Fudma Journal of Accounting and Finance Research, 3(4). ISSN: 2992-4693 (Online); 2992-2704 (Print)

Digital banking tools and savings performance

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https://doi.org/10.33003/fujafr-2025.v3i4.235.35-44

Abstract
Purpose: This study examines the impact of digital banking tools, specifically Point of Sale (POS) systems, Automated Teller Machines (ATMs), and mobile banking (MOB), on savings performance in Nigeria. The primary objective is to assess how the increasing adoption of these technologies influences savings mobilization and overall financial inclusion within the Nigerian banking sector.
Methodology: A quantitative research design was adopted, employing secondary time series data sourced from the Central Bank of Nigeria (CBN) from 2009-2023. Econometric techniques, including the Phillips-Perron unit root test and the Autoregressive Distributed Lag (ARDL) bound testing approach to cointegration were used for data analysis to investigate both the short-run and long-run relationships between digital banking variables and savings performance.
Results and Conclusion: The empirical findings indicate the existence of a long-run equilibrium relationship among the variables. Specifically, MOB and POS transactions exhibit a positive and statistically significant impact on savings performance. Conversely, ATMs display an insignificant relationship with savings performance. The study concludes that digital banking tools significantly enhance savings performance in Nigeria, particularly through MOB and POS platforms, which have helped bridge access gaps and simplified banking for the unbanked/ underbanked populations. However, the potential of ATMs to stimulate savings remains underutilized.
Implication of findings: Policymakers and financial institutions should strengthen and expand digital banking infrastructure, particularly in rural/underserved areas, to promote inclusive access to financial services. Furthermore, stabilizing the macroeconomic environment and improving digital literacy will help build public trust in electronic banking channels, thereby improving national savings performance.

Keywords: Savings Performance, Financial Inclusion, Digital Banking, Interest Rate ARDL.

1. Introduction

The banking sector in Nigeria has undergone significant changes in recent years, largely as a result of the advancement in digital banking technologies. Innovations like Point of Sale (POS) systems, Automated Teller Machines (ATMs), and mobile banking have played a vital role in changing the landscape of financial inclusion across the nation. Historically, Nigeria has struggled with considerable obstacles regarding access to financial services, especially in rural and underserved regions where conventional banking infrastructure is scarce. Digital banking has surfaced as a crucial solution to this challenge, enabling Nigerians to connect with formal financial institutions in ways that were not previously available or easy to access (Ovia, 2022). One of the main goals of financial institutions and policymakers is to enhance performance of savings, as it significantly influences the economic stability and growth of a country. Savings involve the efforts made by financial institutions to encourage individuals and businesses to put their funds into formal banking systems, thus providing banks with the capital necessary to lend for investments (Chikwe, 2017). In Nigeria, despite the increasing number of banking institutions, savings rates continue to be relatively low, with a large segment of the population still resorting to informal saving methods, such as keeping cash or utilizing informal local savings schemes (Oladipo & Olorunfemi, 2020). Nevertheless, the rise of electronic banking presents an opportunity to change savings habits by introducing more convenient, accessible, and secure methods for individuals to save. Various studies have focused on the financial performance implications of sustainable expenditure on economic capital by manufacturing firms in Nigeria (Orinya et al, 2024).

In Nigeria, the widespread adoption of digital financial services such as POS, ATMs, as well as mobile banking has contributed to the expansion of access to banking services, particularly among unbanked and underbanked populations. POS terminals, which facilitate real-time payments and transactions, and ATMs, which provide 24/7 access to cash, have played crucial roles in improving the accessibility of banking services (Ovia, 2022). More recently, mobile banking has emerged as a transformative tool in the Nigerian financial ecosystem, enabling users to access banking services via mobile phones, even in remote locations where physical bank branches are scarce (Musa & Usman, 2019). While these electronic banking channels have undoubtedly improved access to financial services, their impact on savings in Nigeria remains underexplored. Prior studies have focused on the adoption and usage patterns of these technologies but have not fully investigated their direct effect on savings mobilization (Oladipo & Olorunfemi, 2020).

Prior research has mainly explored the factors influencing the adoption of these digital banking technologies but has not sufficiently investigated their direct impact on savings growth. Although these technologies have improved access to banking, there is little empirical evidence on how their use influences the growth of savings deposits and overall financial inclusion in Nigeria (Musa & Usman, 2019). It is unclear whether the adoption of POS, ATM, and mobile banking has contributed to an increase in formal savings accounts, higher savings deposits, or greater participation in the banking sector. Furthermore, the challenges that may hinder the effective use of these digital banking channels in promoting savings, such as security concerns, low digital literacy, and insufficient infrastructure, have not been adequately addressed in existing research.

Despite the adoption of digital banking channels like POS, ATMs, and mobile banking in Nigeria, the impact of these technologies on savings performance remains underexplored, with limited empirical evidence on how they influence savings deposits and financial inclusion. Thus, this study aims to assess how the usage of these digital channels has influenced the growth of savings in the country. Understanding the dynamics between digital banking and savings performance is crucial for designing strategies that encourage greater savings participation, improve financial inclusion, and drive development in Nigeria.

The primary objective of this research is to examine how the usage trends of POS, ATMs, and mobile banking over time have impacted the growth in savings in Nigeria.

2. Literature review

2.1 Theoretical review

2.1.1 Financial intermediation theory

Financial intermediation theory posits that financial institutions serve as intermediaries between savers and borrowers, facilitating the transfer of funds within an economy. By mobilizing savings and directing them towards productive investments, banks play an essential role in fostering economic growth (Diamond & Dybvig, 1983). Electronic banking technologies, including POS terminals, ATMs, and mobile banking, can enhance the financial intermediation process by increasing access to banking services, which subsequently encourages individuals to save in formal financial institutions. Numerous pieces of evidence have shown its positive impact on the growth and development of SMEs through innovative endeavors by tech companies. This has made financial inclusion possible for the under-banked and unbanked population to be part of the financial system for economic prosperity Usman et al, 2025). In Nigeria, these electronic channels are crucial for improving the process of financial intermediation. The availability of ATMs, the ease of POS transactions, and the increasing prevalence of

mobile banking can reduce barriers to saving by minimizing transaction costs and increasing convenience through easy ATM access and practical payment options. Consequently, people are more inclined to participate in savings mobilization when these technologies are present, as they provide straightforward access to banking services (Ovia, 2022). This theory, therefore, supports the notion that utilizing electronic banking channels can have a positive effect on savings performance by enhancing banking services.

2.1.2 Financial inclusion theory

Financial inclusion involves the effort to provide households and firms with valuable and budget-friendly financial options. The concept of financial inclusion suggests that enhanced access to financial services can result in increased savings, investment, and economic development (Demirgüç-Kunt & Klapper, 2012). Electronic banking methods, including POS systems, ATMs, and mobile banking, have been recognized as key instruments for promoting financial inclusion, especially in developing nations like Nigeria, where many people remain without bank accounts. Research indicates that mobile banking can effectively connect individuals in remote or rural areas who lack access to traditional bank branches (Musa & Usman, 2019). By breaking down geographical obstacles and enhancing convenience, these electronic banking platforms motivate people to deposit their savings in official financial institutions instead of depending on informal saving practices. Hence, the concept of financial inclusion reinforces the notion that electronic banking channels are vital in promoting savings mobilization in Nigeria.

2.1.3 Theoretical framework

For the study titled Digital Banking Tools and Savings Performance in Nigeria, where savings performance is the dependent variable and POS, ATM, and mobile banking are the independent variables, the Financial Intermediation Theory serves as the foundational theory for the theoretical framework. Financial Intermediation Theory explains the crucial role played by financial institutions such as banks, insurance companies, and investment firms in linking surplus and deficit economic units. Instead of savers lending directly to borrowers, intermediaries serve as middlemen who mobilize funds from those with excess resources and channel them to those in need of capital for productive ventures. The theory emerged from the works of Gurley and Shaw (1960) and was later refined by scholars such as Leland and Pyle (1977) and Diamond (1984), who emphasized the role of information and monitoring in financial markets.

According to the theory, financial intermediaries exist primarily to reduce transaction costs, manage risks, and mitigate information asymmetry between lenders and borrowers. They pool savings from numerous depositors, diversify investments, and transform short-term deposits into long-term loans, thus ensuring liquidity in the economy. Intermediaries also specialize in screening borrowers and monitoring loans, which minimizes problems such as adverse selection and moral hazard. Through these activities, they enhance the efficiency of financial resource allocation, stimulate investment, and support economic growth. The theory is highly relevant to both developed and developing economies. In countries like Nigeria, for instance, efficient financial intermediation fosters industrial development by channeling savings into productive enterprises. However, critics argue that technological innovation and financial globalization have led to disintermediation, where savers and borrowers increasingly bypass traditional intermediaries through digital finance and peer-to-peer platforms. Despite these changes, the fundamental principles of the theory, reducing transaction costs and information gaps, remain central to understanding modern financial systems. In summary, the Financial Intermediation Theory underscores the indispensable role of intermediaries in promoting economic stability, liquidity creation, and growth by efficiently connecting the surplus and deficit units in the economy.

2.2 Empirical review

Iwedi's (2024) study investigated the impact of digital finance infrastructure on Nigerian commercial banks' growth from 2009 to 2022. The analysis revealed that point of sales POS machines significantly boosted bank assets, while automated teller machines ATMs had a weaker effect, and web banking had minimal impact. Chibuzor (2024) investigated the impact of electronic payment systems on administrative efficiency, transparency, and accessibility within the university's student administration. The researchers utilized a quantitative approach, conducting surveys and applying statistical analyses, which revealed a significant positive correlation between students' perceptions of these systems and improvements in administrative processes. The findings advocated the adoption of electronic payment systems in universities, suggesting that such implementations could enhance resource management and overall student satisfaction. The study underscored the importance of modernizing administrative practices to better serve diverse student populations.

Olalekan and Eze (2024) investigated the interplay between strategic intents and organizational performance within selected deposit money banks in Nigeria. The researchers employed a methodology that included descriptive and inferential statistics, analyzing data from 51 top executives and achieving an impressive 83.6% response rate. The analysis revealed that strategic intent has a significant and positive impact on organizational performance, suggesting that a clear strategic direction is vital for achieving success in the banking sector. The authors argued that a well-articulated mission, vision, and objectives were essential for enhancing strategic intent, which subsequently drove performance improvements. The study suggested that aligning organizational processes with strategic goals could yield better performance metrics and advocated for the adoption of effective strategic management practices to optimize resource utilization, thereby enhancing competitive advantage and overall performance in the Nigerian banking landscape.

Elubode and Adeojo (2024) evaluated mobile money services in Nigeria as a viable alternative to traditional banking, focusing on their potential to enhance financial inclusion for unbanked and under-banked populations. The study utilized a qualitative methodology to examine regulatory frameworks, user experiences, and operational dynamics, highlighting the pivotal roles of the Central Bank of Nigeria and the Nigerian Communications Commission. Key findings indicated that mobile money services significantly increased access to financial resources, facilitating transactions and reducing cash dependency. However, the study identified challenges related to user experience and operational efficiency that needed to be addressed to optimize these services. The study indicated that mobile money had the potential to transform financial inclusion, especially in rural areas, by simplifying registration processes for less literate users.

Zango and Umeoji (2024) investigated the relationship between financial inclusion policies and the performance of Nigerian Deposit Money Banks (DMBs). They utilized an ex-post facto design and econometric regression analysis on secondary data from 2010 to 2020, focusing on ten banks and examining the impact of cashless transactions on bank profitability, measured by Return on Equity. The findings revealed a significant positive correlation between the volume of cashless transactions encompassing point-of-sales (POS), mobile money, and ATM transactions and the profitability of the banks. This suggested that financial inclusion initiatives not only enhanced operational efficiency but also contributed to improved financial performance for DMBs in Nigeria.

Gbenga et al. (2024) examined the correlation between technological capability and market performance among deposit money banks in Lagos State, Nigeria. They utilized a quantitative approach through

employee surveys, which showed a significant positive link between advanced technological capabilities and higher customer satisfaction and competitive positioning. The findings underscore the necessity for banks to invest in technology to enhance market performance, suggesting that such investments were essential for maintaining competitive advantages in the financial sector, thereby arguing for ongoing technological advancements as a strategic priority.

Idris et al. (2024) investigated the relationship between the queuing efficacy of Automated Teller Machines (ATMs) and the market performance of selected deposit money banks in Rivers State, Nigeria. Using a quantitative methodology, they collected data from 381 ATM users, which revealed that efficient queuing systems significantly improved customer satisfaction, positively correlating with key market performance indicators such as customer patronage and profitability. The findings emphasized the importance of investing in enhanced ATM operations, as better customer experience led to increased market performance in a competitive banking environment. The study identified service charges, market development, and operational services as critical factors influencing market outcomes, stressing the need for banks to continuously refine their service delivery to sustain competitiveness and profitability. Based on the empirical review, the study formulated the following hypotheses:

H1: POS (point of sale) usage does not significantly affect savings performance in Nigeria.

H2: There is no significant relationship between ATM usage and savings performance in Nigeria.

H3: Mobile banking has no significant impact on facilitating savings performance in Nigeria.

3. Methodology

3.1 Research design

This research employs a quantitative research design because it aims to measure the dynamic between digital banking tools and savings performance in a statistically verifiable manner. Quantitative methods are appropriate for investigating how independent variables (POS, ATM, and mobile banking) affect the dependent variable (savings performance) through numerical data (Creswell, 2014). This research relies on secondary data from the CBN, which provides comprehensive reports on the banking sector. It employs time series econometric analysis to investigate the dynamic between digital banking tools (POS, ATM, and mobile banking) and the savings performance.

Table 1: Measurement of variables

Symbols	Variable Name	Type	Measurement	Authors
SP	Saving Performance	Dependent	Ratio of total customer deposits to total assets, or annual growth rate in savings mobilized.	Adeniran & Jayeoba (2021); Olayemi (2020)
ATM	Automated Teller Machine	Independent	Number of ATMs deployed by the bank or total ATM transactions per year	Olatokun & Igbinedion (2019); Eze & Eze (2020)
POS	Point of Sales	Independent	Number of POS terminals or total POS transaction volume/value per year	Nworie, G. O., & Okafor, T. G. (2021).
MB	Mobile Banking	Independent	Volume or value of mobile banking transactions within the period	Okiro & Ndungu (2019)

3.2 Model specification

SVPt = f(POSt, ATMt, MBKt) …….. 1

Where:

The dependent variables

SVPt = Savings Performance

Independent variables

POSt = point of sales

ATM = Automated teller machine

MOBt = Mobile banking

The explicit Mathematical Models are:

SVPt = δ0 + δ1POSt + δ2ATMt + δ3MOBt …….. 2

The Econometric Model becomes

SVPt = δ0 + δ1 POSt + δ2ATMt + δ3MOBt + Ut …….. 3

Equation 3 states that savings mobilization (SVPt) as a dependent variable, depends on point of sales (POSt), automated teller machine (ATMt), mobile banking (MOBt), and other factors that are not in the model that represented by the error terms, U.

4. Results and discussion

4.1 Unit root test

The Phillip Perron test is applied to assess the stationarity and order of integration of each variable, guiding the choice of the cointegration test.

Table 2: Phillip Perron Unit Root Test

Variables	Level			First different			
	Stat	P-value	Critical value (5%)	Stat	P-value	Critical value (5%)	Order
SVP	2.738	1.000	-3.436	-13.942	0.000	-3.436	I(1)
POS	-0.754	1.000	-3.436	-14.264	0.000	-3.437	I(1)
ATM	-2.090	0.570	-2.878	-18. 085	0.000	-2.878	I(1)
MOB	-0.689	0.990	-3.436	-25.801	0.000	-3.436	I(1)
PLR	-0.107	0.865	-2.878	-12.855	0.000	-2.878	I(1)

Source: Author's Compilation

Table 2 shows that five variables are tested at the level and first difference using 5% significance level. At the level, all variables (SVP, ATM, POS, PLR) p-values are greater than 5% critical values, which implies that none of the variables are stationary at the level. At first difference, all variables (SVP, ATM, POS, PLR) have p-values of 0.000, which is less than the 5% critical values, which means we reject the null hypothesis of the unit root at first difference. This also implies that each variable becomes stationary after first difference. The unit root test results in Table 2 thus showed a uniform order of integration; savings performance (SVP), ATM, MOB, POS, and interest rate (PLR) are found to be non-stationary at the level but become stationary after first difference. However, the ARDL model bound test is employed to determine the long-run equilibrium relationship between the endogenous variables and the exogenous variables.

Table 2: Autoregressive Distributed Lag (ARDL) Model Bound Test – Cointegration Test

Test Statistic	Value	Sign	Lower Bound I(0)	Upper Bound I(1)
F-statistic	12.41624	10%	2.2	3.09
K	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Source: Author's computation using E-views 10

To determine the cointegration test in the ARDL model, we compare the F-statistic (12.416) to the upper and lower bound critical values. Since the F-statistic exceeds the upper bound (3.49) at 5% significance level, we establish a long-run equilibrium dynamic. This satisfies the necessary condition that requires a statistically significant error term.

Table 3: ***ARDL Error Correction Model and Short Run Dynamics***

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(D_ATM)	-0.5323	0.1268	-4.1977	0.0000
D(D_ATM(-1))	-0.7843	0.1629	-4.8157	0.0000
D(D_ATM(-2))	-0.3597	0.1312	-2.7418	0.0068
D(D_POS)	-0.4865	0.1303	-3.7337	0.0003
D(D_POS(-1))	-0.8669	0.1455	-5.9570	0.0000
D(D_POS(-2))	-1.7614	0.1548	-11.3765	0.0000
D(D_POS(-3))	-0.4835	0.1665	-2.9045	0.0042
D(D_MOB)	0.1062	0.0570	1.8628	0.0611
D(D_MOB(-1))	-0.7843	0.1042	-7.5147	0.0000
D(D_MOB(-2))	-0.7192	0.0992	-7.1801	0.0000
D(D_MOB(-3))	-0.2992	0.0669	-4.4928	0.0000
D(D_PLR)	28529.2900	72578.9800	0.3930	0.6949
CointEq(-1)*	-1.0639	0.0751	-13.7897	0.0000

R-Square = 0.803, Adjusted R-Square0.789, DW = 2.091. F-Statistics 40.057 Prob(F-statistics) 0.000
Source: Author's Computation

The coefficient of the (ECT(-1) is (-1.0639) and the probability value is (0.000), which implies that the test is negative and statistically significant, satisfying the sufficient condition for co-integration and confirming a long-run relationship between the explained and explanatory variables.

Table 4: Long-run Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ATM	0.392	0.494	0.792	0.429
MOB	0.858	0.227	3.779	0.000
POS	0.965	0.4245	2.272	0.024
PLR	-111704.0	135904.5	-0.822	0.412

EC = SVP - (0.392*D ATM + 0.965*MOB -111703.9512*D POS +0.858*D PLR +182880.244)

Source: *Author's Computation*

The table 4, highlights that, automated teller machine (ATM) is not statistically significant (p = 0.429) and point of sale (POS) have positive and significant relationship with savings performance (SVP)

because the p-values (0.024) is less than 0.05, while interest rate (PLR) has a negative significant relationship with savings performance (SVP) this the case because the p-value (0.412) is insignificant at the 0.05 level. Mobile banking (MOB) is found to be positively related to saving performance (SVP); its relationship is significant because its probability value of MOB is (0.000) less than 0.05. Meanwhile, the short-run result in Table 4.3 showed that collectively, automated teller machine ATM, MOB, POS, and interest rate (PLR) account for about 103% of the adjustment to equilibrium of SVP each month.

4.2 Diagnostic Test

The model is subjected to a diagnostic test to assert the adequacy of the model.

Table 5: Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.908	Prob. F(2,152)	0.152
Obs*R-squared	4.210	Prob. Chi-Square(2)	0.122

Source: *Author's Computation*

The Breusch-Godfrey test results indicate no serial correlation in the model. With a probability value of 4.210 being greater than 0.05, we fail to reject the null hypothesis, suggesting that the model is free from serial correlation issues.

4.3 Discussion of Findings

The study reveals the impact of digital banking tools on savings performance (SVP) in Nigeria and found that both MOB and POS systems have a positive and significant dynamic with savings performance in Nigeria. This suggests that the increased availability and accessibility of these digital banking services have made it easier for individuals to save, even in rural or remote areas. While no statistically significant relationship was found between PLR and savings performance (SVP). This implies that as interest rates increase, the public may be less inclined to save, possibly due to factors like higher inflation expectations or reduced disposable income available for saving. This finding echoes the results of studies such as those by Oluranti et al. (2020), who also found that higher interest rates tend to discourage savings in emerging economies, as they are often associated with economic instability or less favorable economic conditions. Conversely, some researchers (e.g., Uche & Bello, 2018) have suggested that while high interest rates could promote savings, their effect may be tempered by other macroeconomic factors, such as inflation.

In contrast to the positive effects of mobile banking (MOB) and point-of-sale (POS) services, the study found that automated teller machines (ATM) do not have a significant relationship with savings performance in Nigeria. However, Abdullahi et al. (2025) reported that ATMs exert a significant influence on the corporate performance of deposit money banks in Nigeria, largely due to their convenience and accessibility to customers. Although ATMs possess the potential to enhance savings by providing users with flexible, round-the-clock access to financial services, the present findings indicate that this potential has not been fully realized. This limitation may be attributed to factors such as insufficient ATM coverage, low digital literacy among users, and persistent security concerns, particularly in rural areas of Nigeria.

In the short run, the combined effects of ATMs, mobile banking, POS, and interest rates account for about 103% of the adjustment to equilibrium of savings performance each month. This indicates that while the relationship between these factors and savings performance is significant, it is not overwhelmingly

dominant. Other factors, such as economic policies or societal attitudes toward savings, likely play a larger role. This short-term effect is consistent with studies such as Adefolalu et al. (2020), which found that while electronic banking services influence savings behavior, macroeconomic factors often dominate in explaining savings patterns in the short run.

5. Conclusion

The study investigated the relationship between digital banking tools and savings performance in Nigeria, focusing on automated teller machines (ATMs), point-of-sale (POS) systems, mobile banking (MOB), and interest rates. The findings revealed that mobile banking and POS systems have a positive and significant effect on savings performance, while interest rates showed a negative but insignificant relationship. Despite its potential, the ATM was found not to have a significant influence on savings mobilization within the Nigerian context. These results emphasize the importance of digital banking tools in improving access to financial services and promoting saving habits among individuals. However, the findings also suggest that fluctuations in interest rates may discourage saving, particularly in times of economic instability or reduced disposable income. Overall, while digital banking tools significantly contribute to improved savings performance, broader macroeconomic conditions and socio-cultural factors appear to exert a stronger influence on saving behavior in Nigeria.

Based on these findings, it is recommended that Nigerian banks and financial institutions increase the availability and accessibility of ATMs and POS terminals, particularly in rural and underserved areas. Expanding the infrastructure for these services would facilitate greater financial inclusion, enabling more individuals to access banking services and save more efficiently. Policymakers should consider measures to lower interest rates or stabilize the macroeconomic environment to foster conditions conducive to savings. Reducing inflation and promoting economic stability would help preserve the real value of savings, thereby encouraging individuals to save more. Furthermore, central banks should adopt policies that protect savings from inflationary pressures. Given the dynamic nature of the financial landscape, it is essential to continue monitoring the impact of digital banking services on savings performance. Future studies should examine the long-term influence of ATMs on saving behavior and consider additional factors such as income level, education, and cultural attitudes toward savings.

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