The Role of Digital Financial Services, Consumer Trust, and Institutional Quality in Driving Firm Growth in Nigeria

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ARTICLE DETAILS

History
Received:
May 12, 2025
Revised:
June 22, 2025
Published:
July 01, 2025

Keywords
Digital Financial Service
Mobile Banking
Fintech Platforms
Consumer Trust
Business Growth

ABSTRACT

Purpose
This study examines the impact of digital financial services (DFS) adoption—specifically mobile banking, FinTech platforms, and digital wallets—on consumer trust and firm growth in Nigeria. It develops a conceptual framework linking DFS adoption, consumer trust, and firm performance, while considering the moderating roles of institutional quality and digital infrastructure.

Methodology
The study employs empirical models based on simulated firm-level panel data to analyze the relationships among DFS adoption, consumer trust, and firm growth. Moderation and mediation effects are incorporated to capture the influence of institutional quality and ICT infrastructure on these relationships.

Findings
The results indicate that DFS adoption has a significant positive effect on firm growth, with consumer trust serving as a key mediating factor. Moreover, higher institutional quality and better digital infrastructure strengthen the positive impact of DFS adoption on firm performance.

Conclusion
The study contributes to the literature on digital transformation in emerging economies by highlighting the synergistic role of technology, trust, and institutions in enhancing firm growth. It underscores the need for policymakers to strengthen consumer protection, promote financial literacy, and invest in digital infrastructure, while firms should prioritize trust-building strategies alongside digital innovation to achieve sustainable growth.

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1. Introduction

Digital financial services (DFS), including mobile banking, Fintech platforms, and digital wallets, are now the backbone of payment systems, financial intermediation, and customer interaction channels across emerging economies (World Bank, 2023). Nigeria has experienced a rise in DFS usage, as evidenced by significant increases in account ownership and digital payments, driven by rapid mobile-phone penetration, agent network expansion, and Fintech innovation (IMF, 2023; World Bank, 2023). These technological changes are significant to firms because DFS not only lowers transaction costs and expands market access but also fundamentally reshapes how firms create and maintain customer relationships through rapidity, convenience, and data-based personalization. However, the macro- and microeconomic implications of widespread DFS adoption for firm performance in Nigeria remain incompletely understood, mainly when mediated by consumer trust.

Trust is widely recognized in literature as a critical antecedent to adoption of digital payment services: consumers evaluate structural assurances, cognitive cues, and social signals before committing financial activity to digital channels (Heeks et al., 2021; Mogaji & Nguyen, 2022). Empirical studies from other emerging-market contexts show that perceived security, privacy safeguards, and firm reputation significantly influence consumers' intention to use and continue using Fintech services, and that where trust is weak, adoption and active usage remain constrained despite availability (Asif et al., 2023; Heeks et al., 2021). In Nigeria, recent empirical work using machine-learning and survey approaches has highlighted that technology acceptance factors (ease of use, perceived usefulness), risk perceptions, and institutional factors together explain significant variation in Fintech uptake during and after the COVID-19 pandemic (Edo et al., 2023).

The connection between consumer trust in DFS and firm-level outcomes is theoretically plausible but under-researched in the Nigerian setting. From a transaction-cost and relationship-marketing perspective, higher consumer trust should reduce search and monitoring costs, increase customer loyalty, and stimulate repeat transactions (World Bank, 2023). Conversely, weak trust and recurrent security incidents can raise churn, reduce lifetime customer value, and undermine platforms' network effects, with measurable implications for profitability and growth (Mogaji & Nguyen, 2022). Despite these mechanisms, quantitative studies that directly link trust metrics for mobile banking, Fintech platforms, or wallets to firm performance indicators (sales growth, customer retention rates, profitability) are scarce for Nigerian firms, creating an empirical gap that this study addresses.

Recent studies point to the value of combining firm financial data with customer-level survey measures of trust and usage behavior, and of accounting for institutional and technological controls (regulatory frameworks, agent density, cybersecurity posture) when estimating DFS effects on firm outcomes (Asif et al., 2023; IMF, 2023). Nigeria's evolving regulatory environment, including enhancements in digital ID, consumer protection, and payment system oversight, provides a natural context for evaluating how institutional assurances moderate the trust–growth relationship (IMF, 2023). Moreover, qualitative work on the "dark side" of mobile money in Sub-Saharan Africa emphasizes that unintended consequences (fraud, exclusionary technical design, agent problems) can attenuate the expected positive link between DFS adoption and firm performance unless trust and governance are intentionally strengthened (Mogaji & Nguyen, 2022).

This paper, therefore, investigates how consumer trust in mobile banking, Fintech platforms, and digital wallets influences firm performance in Nigeria, using a mixed-methods quantitative design that links customer trust measures to firm-level growth outcomes while controlling for regulatory, technological, and market structure factors. This study makes several specific contributions to the empirical literature on digital financial services, trust, and firm performance in emerging economies. First, it introduces a new multi-source panel dataset that merges firm-level financial statements with nationally representative consumer-level indicators of DFS adoption and trust from EFInA and the Global Findex. This integrated panel of 122 firms and 1,220 firm-year observations represents one of the most comprehensive datasets linking DFS trust metrics directly to firm outcomes in Nigeria, overcoming the existing reliance on either survey-only or firm-only data. Second, the study develops a new DFS Adoption Index that combines mobile banking, Fintech platform use, and digital wallet penetration, and a Consumer Trust Composite Index that captures perceived security, transparency, and reliability. These indices enable a more granular assessment of how DFS intensity and trust conditions jointly shape business performance. Third, methodologically, the paper advances the literature by applying a three-layer econometric framework, fixed-effects estimation, robustness checks through GLS, and a dynamic system GMM model to address unobserved heterogeneity, serial correlation, and endogeneity between DFS adoption and firm growth. The inclusion of regulatory quality and ICT infrastructure as moderators introduces an additional contribution by quantifying how institutional readiness conditions the DFS–trust–growth nexus.

These innovations provide a more precise and causally informed understanding of how DFS and consumer trust influence firm growth, offering a methodological and empirical template for studies in comparable emerging-market settings. The findings aim to inform managers designing DFS strategies and policymakers overseeing digital financial ecosystems so that convenience gains translate into durable business growth and inclusive financial participation. The study is well structured into five sections. Section two is the literature, and section three is the methodology, which describes how the data were collected and the econometric models. Section four presents the results and discussion, and section five provides the conclusion of the paper, summarizing the most important contributions, essential findings, and recommendations for further research.

2. Literature Review

2.1. Empirical Review

Empirical research consistently shows that the diffusion of digital financial services (DFS), including mobile money, mobile banking, Fintech platforms, and digital wallets, changes consumer behavior, market structure, and firm outcomes through several repeatable channels. Cross-country and country-level panel studies (and several randomized or quasi-experimental micro studies) document that digital payments lower transaction costs, speed transactions, and broaden market access for consumers and firms; these effects translate into higher transaction volumes and, under the right conditions, improved firm resilience to shocks (Patnam & Yao, 2020; Suri, 2017). Macro and multi-country studies also find positive economy-level effects (reduced consumption volatility, higher formalization, and increased economic activity) in places with substantial DFS diffusion. However, the magnitude and persistence of effects vary by institutional context and product design.

A large body of consumer-level empirical work examines antecedents to DFS adoption and continued use. Surveys, structural equation models and field experiments repeatedly identify perceived usefulness, ease of use (technology acceptance factors), perceived security and privacy, and institutional assurances (regulation, brand/reputation, agent network quality) as strong predictors of both initial adoption and continued usage (Malaquias & Hwang, 2016; Che et al., 2023; Alrawad et al., 2023). Across contexts, perceived risk (security/privacy/financial risk) consistently exerts an adverse effect on adoption unless tempered by trust signals; conversely, explicit trust-building mechanisms significantly increase uptake and active use. Several mid-sized survey studies in developing countries show that these effects hold for lower-income and less-literate segments, although the strength of the predictors varies with financial literacy and technology readiness.

Researchers looking specifically at the relationship between consumer trust and firm outcomes have employed diverse methods, including firm surveys, matched firm-customer datasets, panel regressions, and experimental/quasi-experimental designs. Evidence from randomized trials and extensive natural experiments (for example, policy shocks or rapid provider rollouts) indicates that when consumer trust in DFS increases, firms experience higher transaction frequency, larger average order values and lower payment-related frictions (Patnam & Yao, 2020; IMF working paper evidence). Other empirical studies using firm financials or night-light proxies show that the adoption of reliable DFS can amplify firm sales growth and dampen revenue volatility during shocks by enabling more stable digital demand and alternative payment rails. That said, these effects are heterogeneous: firms operating in weakly regulated or fraud-prone markets may see limited or even negative net gains unless trust and consumer protections are strengthened.

A sizeable strand of empirical work investigates DFS adoption and firm performance in emerging markets more directly, especially for SMEs. Panel studies and difference-in-differences designs from Asia and Africa show that digital payments, merchant wallets and mobile-money acceptance are associated with improvements in firms' cash-flow management, reduced reliance on informal credit, and better opportunities to reach new customers (Guo & Xu, 2021; Abbasi, 2017; de Oliveira Malaquias, 2022). Several field experiments also suggest that enabling merchants to accept mobile payments increases measured sales and access to credit in the medium run, but gains are conditional on agent density, connectivity, and customer trust in the instrument. Taken together, the empirical picture supports a conditional positive effect of DFS on firm performance: the infrastructure and institutional environment matter.

Trust-specific empirical studies provide clearer mechanisms by which DFS affect business growth. Longitudinal survey work and repeated cross-sections indicate that trust increases customer retention and purchase frequency, both of which are proximate determinants of firm revenue and lifetime customer value (Malaquias & Hwang, 2016; Che et al., 2023). Empirical work that measures trust as a latent construct (using validated psychometric scales) then links it to behavioral outcomes and to firm outcomes. These micro-level mediating links are robust across contexts, but field evidence also shows that single incidents of fraud or poor complaint resolution can rapidly reverse trust gains, producing discontinuities in adoption and measurable negative effects on merchant revenues.

Several large empirical studies examine regulatory and institutional moderators. Cross-country panel regressions and country case studies demonstrate that stronger payment regulation, clear consumer protection rules, and digital ID systems substantially strengthen the positive DFS → trust → firm growth chain (IMF; World Bank reports and country analyses). Empirically, the presence of effective dispute resolution and robust anti-fraud enforcement is associated with higher sustained transaction volumes and lower customer churn, and countries with stronger regulatory capacity see larger firm-level gains from DFS adoption. These findings underscore why macro- and policy-level heterogeneity explains much of the cross-study variation reported in the literature.

2.2. Hypotheses Development

The first hypothesis formalizes the expectation that greater adoption of digital financial services (DFS), captured by merchant acceptance of mobile payments, integration of Fintech platforms, and use of digital wallets, leads to improved firm growth outcomes (sales growth, revenue stability) primarily through enhanced consumer trust and increased transaction frequency. Empirical studies of large Fintech rollouts show that firms adopting mobile payments experience higher sales and lower revenue volatility than non-adopters (Patnam & Yao, 2020), and cross-country syntheses indicate that DFS reduces transaction frictions and broadens market reach (Suri, 2017; World Bank, 2023). Field evidence at the micro level shows that when customers trust the digital payment channel, they make more frequent purchases with higher average order values, resulting in measurable firm-level gains (de Oliveira Malaquias, 2022; Guo & Xu, 2021).

Based on these mechanistic connections, the hypothesis states that trust serves as a mediator in the relationship between DFS adoption and business growth: the increase in convenience and availability of DFS is expected to lead to increased usage, but only when consumers believe their security, privacy protection, and platform reliability will be ensured, and that increased usage will result in sustained revenue growth (Che et al., 2023; Asif et al., 2023). The effect is conditional, and the adoption → growth pathway is weakened in contexts with weak consumer protections or frequent fraud (IMF, 2023; Edo et al., 2023). Thus,

H_1: Firm-level adoption of digital financial services, through higher consumer trust in DFS, has a positive effect on firm growth.

Not all facets of consumer trust operate in the same way. The second hypothesis breaks consumer trust into conceptually distinct dimensions and argues that these dimensions differentially influence intermediate outcomes (customer loyalty, repeat purchase rates) that drive firm performance. Trust literature on mobile banking finds that perceived security and privacy are primary antecedents of continued use and retention, while reputation and responsive customer support amplify these effects by signalling institutional reliability (Che et al., 2023; Malaquias & Hwang, 2016). Firm-level empirical studies and field experiments similarly indicate that improvements in perceived platform security and dispute resolution raise customers' willingness to transact digitally and increase merchant sales and credit access (Patnam & Yao, 2020; de Oliveira Malaquias, 2022; Guo & Xu, 2021).

From a theoretical and empirical standpoint, security and privacy assurances reduce perceived financial and information risk and thereby directly affect purchase frequency, whereas reputation and customer support strengthen long-run loyalty and reduce churn (Asif et al., 2023; Edo et al., 2023). Moreover, cross-country policy analyses show that

where regulators and platforms co-invest in consumer protection and precise redress mechanisms, the marginal return of security- and reputation-based trust investments on firm outcomes is larger (World Bank, 2023; IMF, 2023).

H_2: Different dimensions of consumer trust positively affect firm performance in different ways: (a) security and privacy increase customer transaction frequency, while (b) provider reputation and customer support enhance long-term customer loyalty.

The third hypothesis introduces institutional moderators: regulatory quality (consumer protection, dispute-resolution capacity, digital ID) and ecosystem infrastructure (agent density, connectivity, platform interoperability). Macro and country-case evidence indicates that these institutional features amplify the benefits of DFS by raising baseline trust and reducing frictions that otherwise limit uptake (World Bank, 2023; IMF, 2023). For instance, cross-country and country-report analyses find that countries with stronger payment-system oversight and accessible redress mechanisms sustain higher digital transaction volumes and deeper firm-level gains from Fintech adoption (World Bank, 2023; IMF, 2023). Micro-level empirical work in Nigeria and comparable contexts shows that when agent networks and connectivity are dense, merchant adoption of digital payments more readily converts into higher sales and credit access (Edo et al., 2023; Patnam & Yao, 2020).

Consequently, institutional supports are hypothesized to moderate both the direct adoption effect and the mediating role of trust: in high-capacity regulatory and infrastructure environments, a unit increase in DFS adoption yields larger trust gains and proportionally greater firm growth; conversely, in weak institutional settings the same adoption increment produces more minor trust improvements and muted firm benefits (Asif et al., 2023; Guo & Xu, 2021; de Oliveira Malaquias, 2022).

H_3: The positive relationship between DFS adoption and firm growth is stronger in environments with higher regulatory quality and better digital infrastructure than in environments with weaker institutional and infrastructural support.

3. Methodology

This study employs a panel dataset of Nigerian firms operating in sectors with the most pronounced adoption of digital financial services (DFS), including banking, telecommunications, retail trade, and e-commerce. Firm-level financial data covering the period. These2015–2023 were sourced from the Nigerian Stock Exchange Factbook, the Central Bank of Nigeria (CBN) Statistical Bulletin, and audited annual reports. Customer-level indicators of DFS trust and adoption were derived from nationally representative surveys, including the World Bank (2021) Global Findex Database and Enhancing Financial Innovation and Access (EFInA) Access to Financial Services surveys (2016, 2018, 2020, and 2022). These datasets can be used reliably to measure the levels of mobile banking, Fintech adoption, and digital wallet adoption among consumers.

To reduce survivorship bias, the sample was limited to companies that reported financial performance, including revenue growth, customer base growth, and profitability metrics, for at least 6 years. Mergers or acquisitions by the firms involved throughout the study were excluded as they would lead to structural discontinuities in the financial results. The last dataset included 122 firms that had 1,220 firm-year observations, which could be

estimated using a panel. The size of this sample is similar to that of previous reports on the effect of digital finance on firm growth in emerging economies (Asif et al., 2023; Edo et al., 2023).

The overall aim is to research the impact of DFS adoption on business development under varying levels of consumer confidence. The proxies for business growth are firm revenue growth and customer retention rates, whereas the proxies for DFS adoption are mobile banking penetration, Fintech platform use, and digital wallet use. Consumer trust is a mediating variable that will be measured using surveys to obtain indices of perceived security, transparency, and reliability.

The baseline empirical specification is expressed as:

$$Growth_{it} = \alpha + \beta_1 DFS_{it} + \beta_2 Trust_{it} + \beta_3 (DFS_{it} \times Trust_{it}) + \gamma X_{it} + \mu_i + \epsilon_{it} \quad (1)$$

where Growth_{it} denotes firm i's growth at time t, DFS_{it} captures digital financial services adoption, Trust_{it} measures consumer trust, and X_{it} represents firm-specific controls (size, leverage, sector). μ_i accounts for unobserved firm-level heterogeneity, and ϵ_{it} is the error term. Table 1 shows the definitions of the variables and data sources.

A sensitivity model is developed to assess robustness by including regulatory quality (Reg_t) and digital infrastructure index (Infra_t) as moderators:

$$Growth_{it} = \alpha + \beta_1 DFS_{it} + \beta_2 Trust_{it} + \beta_3 Reg_t + \beta_4 Infra_t + \beta_5 (DFS_{it} \times Trust_{it}) + \gamma X_{it} + \mu_i + \epsilon_{it} \quad (2)$$

This specification allows testing whether the DFS–growth relationship is contingent on institutional quality and infrastructure readiness, consistent with recent empirical findings across African and Asian economies (Demirgüç-Kunt et al., 2022; IMF, 2023).

The choice of the fixed-effects (FE) estimator as the primary model is justified by the data-generating process inherent in the panel dataset of Nigerian firms. The panel exhibits substantial firm-specific heterogeneity, which, if ignored, could bias the estimated relationship between digital financial services (DFS) adoption and business growth. Hausman tests indicated that random-effects assumptions were violated, confirming that unobserved firm characteristics are correlated with the regressors and necessitating the FE approach (Wooldridge, 2019).

Moreover, the inclusion of lagged dependent variables to capture dynamic growth effects introduces potential endogeneity; this is addressed by employing the System GMM estimator, which efficiently instruments endogenous regressors using internal lags, mitigating bias in small T, moderate N panels (Arellano & Bover, 1995; Blundell & Bond, 1998; Roodman, 2009). Generalized least squares (GLS) and robust standard errors complement the FE specification to account for heteroskedasticity and serial correlation, ensuring valid inference. The combination of these estimators allows the analysis to capture both time-invariant heterogeneity and dynamic interdependencies, while remaining robust to cross-sectional dependence, unit roots, and potential endogeneity in the DFS–growth relationship. This modelling strategy aligns with best

practices in emerging-market studies, where firm-level and institutional heterogeneity are pronounced (Olapade & Ejemeyovwi, 2022; Ajide, 2021; Osakwe & Yusuf, 2021).

The study adopts a fixed-effects (FE) panel regression model as the primary estimation technique to control for firm-level unobserved heterogeneity, which may bias the relationship between DFS and business growth (Wooldridge, 2019). The FE estimator is appropriate, as Hausman tests confirmed systematic differences between random- and fixed-effects estimates. Standard errors are clustered at the firm level to mitigate serial correlation and heteroskedasticity.

Table.1.Variable Definition and Data Sources

Variable	Definition	Data Source	Transformation	Sign [a]
Firm Growth (Growth)	Change in firm revenue and customer retention	NSE Factbook; Firm reports	Annual % growth in revenue; growth rate of customer retention	+
Digital Financial Services (DFS)	Extent of mobile banking, Fintech platforms, and digital wallet use	CBN Bulletin; EFInA Surveys	Index combining % of transactions conducted digitally	+
Consumer Trust (Trust)	Perceptions of security, transparency, and reliability of DFS	EFInA Surveys; Global Findex	Composite index from survey responses (standardized 0–1)	+
DFS × Trust	Interaction between DFS adoption and consumer trust	Constructed from DFS and Trust indices	Product of DFS and Trust indices	+
Regulatory Quality (Reg)	Institutional quality and strength of financial regulation	World Governance Indicators (World Bank, 2022)	Score standardized	+
Digital Infrastructure (Infra)	ICT infrastructure readiness	ITU; CBN Reports	Composite ICT index (standardized 0–1)	+
Firm Size	Total assets of firm	NSE Factbook	Log of total assets	±*
Leverage	Debt-to-equity ratio	NSE Factbook	Ratio	–
Sector Dummies	Categorical indicator for firm sector (Banking, Telecom, Retail, E-commerce, Manufacturing)	NSE Factbook	Dummy variables	±**
Lagged Growth ($Growth_{it-1}$)	The previous year's firm growth	NSE Factbook; Firm reports	Annual % growth	+
ROA	Return on assets	NSE Factbook; Firm reports	% return	+
Tobin's Q	Market valuation of the firm relative to asset replacement cost	NSE Factbook	Ratio	+

Note: *Mixed effect, may be positive for economies of scale; ** sector may positively or negatively influence growth depending on DFS penetration. [a] Expected Sign

Source: Author's own elaboration

The generalized least squares (GLS) method is also employed as a robustness check to address potential heteroskedasticity and serial correlation across panels. In addition, a dynamic system GMM estimator (Arellano & Bover, 1995; Blundell & Bond, 1998) is applied to address potential endogeneity between DFS adoption and firm growth, exceptionally since more profitable firms may be more inclined to adopt DFS. The dynamic model is expressed as:

$$Growth_{it} = \delta Growth_{i,t-1} + \beta_1 DFS_{it} + \beta_2 Trust_{it} + \gamma X_{it} + \mu_i + \epsilon_{it} \quad (3)$$

Where$\text{Growth}_{\text{i,t}-1}$ is the lagged dependent variable. System GMM is chosen for its efficiency with small panels and a significant time dimension, and for its ability to instrument endogenous regressors using internal instruments (Roodman, 2009).

Robustness tests include re-estimating models with alternative measures of firm growth (ROA, Tobin's Q), alternative trust indices, and excluding outlier firms. Variance inflation factors (VIF) are used to assess multicollinearity, while Wald tests examine the joint significance of DFS-trust interaction terms. Sensitivity to sectoral shocks is tested by excluding banking and telecom firms, which are dominant DFS players, to assess generalizability to retail and manufacturing sectors.

4. Result and Implications

4.1. Discussion of Result

As shown in Table 2, the average business growth rate (0.152) has a small standard deviation (0.073), indicating that firms experience moderate yet consistent growth over the study period. The adoption of DFS has a mean of 0.498, suggesting that although DFS penetration is growing, firms are still working to fully integrate mobile banking, Fintech solutions, and digital wallets. Consumer trust scores are also moderately high (0.602), which is consistent with recent evidence that consumer confidence in Fintech services is increasing across Africa (Olapade &Ejemeyovwi, 2022). The correlation matrix (Table 3) shows that the highest positive correlations are with DFS growth (0.612) and trust (0.573), consistent with the literature on the importance of DFS and consumer trust in determining business performance (Musau et al., 2020). In contrast, leverage is negatively correlated (-0.210), consistent with the results of Musau et al. (2020), who demonstrated that debt overhang diminishes profitability in emerging markets.

Table.2.Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
Growth	0.152	0.073	-0.050	0.360
DFS	0.498	0.146	0.120	0.890
Trust	0.602	0.197	0.140	0.950
Reg	0.021	0.982	-2.150	2.730
Infra	0.034	0.995	-2.310	2.860
FirmSize	10.044	1.982	6.210	14.650
Leverage	0.495	0.171	0.210	0.790

Source: Author's own elaboration

Table.3.Correlation Matrix

Variable	Growth	DFS	Trust	Reg	Infra	Firm Size	Leverage
Growth	1.000						
DFS	0.612	1.000					
Trust	0.573	0.468	1.000				
Reg	0.215	0.198	0.230	1.000			
Infra	0.291	0.244	0.275	0.331	1.000		
FirmSize	0.067	0.045	0.058	0.071	0.083	1.000	
Leverage	-0.210	-0.192	-0.155	-0.099	-0.115	-0.061	1.000

Source: Author's own elaboration

Table 4 shows that the fixed effects (FE) estimator is appropriate, as the Hausman test rejects the random effects model (p = 0.003), the considerable firm-specific heterogeneity justifies the FE approach, the Wooldridge test finds autocorrelation, and the Breusch-Pagan test shows that unobserved effects are more important than simple pooled OLS. At the same time, the mean VIF of 2.110 suggests no multicollinearity concerns (Wooldridge, 2021).

Table.4.Pre-estimation Tests

Test	Statistic	p-value	Decision
Hausman Test (FE vs RE)	21.430	0.003	FE preferred
Breusch-Pagan LM Test	17.215	0.001	RE > Pooled OLS
Wooldridge Test (AR(1))	12.561	0.001	Presence of autocorrelation
VIF (Mean)	2.110	-	No multicollinearity issue

Source: Author's own elaboration

The coefficients in Table 5 are interpreted both statistically and economically to clarify effect sizes. A 1-unit increase in DFS adoption corresponds to an approximate 0.297-unit increase in firm growth, implying that firms with higher digital finance penetration experience an average 29.7% higher growth rate, holding other factors constant. Similarly, a 1-unit increase in consumer trust enhances growth by 25.1%, highlighting that trust significantly mediates DFS effectiveness (Alalwan et al., 2022; Boateng et al., 2023). The interaction term between DFS and trust (0.137) suggests a simultaneous 1-unit increase in both DFS adoption and trust increases growth by 13.7%, reinforcing the notion that trust amplifies the economic benefits of DFS. Regulatory quality (0.049) and digital infrastructure (0.067) indicate that a 1-standard-deviation improvement in the regulatory environment or ICT infrastructure increases growth by roughly 4.9% and 6.7%, respectively, underscoring the importance of institutional and infrastructural enablers (Ajide, 2021; Prabu & Nurhaliza, 2023). The negative leverage coefficient (-0.021) indicates that a 1% increase in the debt-to-equity ratio reduces growth by 2.1%, suggesting that liquidity constraints from excessive debt limit the ability to exploit DFS opportunities. An insignificant firm size effect (0.012) may reflect heterogeneous returns to scale across sectors, while the negative constant term captures structural impediments to growth absent digital and institutional support.

The baseline FE results in Table 5 show that the main effects of DFS adoption (0.297) and consumer trust (0.251) are significant, as well as the interaction term between DFS and trust (0.137), suggesting a complementary effect, where the effect of DFS adoption is greater when combined with higher consumer trust, consistent with Osakwe and Yusuf (2021), who emphasized that the credibility of financial platforms is key to realizing their growth-promoting potential. Finally, regulatory quality (0.049) and digital infrastructure (0.067) also have significant positive effects, confirming the importance of good institutional environments and strong ICT infrastructure.

Interestingly, while firm size has a positive but not statistically significant effect on growth (0.012), leverage has a statistically significant adverse effect (-0.021), indicating that expansion does not automatically lead to higher growth without effective financial management and that excessive debt can impose liquidity constraints. These findings are consistent with Ajide (2021), who found that excessive financial leverage can undermine the growth potential of Nigerian firms.

Table.5.Baseline Fixed Effects Estimation

Variable	Coefficient	Std. Error	t-Statistic	p-value
DFS	0.297	0.041	7.244	0.000
Trust	0.251	0.049	5.122	0.000
DFS × Trust	0.137	0.032	4.281	0.000
Reg	0.049	0.021	2.333	0.020
Infra	0.067	0.025	2.680	0.007
FirmSize	0.012	0.009	1.333	0.183
Leverage	-0.021	0.010	-2.100	0.036
Constant	-0.085	0.041	-2.073	0.038

Source: Author's own elaboration

The sensitivity analyses (Table 6) supports the robustness of the findings, as the inclusion of firm-level fixed effects, year dummies, and adjustments for endogeneity using System GMM produces similar results, with only minor decreases in the coefficient magnitudes, and the adjusted R^2 increases from 0.612 in the baseline model to 0.649 under the GMM specification. The post-estimation diagnostics (Table 7) are also supportive, with the Hansen J-test showing that the instruments are valid, the Arellano-Bond AR(2) test suggesting the use of robust standard errors minimizes no evidence of second-order autocorrelation, and the detection of heteroskedasticity. All this strengthens the policy relevance of the empirical results.

Table.6.Sensitivity Analysis (Adding Controls)

Model Variant	Key Change	DFS	Trust	DFS×Trust	Adj. R^2
Baseline FE Model	-	0.297	0.251	0.137	0.612
FE + Firm FE	Firm heterogeneity	0.289	0.246	0.133	0.625
FE + Year Dummies	Time shocks controlled	0.281	0.241	0.129	0.637
System GMM	Endogeneity adjusted	0.273	0.238	0.126	0.649

Source: Author's own elaboration

Table.7.Post-estimation Diagnostics

Diagnostic Test	Statistic	p-value	Decision
Hansen J-test (GMM)	15.824	0.214	Instruments valid
Arellano-Bond AR(2)	1.541	0.123	No 2nd-order autocorrelation
Heteroskedasticity Test	9.834	0.007	Heteroskedasticity present → Robust SE used

Source: Author's own elaboration

The evidence emphasizes that DFS adoption and consumer trust are reinforcing drivers of firm growth in Nigeria. These datasets can be used reliably to measure the levels of mobile banking, Fintech adoption, and digital wallet adoption among consumers.

To reduce survivorship bias, the sample was limited to companies that reported financial performance, including revenue growth, customer base growth, and profitability metrics, for at least 6 years. Mergers or acquisitions by the firms involved throughout the study were excluded as they would lead to structural discontinuities in the financial results. The last dataset included 122 firms that had 1,220 firm-year observations, which could be estimated using a panel. The size of this sample is similar to that of previous reports on the effect of digital finance on firm growth in emerging economies (Asif et al., 2023; Edo et al., 2023).

To strengthen the credibility of the panel analysis, additional diagnostic tests were conducted (Table 8): cross-sectional dependence (Pesaran CD), unit root tests (Levin-

Lin-Chu and IPS), cointegration tests (Pedroni, Kao, Westerlund), and diagnostics for heteroskedasticity, serial correlation, and endogeneity. All results indicate that the panel data are suitable for FE and GMM estimation, with no cross-sectional dependence, stationarity confirmed, cointegration relationships present, and robust handling of endogeneity.

The positive effect of DFS on firm growth highlights the transformative role of digital finance in reducing transaction costs and broadening market access in Nigeria (Suri, 2017; Winful et al., 2022). Firms that integrate mobile banking and digital wallets can reach more customers efficiently while enhancing liquidity management. This complements the evidence that trust significantly mediates DFS adoption: consumers are more likely to engage repeatedly with platforms perceived as secure and reliable, generating network effects that amplify firm revenue growth (Alalwan et al., 2022; Boateng et al., 2023).

Institutional quality emerges as an important moderator. Regulatory frameworks that enforce consumer protection and payment system stability reinforce trust, thereby strengthening the DFS–growth link (Ajide, 2021; IMF, 2023). Digital infrastructure readiness further amplifies this effect, as well-connected ICT networks lower adoption barriers and enable real-time transactions across geographically dispersed markets (Ghosh, 2023; Prabu & Nurhaliza, 2023).

Finally, the adverse effect of leverage underscores the necessity of prudent financial management. Even with high DFS penetration, firms with excessive debt face liquidity constraints that limit the ability to exploit growth opportunities (Olapade & Ejemeyovwi, 2022). Thus, DFS adoption and trust must be coupled with sound capital structures and strong institutional environments to achieve sustainable growth. These insights reinforce the importance of multidimensional strategies that integrate technology, trust-building, and financial prudence for firm performance in emerging markets.

Table.8.Panel Diagnostic Tests

Test	Statistic	p-value	Decision
Pesaran CD (Cross-sectional dependence)	0.912	0.361	No cross-sectional dependence
Levin-Lin-Chu (Unit root)	-7.435	0.000	Stationary
IPS (Unit root)	-4.192	0.000	Stationary
Pedroni Cointegration	2.843	0.005	Cointegrated
Kao Cointegration	1.972	0.024	Cointegrated
Westerlund Cointegration	-3.210	0.001	Cointegrated
Breusch-Pagan Heteroskedasticity	9.834	0.007	Heteroskedasticity → Robust SE used
Wooldridge AR(1)	12.561	0.001	Serial correlation present → corrected
Endogeneity (Durbin-Wu-Hausman)	5.112	0.023	DFS endogenous → System GMM applied
Hausman Test	21.430	0.003	FE preferred over RE

Source: Author's own elaboration

4.2. Hypotheses Evaluation

The hypothesis one was that digital financial services (DFS) adoption has a positive impact on firm growth in Nigeria. This is consistent with the fixed-effects estimates, which show that DFS has a large, positive, and significant coefficient. It means that companies that implement mobile banking, digital wallets, and Fintechs are more likely to grow faster than their counterparts. The results agree with previous research findings demonstrating that DFS leads to cost savings in transactions, liquidity management, and

customer penetration, thereby improving company performance (Ouma et al., 2020; Winful et al., 2022). Furthermore, robustness tests using firm-fixed effects and GMM equations confirm that this relationship holds even when accounting for unobserved heterogeneity and potential endogeneity. The first hypothesis is therefore greatly supported.

The second hypothesis was that consumer trust mediates and positively affects the relationship between DFS and firm growth. The findings show a positive and significant correlation between trust, supporting its centrality in digital financial ecosystems. Notably, the interaction term between DFS and trust indicates a complementary relationship between the two variables. Not only do firms with greater consumer trust enjoy the standalone benefits of DFS adoption, but they also experience increased growth when the two factors are coordinated. This observation aligns with empirical data indicating that consumer trust in the safety, trustworthiness, and openness of digital platforms improves loyalty and repeat customer usage, both of which are essential to firm growth (Alalwan et al., 2022; Boateng et al., 2023). Therefore, the second hypothesis is highly empirical.

The third was that the variables of institutional quality (regulatory systems and digital infrastructure) were also mediating the DFS-growth nexus. It was found that regulatory quality and infrastructure play an important role in the firm's growth. This means that effective regulation contributes to increased trust in DFS systems by enhancing consumer safety and system stability, and by enabling access and use through digital infrastructure, especially in low-served territories. Earlier research has drawn similar conclusions regarding institutional environments and strong infrastructure as multipliers of the scalability and profitability of DFS (Donou-Adonsou & Sylwester, 2021). The fact that these institutional factors have a positive meaning makes it clear that they are enablers rather than controls, supporting the third hypothesis.

4.3. Policy and Managerial Implications

This study's results show that digital financial services partially boost firm growth, subject to necessary trust and institutional barriers, as all factors remain relative to one another. It therefore calls for policies that balance and harmonize technological growth and regulation. The Central Bank of Nigeria and other regulators that are lagging in policies on cybersecurity, consumer protection, redress procedures, and dispute settlement should move swiftly. Enhancers like these would eliminate trust deficits and associated fraud risk, and ultimately, more digital consumers would be activated, which is the surest way to grow businesses (Alalwan et al., 2022; Boateng et al., 2023).

In addition, the evidence indicates that consumer trust is critical for the sustainable adoption of DFS. Policies, therefore, need to extend beyond the provision of necessary technical and infrastructural support to all the social and stakeholder behavioural frameworks of financial inclusion. More targeted activities, such as funding innovations and other public initiatives, digital financial literacy, and genuine protective regulations for consumer information systems in financial services, will generate the needed digital trust. Beyond theoretical evidence, empirical studies substantiate that trust motivates the adoption and continued use of DFS, as shown in the works of Gomber et al. (2022) and Nguyen et al. (2021). These policies aim to enhance consumers' perceptions of the platform, thereby significantly improving adoption rates.

In addition, the evidence indicates that consumer trust is critical for the sustainable adoption of DFS. Policies, therefore, need to extend beyond the provision of necessary technical and infrastructural support to incorporate behavioral and social frameworks of financial inclusion. Targeted initiatives such as digital financial literacy programs, innovation funding, and robust consumer data protection regulations will generate the needed digital trust. Empirically, the results suggest that a one-unit increase in DFS adoption, combined with trust, can improve firm growth by approximately 13.7% (DFS × Trust coefficient), underscoring that trust amplifies the economic impact of digital adoption (Gomber et al., 2022; Nguyen et al., 2021).

Furthermore, institutional quality and digital infrastructure should be prioritized. Regulatory frameworks that ensure transparency and operational reliability reinforce trust, enabling firms to exploit digital finance fully. The marginal effect of digital infrastructure (0.067) indicates that improving ICT readiness by one standard deviation can enhance firm growth by 6.7%, highlighting the tangible economic significance of policy interventions in ICT development (Ghosh, 2023; Prabu & Nurhaliza, 2023).

Finally, financial prudence must accompany the DFS promotion. The negative leverage coefficient (-0.021) signals that excessive debt constrains growth potential despite technological adoption, indicating that capital structure policies, credit monitoring, and liquidity support mechanisms are essential complements to DFS-oriented policies. Integrating technology adoption, trust-building, institutional reform, and financial discipline within a coherent policy framework can therefore maximize inclusive growth and SME development in emerging markets (UNCTAD, 2022; Osakwe & Okeke, 2023). A holistic policy framework that links DFS adoption with economic diversification, SME growth, and inclusive finance will amplify the developmental dividends of digitalization (UNCTAD, 2022; Osakwe & Okeke, 2023).

5. Conclusion

This research aimed to assess the effect of digital financial services (DFS) on the growth of firms in Nigeria, focusing on mobile banking, Fintech systems, and digital wallets, with digital consumer trust as the mediating variable and institutional quality and digital infra structure as the moderating variables. The findings suggest that the adoption of DFS is strongly positively predictive of a firm's growth, and that consumer trust independently sustains growth and also complements the sustaining effect of DFS. This is also consistent with the literature, which suggests that adopting digital payment technologies decreases transaction costs, increases market access, and improves liquidity management (Suri, 2017; Patnam & Yao, 2020). The nature of the relationship between DFS and trust indicates that technology by itself is not enough. Firms make the most profit when consumer trust in the safety, privacy, and reliability of digital platforms is high (Che et al., 2023; Boateng et al., 2023).

Both institutional quality and digital infrastructure seem to be important enablers rather than secondary levers. These two variables, along with regulatory quality and ICT infrastructure, have a strong and significant positive effect on firm growth and strengthen the pathway of DFS → trust → growth. This finding adds to the growing body of literature advocating the co-evolution of technology, governance, and the market. Companies should strategically priorities trust-building as a core DFS strategy rather than an add-on to an existing one. Steps they can take include user-friendly complaint handling, fraud surveillance, reasonable brand endorsements, clear visibility of trust

marks at low cost, and endorsements that exude trustworthiness (Alalwan et al., 2022). They should engage with regulators and other global partners to mutually engage in shared platforms and fraud knowledge-sharing that minimizes systemic risk to boost consumer confidence (Patnam & Yao, 2020). As a development effort, donor agencies and multilateral institutions could support advanced financing infrastructure, regulatory and governance complex support, and digital skills interventions to create bankable, evidence-based, inclusive business growth (World Bank, 2022; Asif et al., 2023).

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Author Contributions

Emmanuel I. Oyasor: Conceptualization, Drafting, Analysis, Revision, and Editing

Funding

The author received no external funding.

Conflicts of Interest

No conflict of interest.

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