques to investigate the relationship between inward remittances and economic growth in Sub-Saharan African countries. Their methodology combined panel data estimation using both fixed and random effects, the Hausman test to determine model suitability, and panel unit root tests such as Levin, Lin and Chu (LLC), Im, Pesaran and Shin (IPS), Augmented Dickey-Fuller (ADF), and Phillips-Perron (PP). The results revealed that remittance inflows exerted a positive and statistically significant impact on economic and income growth across the region, suggesting that remittances serve as an important source of external finance that supports household consumption and investment.

**Hypothesis Development**

The study adopts a structured hypotheses that provide us with the general hypothesis (overall DFS effect on economic growth). Using these hypotheses, we test the aggregate effects as well as the contribution of each DFS dimension to economic growth. We adopt account ownership, interest spread, financial literacy, financial sector's policy and regulations, and internet penetration as measures of DFS and GDP per capita as indicator of economic growth, based on a data set from 2010 – 2024. Therefore, the overall null hypothesis ($H_0$) and alternative hypothesis (($H_1$) for the study are as formulated below.

- Null Hypothesis ($H_0$): Digital Financial Services (DFS) measures have no statistically significant effect on economic growth in Nigeria.
- Alternative Hypothesis ($H_1$): Digital Financial Services (DFS) measures have a statistically significant effect on economic growth in Nigeria.

## METHODOLOGY

The study employs a mixed research design with the adoption of an ex post facto design, which is particularly suitable for analysing secondary data retrieved from established sources such as the World Development Indicators (WDI) database and the Global Findex database. According to Creswell and Creswell, 2018, the choice of ex post facto design is usually informed by the need to examine historical data which will enable this study to capture both short-run and long-run dynamics of digital financial services on inclusive development outcomes in Nigeria. By employing ex-post analysis, the study will statistically test hypotheses regarding the impact of digital financial services on inclusive development

outcomes (Abdullahi et al., 2025). This estimation approach ensures that findings are grounded in actual trends and patterns observed in the Nigerian context to provide robust evidence for policy directions.

**Model Specification**

This study adopted a generalised form of model specification, in line with the work of Chukwu, et. al. (2024) on "Financial Technology and Economic Development in Nigeria". We modelled indicators of digital financial services on economic growth proxied by GDP per capita as shown in Equation (1) below.

$$GDPC_t = \beta_0 + \beta_1 ACTP_t + \beta_2 INTS_t + \beta_3 LTRC_t + \beta_4 FSPR_t + \beta_5 TNET_t + \mu_t \text{ ----- Equation (1)}$$

Where:

- GDPC = GDP per capita (Economic growth)
- ACTP = Accounts ownership
- INTS = Cost of borrowing/credit - Interest spread
- LTRC = Financial Literacy rate
- FSPR = Financial sector's policies and regulation index
- TNET = Internet penetration
- Ƀ0 = constant term which is the value of the Gross Domestic Products per capita (GDPC) when there is no presence of digital financial services in Nigeria, hence, it is the theoretical Y-axis intercept.
- Ƀ1, ….., Ƀ5 = the regression coefficients which measure the rate at which the gross domestic products per capita (GDPC) change to a unit change in each of the measures of digital financial services in Nigeria.
- t = time series 1,2,3, …., 34 which is equivalent to fiscal year 2010 - 2024
- μ = residual or error term in the model that account for unexplained variation in the GDP per capita.

Other measures in the equation above are rates / percents, hence, we logged GDPC which is in absolute value to align with other measures in the equation. Also, the logged GDPC is a precaution to avoiding heteroskedasticity issue. The effect is as shown in Equation (2) below.

$$LOGGDPC_t = \beta_0 + \beta_1 ACTP_t + \beta_2 INTS_t + \beta_3 LTRC_t + \beta_4 FSPR_t + \beta_5 TNET_t + \mu_t \text{ ---- Equation (2)}$$

To capture both short-run adjustments and long-run equilibrium, we re-specified our equation into its Error Correction Model (ECM) form which is Equation (3) below to make it possible to test for cointegration and estimate long-run equilibrium relationship.

$$\Delta LOGGDPC_t = \beta_0 + \sum_{i=1}^{m} \beta_1 \Delta LOGGDPC_{t-1} + \sum_{i=1}^{p} \beta_1 \Delta ACTP_{t-i} + \sum_{i=1}^{q} \beta_2 \Delta INTS_{t-I} + \sum_{i=1}^{r} \beta_3 \Delta LTRC_{t-1} + \sum_{i=1}^{s} \beta_4 \Delta FSPR_{t-1} + \sum_{i=1}^{v} \beta_5 \Delta TNET_{t-1} + \Upsilon_1 ACTP_{t-1} + \Upsilon_2 INTS_{t-1} + \Upsilon_3 LTRC_{t-1} + \Upsilon_4 FSPR_{t-1} + \Upsilon_5 TNET_{t-1} + \pi ECT_{t-1} + u_t \text{…….. Equation (3)}$$

Where:

- Δ: represents the first differences (growth rate) and it captures short-run adjustments in GDP per capita and the short-run adjustments in the selected measures of digital financial services (account ownership, interest spread, financial literacy, financial sector's policy and regulation index and internet penetration)
- $LOGGDPC_t$ : The natural log of GDP per capita at time t
- $ACTP_t$: Account ownership at time t
- $INTS_t$: Interest spread (Cost of borrowing) at time t
- $LTRC_t$: Financial literacy at time t
- $FSPR_t$: Financial sector's policy and regulation index at time t
- $TNET_t$: Internet penetration at time t
- $LOGGDPC_{t-1}$, $ACTP_{t-1}$, $INTS_{t-1}$, $LTRC_{t-1}$, $FSPR_{t-1}$, and $TNET_{t-1}$: These are lagged level terms which capture the long-run equilibrium relationship.
- The coefficients $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ represent the short-run adjustment rates.
- The coefficients $\lambda_1, \lambda_2, \lambda_3, \lambda_4, \lambda_5$ : represent the long-run multipliers.
- ECT: the error correction term which represents the rate at which the short-run dynamics corrects itself towards establishing a long-run equilibrium
- $u_t$: the error term of the residual which is presumed to unexplained influences of account ownership, interest spread, financial literacy, financial sector's policy and regulation index and internet penetration, on GDP per capita.

**Measurements of Variables**

**Table 1: Measurements and Source of Variables**

| Variable | Var. Id. | Variable Definition | Unit of Measure | Source of Data |
|---|---|---|---|---|
| GDP per capita | GDPC | Average economic output per person in a country, usually measured by total output divided by total population | International US Dollars per person | World Development Indicators (WDI) database |
| Accounts ownership | ACTP | Proportion of adult (15+ years) with account ownership at a financial institution or with a mobile-money-service provider | Percentage / Proportion of population | World Development Indicators (WDI) database |
| Cost of borrowing - Interest spread | INTS | Net interest due to difference in interest rate a financial institution charges borrowers and the rate it pays depositors | Percentage / Proportion | World Development Indicators (WDI) database |
| Financial Literacy rate | LTRC | Percentage of people aged 15 years and above, who can understandably read and write simple statements and make basic decisions about their daily financial life. | Percentage / Proportion | World Development Indicators (WDI) database |
| Financial sector regulatory index | FSPR | Extent to which a country's financial policy and | Score | World Development |

| | | | | |
|---|---|---|---|---|
| | | institutional framework support sustainable growth and poverty reduction. | | Indicators (WDI) database |
| Internet penetration | TNET | Percentage of population using internet via any platform in a country. | Percentage / Proportion of population | World Development Indicators (WDI) database |

### Estimation Techniques

The study adopted multicollinearity, stationarity and cointegration tests as pre-estimation diagnostic tests and normality, serial correlation, and heteroskedasticity tests were adopted as post-estimation tests. The primary diagnostic estimations were carried out with the aid of Autoregressive Distributed Lag (ARDL) / Error Correction Model (ECM) to test the general hypotheses, including short-run and long-run impacts. Furthermore, we validated the stability of our model and reliability of the estimates by conducting CUSUM and CUMSUMSQ tests.

## DATA ANALYSIS, RESULTS AND DISCUSSION

### Descriptive Statistics

Table 2 below summarises the observed descriptive statistical results we obtained from the analysis of time series data for the selected measures of digital financial services and the proxy for economic growth, GDP per capita. Further insights we derived from these indicators and measures are elaborated in the subsequent part of this subsection.

**Table 2: Descriptive Statistics (Details)**

| | Mean | Maximum | Minimum | Std. Dev. | Skewness | Kurtosis | Jarque-Bera Probability |
|---|---|---|---|---|---|---|---|
| GDPC | 5634.617 | 5985.090 | 5359.520 | 180.6352 | 0.619737 | 2.809753 | 0.611767 |
| ACTP | 41.22667 | 45.60000 | 33.00000 | 3.724910 | -0.4246 | 2.563890 | 0.752174 |
| INTS | 25.16067 | 27.80000 | 21.75000 | 1.792147 | -0.64176 | 2.540916 | 0.559520 |
| LTRC | 69.16067 | 70.41000 | 65.70000 | 1.577541 | -1.08831 | 2.764537 | 0.223612 |
| FSPR | 2.933333 | 3.500000 | 2.500000 | 0.495215 | 0.268547 | 1.146244 | 0.312227 |
| TNET | 26.74667 | 45.50000 | 11.50000 | 9.893134 | 0.230690 | 2.146271 | 0.745061 |

**Source: Author's computation (2025).** Where: GDPC = GDP per capita; ACTP = Accounts ownership; INTS = Cost of borrowing /credit - Interest spread; LTRC = Financial Literacy rate; FSPR = Financial sector's policies and regulation index; TNET = Internet penetration

The descriptive statistical results in Table 2 above shows that Nigeria reported an average of $5634.62 gross domestic product per capita (GDPC) over 15-year period (2010 – 2024) and with a standard deviation of $180.64 which indicates relatively low variability across the 15 years. The skewness (0.62) reflects a positively tilted distribution which suggests a slight concentration of values below the mean with a few higher values pulling the distribution rightward. Similarly, the kurtosis (2.81) is close to 3.0 which is the normal distribution benchmark and a reflection of moderation in the peakiness. The Jarque-Bera's probability (0.61) in Table 4.2 above validates the normality of the GDPC's residuals over the study's time, which indicate a regular pattern.

The relatively stable GDPC aligns with the idea that long-run growth depends on investments in human capital, innovation, and financial development (Romer, 1990). Theories by Schumpeter (1911) and the empirical work (Levine, 1997) argue that financial services facilitate capital allocation and innovation, hence, translating to stability or increase in GDP per capita. The presence of account ownership (ACTP) and financial sector regulation (FSPR) in the dataset directly ties to this channel. According to the World Bank (2025), the observed maximum GDPC ($5,985.09) coincides with periods of high global oil prices, given Nigeria's dependence on oil exports. Conversely, the minimum ($5,359.52) reflects downturns during oil price collapses.

Residuals of all measures of digital financial measures adopted for the study are normally distributed as evidenced by the Jarque Berra's probabilities reported in the table above (P > 0.05). Despite that the maximum account ownership rate hovers around 46%, there are still concerns because the metric is below the global averages of over 60% for developing economies (World Bank, 2024). Nigeria's interest spread averaged 25% from 2010-2024, which indicates that digital financial services are costly for borrowers since interest spread represents the net interest which is the difference between interest on borrowing and interest on savings. The interest spread's skewness of -0.64 indicates a mild concentration of cost of borrowing above the average cost of 25%, implying that there are instances where interest spread reaches a maximum of about 28%. The average rate of 69% suggests that nearly seven out of ten Nigerian adults possess basic financial literacy no matter how "crud"e the financial knowledge may sound. However, the modest variability (standard deviation) of 1.58 implies that improvements were incremental rather than transformative between 2010 - 2024. Table 2 indicates that Nigeria recorded an average index score of 2.9 with a maximum and minimum score of 3.5 and 2.5 respectively. Disturbingly, the mean score of 2.9 regulatory index for financial sector is dwarfed by Sub-Saharan Africa (SSA)'s mid-range of 3.0 – 4.0 and World Bank's average governance and financial regulatory quality of 3.5 – 4.5 for developing economies (Absa & OMFIF, 2025; Akinbowale et al. 2025). Finally, the Table above shows that only about 27% of the Nigeria population have access to internet via any platform with a noticeable range of 34% considering that certain periods reported internet penetration rate up to 46% while some years experienced disturbing internet penetration as low as 12% of the population.

**Correlation Matrix and Multicollinearity Results**

The correlation and Variance Inflation Factor (VIF) results in Table 3 below indicate that there is no serious concern of redundant variables in the selected measures of digital financial services such as account ownership (ACTP), interest spread (INTS), financial literacy (LTRC), financial sector's policy and regulations index (FSPR) and internet penetration TNET). According to Gujarati and Porter (2009), a pairwise correlation below 0.9 is generally acceptable for model estimation especially in economic and financial data where relationships are often moderately correlated due to shared macro factor. Therefore, for instance, the ACTP's correlation score of 0.7 and 0.6 with LTRC and TNET should not connote multicollinearity issue. This presumption is validated by VIF and Tolerance which are lower than 5 (for moderate collinearity), lower than 10 (for severe/high collinearity) and greater than 0.1 respectively (Wooldridge, 2016).

**Table 3: Correlation Matrix and Variance Inflation Factor Results**

| | ACTP | FSPR | INTS | LTRC | TNET | VIF | Tolerance |
|---|---|---|---|---|---|---|---|
| ACTP | 1.000000 | | | | | 2.43315 | 0.4 |
| FSPR | -0.38813 | 1.000000 | | | | 4.107272 | 0.2 |
| INTS | -0.08707 | 0.286171 | 1.000000 | | | 1.349251 | 0.7 |
| LTRC | 0.716749 | -0.83151 | -0.30307 | 1.000000 | | 4.766699 | 0.2 |
| TNET | 0.626981 | -0.84275 | -0.45727 | 0.866084 | 1.000000 | 6.064703 | 0.2 |
| Average Variance Inflation Factor (VIF) | | | | | | 3.744215 | |

**Source: Author's computation (2025).** Where**:** ACTP = Accounts ownership; INTS = Cost of borrowing /credit - Interest spread; LTRC = Financial Literacy rate; FSPR = Financial sector's policies and regulation index; TNET = Internet penetration

## Pre-estimation Tests

### *Stationarity Test Results*

Table 4 below summarises the integration order at which each indicator of inclusive development and measure of digital financial services are stationary. In line with the conclusion of Pesaran et al. (2001) and Ogboi et al. (2023), the table shows that Autoregressive Distributed Lag (ARDL) is suitable for our research indicators and measures are stationary at integration order of zero, *I(0)*, or order one, *I(1)*.

**Table 4: Summary of Stationarity**

| Indicators | Order of Stationarity |
|---|---|
| LOGGDPC | I(1) |
| ACTP | I(1) |
| INTS | I(1) |
| FSPR | I(1) |
| LTRC | I(0) |
| TNET | I(0) |

**Source: Author's computation (2025).** Where**:** LOGGDPC = Natural log of GDP per capita; ACTP = Accounts ownership; INTS = Cost of borrowing /credit - Interest spread; LTRC = Financial Literacy rate; FSPR = Financial sector's policies and regulation index; TNET = Internet penetration

Table 4 above is an extract from the details statistical results which represent unit root tests at level *I(0)* and first difference *I(1)*.

**Table 4a: Details Results of Unit Root Test at Level**

| Augmented Dickey-Fuller (ADF) | | | | Philip-Perron (PP) | | | |
|---|---|---|---|---|---|---|---|
| Level | | | | Level | | | |
| | None | Intercept | Trend and Intercept | None | Intercept | Trend and Intercept | I(0) or I(1) |
| LOGGDPC | 0.552475 | -2.313203 | -2.506837 | 0.461258 | -2.004041 | -2.110114 | |
| ACTP | 1.101627 | -2.37569 | -2.322952 | 1.101627 | -2.37569 | -2.322952 | |
| INTS | -0.562183 | -1.604217 | -2.06694 | -0.598796 | -1.604217 | -2.120421 | |
| FSPR | -1.616282* | -1.366937 | -2.30924 | -1.616282* | -0.866872 | -1.536756 | |
| LTRC | 0.032056 | -7.387086*** | -1.669508 | 2.32179 | -6.505482*** | -1.615095 | I(0) |
| TNET | 6.513281 | -2.779829* | -3.884568** | 4.787951 | -2.660292 | -8.791812*** | I(0) |

**Note**: **"*"**, **"**"** and **"***"** are probability values at 10%, 5% and 1% respectively, **Source: Author's computation (2025).** Where**:** LOGGDPC = Natural log of GDP per capita; ACTP = Accounts ownership; INTS = Cost of borrowing /credit - Interest spread; LTRC = Financial Literacy rate; FSPR = Financial sector's policies and regulation index; TNET = Internet penetration.

**Table 4b: Details Results of Unit Root Test at First Difference**

| Augmented Dickey-Fuller (ADF) | | | | Philip-Perron (PP) | | | |
|---|---|---|---|---|---|---|---|
| First Difference | | | | First Difference | | | |
| | None | Intercept | Trend and Intercept | None | Intercept | Trend and Intercept | I(0) or I(1) |
| LOGGDPC | -2.426296** | -2.332151 | -2.154096 | -2.320302** | -2.21385 | -2.104957 | I(1) |
| ACTP | -2.935205*** | -2.902363* | -2.287783 | -3.119904*** | -3.113762* | -2.760892 | I(1) |
| INTS | -3.880299*** | -3.823603** | -3.906363** | -3.883306*** | -3.849053** | -3.929262** | I(1) |
| FSPR | -2.000000** | -2.598076 | -2.557857 | -1.953043** | -1.97511 | -1.784973 | I(1) |
| LTRC | -1.835602* | -1.217934 | -2.281483 | -2.019588** | -1.141652 | -2.281483 | I(1) |
| TNET | -1.090084 | -2.371662 | -1.401109 | -1.057004 | -2.799933* | 0.931085 | |

**Note**: **"*"**, **"**"** and **"***"** are probability values at 10%, 5% and 1% respectively, **Source: Author's computation (2025).** Where**:** LOGGDPC = Natural log of GDP per capita; ACTP = Accounts ownership; INTS = Cost of borrowing /credit - Interest spread; LTRC = Financial Literacy rate; FSPR = Financial sector's policies and regulation index; TNET = Internet penetration.

To enhance robustness of the stationarity tests, we adopted both Augmented Dickey Fuller (ADF) and Pillips-Perron tests across all variables as shown in Table 4a and Table 4b below.

**Cointegration Test**

The unit root results in the previous sub-section validate that the Autoregressive Distributed Lag (ARDL) estimation technique is appropriate for this study. It is however, imperative for us to check for long-run relationships among the indicators and measures, with expectation that any short-run dynamic should adjust to its long-run equilibrium within a reasonable period of time. Table 5 below summarises the result of cointegration tests we carried out on the GDPC model.

**Table 5: Results of Cointegration / Bound Test**

| Test Statistic | F-stat | K | I(0) Bound | I(1) Bound |
|---|---|---|---|---|
| F-stat | 6.776205 | 5 | 2.39 | 3.38 |

Note: Critical value (α=0.05), Source: Author's computation (2025)

We conducted the Bound test's null hypothesis ($H_0$: No cointegration) to verify existence of long-relationship for GDPC ARDL model by examining the F-statistic against the Upper Bound, I*(1)*. As shown, in Table 5 above, the reported F-statistics (F = 6.78) which is greater that the respective Upper Bound, I*(1)*.

**Table 6: Error Correction Model (ECM) Regression Results**

| Test Statistic | ECT | Prob. | Sig. Level (α) |
|---|---|---|---|
| F-stat | -0.947679 | 0.0002 | 0.05 |

Note: Critical value (α=0.05), Source: Author's computation (2025). Where ECT = Error Correction Term

Therefore, we rejected the null hypothesis of no cointegration and concluded that there is existence of long-run relationship in the model. Further to confirmation of existence

of long-run relationship in the models, we estimated the Error Correction Model (ECM) regression. We aimed to analyse the short-run dynamics and evaluate the speed of adjustment of the short-run shocks to the long run equilibrium in the GDPC model. Table 6 below shows the speed of adjustment to equilibrium for the ARDL model.

In Table 6 above, the significance ($p < 0.05$) and negative signs of the error correction term (ECT = ~95%) suggests that deviations from long-run equilibrium caused by the short-run dynamics are corrected over time which confirms cointegration between the measures of digital financial services and economic growth. This statistic shows that about 95% of the short-run dynamics within a period (year) in the GDPC's ARDL model are adjusted to its long-run equilibrium within the following period (year).

**Estimation Results the GDPC Model**

**Table 7: Estimation Results for GDP per capita (GDPC)**

| **Dependent Variable: LOGGDPC** | | | | |
|---|---|---|---|---|
| **Panel I: Short Run Estimates (ECM Regression)** | | | | |
| **Variable** | **Coefficient** | **Std. Error** | **t-Statistic** | **Prob.** |
| D(ACTP) | 0.002368 | 0.000803 | 2.948562 | 0.0319 |
| D(TNET) | 0.004240 | 0.000844 | 5.024187 | 0.0040 |
| ECT | -0.947679 | 0.092770 | -10.21536 | 0.0002 |
| | | | | |
| **Panel II: Long-run Estimates** | | | | |
| **Variable** | **Coefficient** | **Std. Error** | **t-Statistic** | **Prob.** |
| ACTP | 0.010694 | 0.003549 | 3.013081 | 0.0297 |
| FSPR | -0.007136 | 0.020880 | -0.341768 | 0.7464 |
| INTS | -0.005324 | 0.002508 | -2.122698 | 0.0872 |
| LTRC | 0.018734 | 0.007302 | 2.565491 | 0.0503 |
| TNET | -0.007443 | 0.001639 | -4.539973 | 0.0062 |
| C | 7.232767 | 0.401069 | 18.03371 | 0.0000 |
| | | | | |
| **Panel III: Evaluation Tests** | | **Statistics** | | **Prob** |
| R-squared | | 0.851639 | | N/A |
| Adjusted R-squared | | 0.824261 | | N/A |
| F-statistic | | 12.29863 | | 0.006685 |
| | | | | |
| ***Panel IV: Post Estimation Diagnostics Test*** | | **Statistics** | | **Prob** |
| Serial Correlation LM Test | | 4.667531 | | 0.0968 |
| Heteroskedasticity Test (BPG) | | 0.402260 | | 0.8789 |
| Heteroskedasticity Test (ARCH) | | 0.039993 | | 0.8451 |
| Heteroskedasticity Test (White) | | 0.403541 | | 0.8781 |
| Normality Test | | 0.663623 | | 0.717623 |
| Stability Test | Refer to CUMSUM/CUMSUMSQ Graph | | | |

**Source: Author's computation (2025).** Where**:** LOGGDPC = Natural log of GDP per capita; ACTP = Accounts ownership; INTS = Cost of borrowing /credit - Interest spread; LTRC = Financial Literacy rate; FSPR = Financial sector's policies and regulation index; TNET = Internet penetration.

**Short Run Estimates (ECM Regression) and Long-run Estimates (Panel I & Panel II)**

The short-run estimates indicate that only account ownership ($p = 0.0319$) and internet penetration ($p = 0.0040$) significantly enhance GDP per capita (GDPC). Both measures also

show significant long-run effects (p = 0.0297 and p = 0.0062, respectively). Other long-run indicators; financial literacy (p = 0.0503), interest spread (p = 0.0872), and financial sector regulation (p = 0.7464) exert statistically insignificant impacts. Coefficient results reveal that a 1% increase in account ownership raises GDP per capita by 0.002% in the short run and 0.01% in the long run. Internet penetration increases GDP per capita by 0.004% in the short run but reduces it by 0.007% in the long run. Interest spread carries a negative coefficient (-0.005324), suggesting that a 1% increase slows growth by 0.005% in the long-run, though insignificantly. Financial literacy contributes a 0.02% increase in GDP per capita, but the effect is statistically insignificant. Regulation effectiveness shows a decline of 0.007% in GDP per capita, which is also statistically insignificant. Overall, account ownership and internet penetration emerge as the most influential drivers of economic growth in both short- and long-run models. The error correction term (-0.947679, p = 0.0002) is negative and highly significant, indicating rapid adjustment of short-run dynamics toward long-run equilibrium.

**Model Evaluation (Panel III)**

The evaluation statistics of the GDPC model in Panel III of Table 7 above demonstrate that digital financial services variables collectively explain a substantial proportion of economic growth in Nigeria. With an R-squared of 0.85 and an adjusted R-squared of 0.82, the GDP per capita model exhibits strong explanatory power, and it indicates that the digital financial service measures account for most of the variation in GDP per capita. The significant F-statistic (F = 12.30, p = 0.006685) further confirms that these measures jointly exert a statistically significant influence on economic growth. Therefore, we reject the null hypothesis ($H_0$1) that there is no significant effect of digital financial services on economic growth in Nigeria.

**Post Estimation Diagnostics Test Results (Panel IV)**

The post-estimation diagnostic results in Table 7 above validate the reliability of the model considering the p-values for the test results. We fail to reject the null hypothesis of no serial correlation in the GDP per capital (GDPC) model's residuals since the Serial Correlation LM Test (F = 4.667531, p = 0.0968) has a p-value > 0.05. Based on Heteroskedasticity Tests (Breusch-Pagan-Godfrey, F = 0.40226, p = 0.8789; ARCH, F = 0.039993, p = 0.8451; and White, F = 0.403541, p = 0.8781), the results imply that there is no evidence of heteroskedasticity, hence, the model residuals have constant variance across the study time. We fail to reject the null hypothesis that the residuals in the model are normally distributed as evidenced in the Jarque-Bera's Normality Test result (F = 0.663623, p = 0.717623).

**Panel IV – Stability Diagnostics**

We further assess the structural stability of the GDPC model over the study's time by conducting CUMSUM stability test. Figure 1 below reflects the plots of the cumulative sum of recursive residuals against the 5% significance boundaries. The CUSUM (blue) line remains within the critical bounds (the two dotted red lines) throughout the study's period,

therefore, we conclude that there are no significant structural breaks in the regression coefficients.

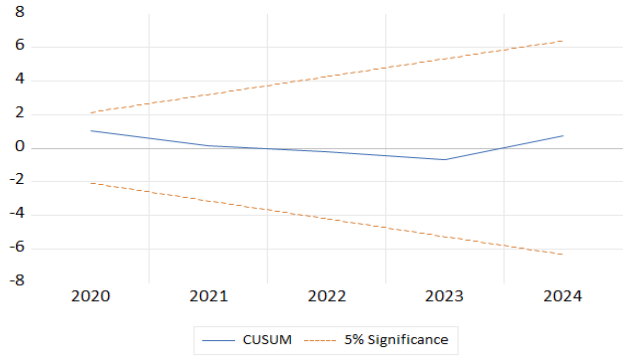


**Figure 1: CUMSUM Stability Test for GDPC Model**

Source: Author's computation (2025)

## DISCUSSION OF FINDINGS

The study revealed that digital financial services (DFS) significantly affect GDP per capita in Nigeria (Adj. $R^2$ = 0.82, F = 12.30, $p < 0.05$), confirming DFS measures' role as important drivers of economic growth. In the short run, account ownership (ACTP) and internet penetration (TNET) exert positive and statistically significant effects, showing that broader financial access and digital connectivity immediately stimulate economic activity. These findings align with earlier evidence that financial access mobilizes savings, facilitates investment, and drives growth (Babajide et al., 2015; Demirgüç-Kunt et al., 2018; Obayori & George-Anokwuru, 2020). The error correction term (ECT = -0.95, $p < 0.05$) is negative and statistically significant, which indicates rapid adjustment of short-run shocks toward long-run equilibrium.

In the long-run, account ownership continues to positively and significantly influence GDP per capita, while financial literacy (LTRC) shows a positive but statistically insignificant effect. Interest spread (INTS) exerts a negative, though insignificant impact, which suggests that high borrowing costs constrain growth. Unexpectedly, internet penetration turns negative and significant in the long-run, implying that while connectivity boosts economic growth initially, its long-term effect may be undermined by inefficiencies or structural imbalances in Nigeria's financial system. This divergence resonates with studies highlighting how persistent inefficiencies in financial markets can hinder growth (Greenwood & Jovanovic, 1990; Cornelli et al., 2023; Ogbebor et al., 2023). Regulatory effectiveness (FSPR) also shows no meaningful influence on GDP per capita, reflecting weak policy transmission mechanisms.

The overall findings emphasize account ownership and internet penetration as the most influential drivers of economic growth, with financial literacy playing a supportive role. The negative long-run effect of internet penetration underscores the need for complementary policies to ensure digital connectivity translates into productive outcomes. This aligns with arguments that DFS alone cannot guarantee growth but must be integrated into broader development strategies to address structural inequities and governance challenges (Ababio et al., 2024; Edet et al., 2025). The results also resonate with Human Development Theory (Becker, 1964; Becker, 1993), which highlights the role of financial

tools and knowledge in enhancing productivity, and with UTAUT (Venkatesh et al., 2003), which explains how innovation dynamics and infrastructure shape technology's impact on growth.

## SUMMARY AND RECOMMENDATIONS

The study revealed that digital financial service measures have a collective and statistically significant effect on GDP per capita (GDPC) (Adj. $R^2 = 0.82$, F-statistic = 12.30, $p < 0.05$). In the short run, account ownership (ACTP) ($p = 0.0319$) and internet penetration (TNET) ($p = 0.0040$) significantly and positively enhanced GDP per capita, while interest spread (INTS) exerted a negative but insignificant effect. In the long run, account ownership (ACTP) ($p = 0.0297$) and financial literacy (LTRC) ($p = 0.0503$) retained positive effects but with statistically significant and insignificant effect respectively, while interest spread (INTS) ($p = 0.0872$) exerted a negative and insignificant impact in the long run. Internet penetration (TNET) showed a significant positive and negative effect ($p = 0.0040$ and $p = 0.0062$), in the short run and long run respectively.

The study concluded that DFS significantly influence GDP per capita. Account ownership (ACTP) and financial literacy (LTRC) emerged as positive drivers of growth, while interest spread (INTS) and internet penetration (TNET) exerted adverse long-run effects. These findings highlight that while DFS can enhance growth, structural challenges in credit markets and digital infrastructure may constrain their full potential.

We recommended expansion of internet infrastructure and digital connectivity because internet penetration (TNET) was found to improve GDP per capita (in the short run). However, its negative long-run effect on GDP per capita highlights the need for complementary policies that ensure connectivity translates into productive economic activities. Affordable internet access, particularly in rural and semi-urban areas, should be combined with digital and financial skills training to ensure households and businesses can leverage connectivity for sustainable income growth and welfare improvements. Also, the study recommended deepening account usage beyond access since Account ownership (ACTP) significantly boosts GDP per capita. Therefore, policies should move beyond expanding access to accounts and focus on deepening usage through digital platforms. This includes promoting affordable credit, savings mobilization, micro-insurance, and health financing products tailored to low-income households and marginalized groups. Such measures will ensure that account ownership translates into meaningful financial participation and inclusive economic growth. High interest spread (INTS) constrains economic growth, hence, the findings underscore the need for regulatory reforms that promote healthy competition among financial intermediators, reduce borrowing costs, and enhance financial sector efficiency. Lower interest spreads will improve access to affordable credit, supporting both economic productivity and welfare outcomes. Regulatory frameworks should also prioritize consumer protection, cybersecurity, and trust in digital financial platforms to encourage adoption and sustained usage.

**A Contribution/Originality statement**: The study contributes to the existing literature by exploring the impacts of digital financial services using multiple measures, on economic growth. The insights from the study shows that context and other country-specific structural imbalance can inhibit economic growth-potential of digital financial services.

## REFERENCES

Absa Group & OMFIF. (2025). Africa Financial Markets Index 2025. Absa Corporate and Investment Banking.

Adeleye, N., & Eboagu, C. (2019). Digital finance, financial inclusion and inclusive growth in Nigeria. Journal of Economic Policy Reform, 22(2), 101–118. https://doi.org/10.1080/17487870.2018.1495353

Abdullahi, A. S., Ladan, A., Yusuf, A., & Salisu, M. (2025). Financial technology and financial inclusion: The role of financial literacy. International Journal of Financial Research and Business Development, 7(7). https://doi.org/10.70382/mejfrbd.v7i7.012

Abdullahi, A., Musa, I., & Bello, S. (2025). Digital financial services and inclusive development: Evidence from Sub-Saharan Africa. Journal of Development Economics and Policy Studies, 12(2), 145–162.

Agyekum, F., Locke, S., & Hewa-Wellalage, N. (2016). Financial inclusion and digital financial services: Empirical evidence from Ghana. MPRA Paper No. 82885. https://mpra.ub.uni-muenchen.de/82885/

Akinbowale, O. E., Zerihun, M. F., & Mashigo, P. (2025). Banking and financial regulation in Sub-Saharan Africa: A systematic literature review. Journal of Financial Regulation and Compliance, 33(3), 359–385. https://doi.org/10.1108/JFRC-09-2024-0170

Alemu, M. D. (2024). Financial technology (FinTech), artificial intelligence (AI), ICT, institutional quality, and financial sector development: International evidence. https://doi.org/10.21203/rs.3.rs-5712330/v1

Aluko, O. A., Odewale, A. T., Taiwo, K., & Adefeso, H. (2024). Unlocking inclusive growth and sustainable development in Nigeria: A roadmap through challenges and opportunities. African Journal of Applied Research, 10(1).

Atanda, M. S., & Ogboi, C. (2014). Inward remittances and economic growth in Sub-Saharan African countries: Application of panel cointegration approach. Research Journal of Finance and Accounting, 5(9), 345–357. International Institute for Science, Technology & Education (IISTE).

Ben-Abdallah, A., Becha, H., Kalai, M., & Helali, K. (2023). Does digital financial inclusion affect economic growth? New insights from MENA region. In R. Jallouli et al. (Eds.), Digital Economy: Emerging Technologies and Business Innovation. Lecture Notes in Business Information Processing, 485, 195–221. Springer. https://doi.org/10.1007/978-3-031-42788-6_13

Central Bank of Nigeria. (2022). Digital financial services awareness guidelines (Exposure Draft). https://www.cbn.gov.ng/Out/2022/CCD/DFS%20Awareness%20Guidelines%20Exposure%20draft%5b6802%5d.pdf

Central Bank of Nigeria (CBN). (2022). Financial inclusion strategy documents. https://www.cbn.gov.ng/FinInc/

Chukwu, K. O., Akunna, R. C., & Anaike, C. L. (2024). Financial technology and economic development of Nigeria. African Banking and Finance Review Journal (ABFRJ), 10(10), 117-134. https://www.abfrjournal.com/index.php/abfr/article/view/165

Cornelli, G., Frost, J., Gambacorta, L., Rau, P.R., Wardrop, R., & Ziegler, T. (2023). Fintech and big tech credit: drivers of the growth of digital lending. Journal of Banking and Finance, 148,1-14. https://doi.org/10.1016/j.jbankfin.2022.106742"

Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.). SAGE Publications.

Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2018). The Global Findex Database 2017: Measuring financial inclusion and the fintech revolution. Washington, DC: World Bank.

Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2020). The Global Findex Database 2017: Measuring financial inclusion and the fintech revolution. Washington, DC: World Bank.

Doku, J. N., Iddrisu, K., Bortey, D. N. A. S., & Ladime, J. (2023). Impact of digital financial technology on financial inclusion in Sub-Saharan Africa: The moderation role of institutional quality. African Finance Journal, 25(2), 31–45. https://www.researchgate.net/publication/380069569_Impact_of_Digital_Financial_Technology_on_Financial_Inclusion_in_Sub-Saharan_Africa_The_moderation_Role_of_Institutional_quality

Gupta, J., & Vegelin, C. (2016). Sustainable development goals and inclusive development. International Environmental Agreements: Politics, Law and Economics, 16, 433–448. https://doi.org/10.1007/s10784-016-9323-z

International Monetary Fund. (2023). Financial Access Survey. https://data.imf.org/FAS

International Monetary Fund. (2023). Financial Sector Assessment Program (FSAP) reports. IMF. https://www.imf.org/en/Publications/FSAP

Kanga, D., Oughton, C., Harris, L., & Murinde, V. (2022). The diffusion of fintech, financial inclusion and income per capita. The European Journal of Finance, 28(1), 108-136. https://doi.org/10.1080/1351847X.2021.1945646

Klapper, L., Singer, D., Starita, L., & Norris, A. (2025). The global FINDEX database 2025: Connectivity and financial inclusion in the digital economy. The World Bank Group. https://hdl.handle.net/10986/43438

Koefer, F., Bokkens, A., Preziuso, M., & Ehrenhard, M. (2024). Addressing financial and digital literacy challenges for inclusive finance: Insights from microfinance institutions and FinTech organisations. EIF Working Paper Series, 2024/97. European Investment Fund.

Levine, R. (1997). Financial development and economic growth: Views and agenda. Journal of Economic Literature, 35(2), 688–726.

Mashrur, F. A. (2024). Role of digital financial inclusion on economic growth: Evidence from South Asian countries. International Journal of Economics, Business and Management Research, 8(12), 91–101. https://doi.org/10.51505/IJEBMR.2024.81207

Nguyen, T. T. (2021). Measuring financial inclusion: a composite FI index for the developing countries. Journal of Economics and Development, 23(1): 77–99. https://doi.org/10.1108/JED-03-2020-0027

Ogbebor, P. I., & Siyanbola, T. T. (2018). Financial development and economic nexus in Nigeria: The role of the stock market. International Journal of Business and Social Science, 9(1), 120–131.

Ogbebor, P. I., Awonuga, A. R., & Oladapo-Dixon, I. (2023). Liberalization and economic growth in Nigeria. WSEAS Transactions on Business and Economics, 20, 1–12.

Ozili, P. K. (2021). Financial inclusion: Globally important determinants. Financial Internet Quarterly, 17(4), 1–11. https://doi.org/10.2478/fiqf-2021-0023

Panos, G. A., & Wilson, J. O. S. (2020). Financial literacy and responsible finance in the FinTech era: capabilities and challenges. European Journal of Finance, 26(4–5), 297–301. https://www.scopus.com/pages/publications/85079427405

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 16(3), 289–326. https://doi.org/10.1002/jae.616

Romer, P. M. (1990). Endogenous technological change. Journal of Political Economy, 98(5), S71–S102. https://doi.org/10.1086/261725

Sarpong, B., & Nketiah-Amponsah, E. (2022). Financial inclusion and inclusive growth in sub-Saharan Africa. Cogent Economics & Finance, 10(1), 2058734. https://doi.org/10.1080/23322039.2022.2058734

Schumpeter, J. A. (1911). The theory of economic development. Cambridge, MA: Harvard University Press.

Sen, A. (1999). Development as freedom. Oxford University Press

Suri, T., & Jack, W. (2016). The long-run poverty and gender impacts of mobile money. Science, 354(6317), 1288–1292. https://doi.org/10.1126/science.aah5309

Tay, L. Y., Tai, H. T., & Tan, G. S. (2022). Digital financial inclusion: A gateway to sustainable development. Heliyon, 8(6), e09766. https://doi.org/10.1016/j.heliyon.2022.e09766

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 27(3), 425–478. https://doi.org/10.2307/30036540

Voptia, E., & Stukalina, Y. (2024). Financial inclusion in Sub-Saharan Africa: The case of mobile money. Ekonomika, 103(4), 81–96. https://doi.org/10.15388/Ekon.2024.103.4.5

Wale-Awe, O. I., & Evans, O. (2023). Financial inclusion through digital channels and the growth-inequality-poverty triangle: Evidence from Africa. Nigerian Journal of Banking and Financial Issues, 9(2), 53–68.

Wezel, T. & Ree, J. (2023). Nigeria - Fostering financial inclusion through digital financial services. International Monetary Fund.

Wooldridge, J. M. (2016). Introductory econometrics: A modern approach (6th ed.). Cengage Learning.

World Bank. (2023). Nigeria economic update: Seizing the opportunity for reforms. Washington, DC: World Bank Publications

World Bank. (2024). World Development Indicators. World Bank Group. https://databank.worldbank.org/source/world-development-indicators

World Bank. (2025). Gross national income (GNI) per capita. https://data.worldbank.org/indicator/NY.GNP.PCAP.CD6

Yunusa, H., Tsauni, A. M., & Abubakar, F. H. (2022). Analysis of the impact of human capital on inclusive growth in Nigeria: An ARDL approach. IOSR Journal of Humanities and Social Science, 27(12), 60–71.