



Technology and Financial Innovation: Implications for Banking, Fintech and Monetary Policy in Nigeria

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Abstract

The study explored the implication of technology and financial innovation on banking, fintech, and monetary policy in Nigeria for the period 2009-2024. The study adopted an ex-post facto research design in which the regressors proxied by ATM, check, mobile pay, NEFT, POS, and web pay were regressed against the response variable in a multiple regression model using Ordinary Least Square (OLS) estimators in functional forms. Data for each of the variables was obtained from the Central Bank of Nigeria (CBN) statistical bulletin for 2024. Findings showed that financial innovation in its various forms wholly or partially has significant positive and negative impact on both banking and monetary policy. In view of the findings, it is concluded that technology and financial innovations have a significant impact on banking proxied by deposit money, bank loans, and credit to the private sector as well as monetary policy proxied by the brought money supply, exchange rate, and interest rate. In view of the findings, it was recommended that a proper regulatory framework should be put in place to check the abuse of financial innovation on the monetary system. It is also expedient that proper education should be provided to users of the technology so as to guard against cyber fraud associated with the innovations.

Keywords: Banking, Technology, Cyber Fraud, Innovations, Monetary Policy, Mobile Pay



Introduction

The advent of technology and the introduction of digitization in the payment system have reshaped the global monetary and financial systems' landscape, causing an upsurge in the use of digital platforms for financial transactions in both developed and developing economies (Maryaningsih et al., 2022; Obiora, 2023; Ajibola et al., 2024). The use of digital platforms in the payment system became more expedient during the Covid-19 pandemic as a way to reduce physical contact while also keeping the spread of the virus under control. The introduction of the new payment system has accelerated growth in financial transactions across various regions, but it has also created challenges for policymakers, as this new technology has led to a decrease in the demand for money, raising concerns about the effectiveness of monetary policy and the independence of central banks.

The use of technology in financial transactions has been evidenced by the use of blockchain technology in such climes as Estonia, Georgia, the United Arab Emirates (Dubai), Switzerland, and Singapore. Understanding the role of blockchain technology in boosting innovation, improving public services, creating job opportunities, reducing corruption, and driving economic growth, Nigeria developed and implemented a national blockchain policy in 2023 as a prelude to becoming active players in the new monetary ecosystem with a view to benefiting from the anticipated BT-driven injection of \$1.76 trillion to the global GDP by 2030 (FGN, 2023). Despite the anticipated benefits associated with BT adoption and implementation, it should be admitted that the process is still in its infancy and is therefore not devoid of challenges. However, present-day financial innovation can be attributed to technological innovation as the significant dynamism behind its success.

Noting from this assertion, Manasseh et al. (2023) observe that, over the past two decades, financial technology has revolutionized the financial sector as information and communication technology (ICT) platforms have enabled the use of different digitalized financial services, from automated teller machines (ATMs) to mobile payment systems, online banking, and blockchain technologies. Corroborating this position, Babarinde (2023) asserts that, at present, Nigeria's digital financial services are dominated by digital/electronic payment services such as POS, ATM, webpay, mobile pay, Remita, Nigerian Interbank Settlement System (NIBSS) instant payment (NIP), NIBSS electronic funds transfer (NEFTS), NIBSS automated payment services (NAPS), central pay, m-cash, e-bills/pay, among others. The volume and value of each of these payment statistics, as revealed by CBN (2024), indicate that, between 2009 and 2024, the volume of POS transactions rose from 918,256 with the value of N11.03 billion in 2009 to the volume of 3,545,883,829 with the value of N83,527.76 billion in 2024, representing a percentage increase of 386,054.17% in volume and 757,177.96% in value, respectively. Similarly, ATM transactions increased from 109,161,646 in volume and N548.60

billion in value in 2009 to 285,854,504 in volume and N9,194.08 billion in 2024, representing a 161.86% increase in volume of transactions and a 1575.92% increase in value of transactions, respectively.

Consequently, web pay transactions increased in volume from 2,703,516 in 2009 to 6,143,121,424 in 2024, representing a percentage change of 227,127.11%, while the value of web pay in the same period rose from N84.15 billion to N571,620.47 billion, indicating a percentage change of 679,187.54%. On the other hand, mobile pay rose from 5,259,477,576 in volume in 2009 to 6,143,121,424 in 2024, a percentage change of 16.80%. In terms of value, mobile pay rose from N1.27 billion in 2009 to N131,643.31 billion in 2024, a percentage change of 10,365,514.96%.

On average, there has been an annual increase in volume and value of POS transactions by 24,128.38% and 47,323.62%, respectively. In the case of ATM transactions, the annual average had been a 10.11% increase in volume and a 98.495% increase in value, respectively. Apparently, the annual average of percentage changes with regard to web pay in terms of volume and value had been 14,195.44% and 42,449.22%, respectively. Furthermore, mobile pay, on average, had an annual percentage change of 1.05% and 647,844.68% in volume and price, respectively.

However, it has been noticed that check transactions have reduced from 29,166,780 in volume in 2009 to 3,829,565 in 2024, representing a percentage reduction in check usage of 86.87% for the period between 2009 and 2024. The value of check transactions in billions in 2009 had been N29,436.02 billion, while this fell to N5,416.69 billion in 2024, a percentage reduction of 81.59%. On the annual average, the volume and value of check transactions within the reviewed period had been 5.42% and 5.09%, respectively. The information clearly indicates that technology and innovation have greatly impacted financial transactions more than the conventional approach to financial intermediation. Thus, changes in the global financial system landscape have provided a considerable direction towards recognizing the place of financial innovation in the monetary system of any economy.

Financial innovations, as noticed by Olugbenga and Ashegon (2024), have transformed the global monetary system and reformed the way financial services are provided. And as a consequence, their role in the economies is expanding. For instance, in the banking sector, financial innovation appears to provide better financial services, higher credit facilities, higher liquidity, and a wider variety of financial instruments. These factors result in higher economic growth as well as sustainable development for the country (Sirait et al., 2023). Though it is noticed in some quarters that the link between financial innovation and economic growth in Nigeria and other developing nations has not been properly explored despite its significant contribution to financial development, it is, however, worth mentioning that financial



innovation that becomes the permanent feature of the capital market results in a financial system that is robust and optimal (Oyadeyi, 2023).

Apparently, innovation has been acknowledged as a key driver of economic growth, though financial innovation in the Nigerian economy is associated with such issues as inadequate financial literacy education, a gender gap in account ownership, low rates of financial deepening and inclusion, weak telecommunication services in rural areas, deficient infrastructural development, insufficient security measures, and inadequate power supply. On the basis of these limitations to effective adoption and implementation of financial innovation in the country, further endeavors are required to attain the intended augmentation in economic growth and sustainability in Nigeria.

Nigerian financial institutions, namely Deposit Money Banks (DMBs), have adopted financial technology innovation platforms to encourage the expansion of financial services and inclusion in the economy (Adedokun & Ağa, 2023). However, a significant proportion of the Nigerian population does not have access to banking services, resulting in a slow adoption of financial innovation and low levels of financial inclusion. A significant proportion of adults remain financially excluded. The majority of those who are financially excluded are both educationally disadvantaged and reside in rural areas. The adoption of financial innovation products and services is often perceived as ambiguous and overwhelming due to a combination of factors such as ignorance, illiteracy, lack of understanding of the modern banking system, and fear of fraud and theft (Omankhanlen et al., 2022).

Babarinde (2023) asserts that advances in information and communication technology have highlighted the significance of the internet and other digital channels and technologies in delivering banking and financial services, emphasizing technology and innovation as key drivers of change in the country's payment system. The application of financial innovations in the Nigerian financial system is evidenced by the provision of banking and financial services to clients the provision of banking and financial services to clienteles without the need for physical contact between the providers and the consumers of the financial services. In Nigeria, the formal launch of the CBN's National Financial Inclusion Strategy (NFIS) in 2012 gave impetus to the digitalization of banking and financial service provision in the country, banking and financial service provision in the country with more emphasis on digital payment systems. Furthermore, the revised version of the 2018 NFIS emphasized four strategic areas of agency banking, mobile banking/mobile payments, linkage models, and client empowerment. The foregoing thus presents a larger picture of what is expected of technology and innovation in the Nigerian monetary system.

In the conventional monetary system, a central bank is entrusted with the responsibility of producing and issuing banknotes (cash), referred to as "fiat currency" that is backed by the



credibility of a government, and private money (or private sector-issued money) like bank deposits (Shirai, 2020). Under this system, the central bank is tasked with the responsibility of issuing money with the primary objective of maintaining price stability. However, the fintech-led evolution in payment systems had seen an unprecedented transformation in the concept of currency (Forster et al., 2021). This technological revolution that saw the emergence of digital ledger, blockchain, and other technological developments, as well as the advent of private virtual currencies, "stablecoins," has forced the central banks to actively pursue the merits of issuing a so-called "Central Bank Digital Currency (CBDC)" (Bossu et al., 2020). Similarly, a number of global trends and some jurisdiction-specific motivations have influenced the interest of central banks and accelerated their work in CBDC (Auer et al., 2022). These global trends are, first, the rapid increase in interest in Bitcoin and other cryptocurrencies that compete with traditional forms of money; second, the advent of private sector-issued stablecoins, which are distinct from other cryptocurrencies, as they are designed to maintain a stable value through their backing of assets with major currencies; and third, the entry of big technology companies and the several challenges that the huge volume of personal data that is collected and processed as an input into their business activities pose for central banks (Ogun, 2022).

The extent to which technology and financial innovation impact the country's monetary system has continued to generate many debates. While some scholars (Ekong & Ekong, 2022; Eromosole, 2021; Nkechika, 2022) looked at technology and financial innovation from the point of financial inclusion, others (Aminu et al., 2022; Okon et al., 2023; Ajibola et al., 2024) view the development from the perspective of economic growth. However, it is important to contribute to the debate by examining the impact of technology and financial innovation from the perspectives of banking, fintech, and monetary policy. This is what the current study is poised at investigating. Specifically, this study is directed at examining the impact of financial innovation on banks' intermediation functions, the impact of technology and financial innovation on Fintech, and the impact of technology and financial innovation on monetary policy.

Literature Review

The financial industry is becoming more and more relevant as well as competitive on a global scale, and staying competitive requires being flexible, adaptable, and open to new ideas (Awaliyah et al., 2023). The rapid pace at which innovation and dynamism propel the financial sector has led to a surge in expenditure on Information and Communication Technology (ICT) by financial institutions, particularly deposit money banks (DMBs) (Islam et al., 2022). The financial sector's services have been globally revolutionized and reformed by financial innovation, leading to a growing recognition of its significance to economies (Okoi et al., 2025).



The implementation of financial innovation has facilitated the transformation of financial service sectors from conventional methods of financial transactions to contemporary innovative approaches, thereby enhancing the efficiency of their services. This transformation has resulted in the advancement of payment systems, improved investment prospects, the availability of alternative assets for storing wealth, and the facilitation of financial transactions in international trade. Furthermore, financial innovation has also played a pivotal role in promoting financial inclusion, ultimately contributing to economic growth and development (Oluseye et al., 2025). Though the innovations resulting from the 2008 financial crisis have faced criticism for abuse and misuse, scholars have highlighted the significant economic benefits of financial innovations that integrate technological advancements. Technological innovations, such as digital finance, have enhanced the payment systems' unification globally. In Africa, it has redefined the types of financial products and services that are accessible within the financial system. Digital financial services as a financial innovation have changed the financial system and have principally simplified the approaches and procedures of financial service delivery. The relationship between digital financial services as an offshoot of financial innovation and financial development has witnessed different views in theory and empirical studies (Manasseh et al., 2023).

Implication for Banking

The impact of digitalization is significantly seen in the banking sector. Abstracting from this, Enebeli-Uzor (2024) asserts that digitalization is revolutionizing the banking landscape in Nigeria, enhancing efficiency and customer engagement. The significance of digitalization in the banking sector is evidenced in leaner cost structures, automated service production, and reduction in the need for physical branches, contributing to long-term profitability, bank stability, and economic growth. Alluding to this assertion, Appah et al. (2023) note that the growing attractiveness of transactions and payment services through digital platforms has exposed the incredible prospective to increase financial services through financial technology. Consequently, the use of digital financial services in the contemporary intermediation process has improved the lives of people by minimizing the need to carry cash or spend time traveling over long distances to get to the nearest point of banking services (Iwedi et al., 2023).

El-Yaqub and Ismail (2025) observe that the advent of digital currencies has significantly transformed the global financial landscape, introducing both opportunities and challenges for traditional banking institutions. For instance, the launch of eNaira in October 2021 by the Central Bank of Nigeria (CBN) was aimed at enhancing financial inclusion, improving payment systems, and reducing the costs associated with physical cash management. However, one of the primary concerns regarding the adoption of digital currencies is the



potential disintermediation of traditional banks. As customers transition to using digital wallets provided by the central bank, there is a risk that deposits may migrate from commercial banks to the eNaira platform. This shift could diminish the deposit base of DMBs, subsequently affecting their liquidity positions and their ability to extend credit (International Monetary Fund, 2021). Such a development poses significant challenges to the traditional banking model, which relies heavily on deposit mobilization for lending activities (El-Yaqub, 2024).

Despite the observed anomalies, the Central Bank of Nigeria (2021) posits that the introduction of the eNaira presents opportunities for DMBs to innovate and enhance their service offerings. By integrating digital currency functionalities into their platforms, banks can offer seamless and efficient payment solutions, attracting a broader customer base. Moreover, the eNaira's potential to reduce transaction costs and improve payment efficiency aligns with the banks' objectives of enhancing customer satisfaction and operational efficiency. Therefore, strategic collaboration with the CBN in promoting and utilizing the eNaira could position DMBs to leverage the benefits of digital currency adoption.

Nonetheless, the implementation of digital currencies could also introduce risks related to cybersecurity and operational resilience (El-Yaqub et al., 2024). The digital nature of the eNaira necessitates robust cybersecurity measures to protect against potential threats that could compromise the integrity of the financial system. Consequently, banks must invest in technological infrastructure and employee training to effectively manage and support digital currency transactions (International Monetary Fund, 2021). Failure to address these challenges could undermine public confidence in both the digital currency and the banking institutions facilitating its use (Ismail et al., 2024).

Implication for Fintech

Fintech has been explained by the Financial Stability Board (FSB) (2019) to mean "technology-enabled innovation in financial services that could result in new business models, applications, processes, or products with an associated material effect on the provision of financial services." Generally, Kumar and Rani (2024) believe that FinTech is utilized to help companies, business owners, and consumers better manage their financial operations, processes, and lives by utilizing specialized software and algorithms that are used on computers and, increasingly, smartphones. Okon et al. (2023) see FinTech as the integration of information and communication technology into the operational and business activities of classical financial systems for financial transactions, payment, insurance, and peer-to-peer lending. The incorporation of financial technology (FinTech) into the mainstream operational and business activities of the classical financial systems has successfully reshaped, restyled, and eliminated some of the barriers associated with classical financial systems (Udo et al., 2023). Financial



inclusion, therefore, results when various FinTech platforms are integrated to make formal financial services available, accessible, and affordable to all households and enterprises (Chand et al., 2025).

The financial sector, like all other areas of human endeavor, has experienced significant technological influence, and the technological ecosystem has become so powerful that no sector can develop and maintain its growth without some technological input (Akinbajo et al., 2024). The influence of technology through the FinTechs has resulted in widespread use of the digital currency known as cryptocurrency. These growing innovative activities, driven by FinTechs and other third parties, have brought about the development of new types of products, including alternative financing and digital financial products (Eromosole, 2021).

Globally, the adoption of FinTech in the financial system comprises traditional applications such as backend operations for banks, information and data storage and processing infrastructure, Automated Teller Machines (ATMs), and credit cards to more disruptive and innovative applications like blockchain, peer-to-peer lending, cryptocurrency, agent banking, mobile money, payments processing, microfinance and lending, digital banks, and the use of machine learning algorithms and data science to perform all tasks from processing credit risks to running hedge funds. The effectiveness of FinTech in the new financial innovation architecture is predicated on the fact that FinTech companies operate mainly in digital financing, investments, financial advisory (robo-advisors), and digital money (cryptocurrencies and online payments). Consequently, FinTech firms also adopt various technologies like blockchain technology, big data analytics, the Internet of Things (IoT), cloud computing, artificial intelligence (AI), robotics, and social media networks to enable their financial activities. Similarly, cybersecurity infrastructure, intuitive user interfaces, and mobile device technologies are all important for enabling the deployment of FinTech solutions (Kamur & Rani, 2024). The relevance of FinTech in digital finances is commendable in that, as observed by Eromosole (2023), FinTechs use technology and innovation to offer affordable products and services that support households and businesses in managing other development challenges, services that support households and businesses in managing other development challenges such as school fee payments and collections, education loans, accessing health grants and products, off-grid solar, and payment for water and sanitation services, among others. Thus, the anticipated growth of mobile payments infrastructure offers tremendous opportunity to unlock inclusive new business models directly targeting the poor in the areas of affordable credit, savings, micro-insurance, and financing for basic services. And what digitization does is improve the commercial viability of serving these markets.



Implication for Monetary Policy

Traditionally, the economy of money and payments had been confined to central banking and the financial industry. However, in the past few decades, financial systems have witnessed massive developments on a global scale due to changes and innovations within the financial system (Ahmert et al., 2024; Oyadeyi, 2024). The financial system is also critical to the conduct and performance of central bank operations and the channels through which they impact economic activity. This is because the financial system, through the use of monetary policy channels, is the conduit that allows monetary policies to affect economic activities. Monetary policy operations affect the economy through five channels of asset price, credit, exchange rate, inflation expectations, and interest rate. And financial development plays a crucial role in these operations. Accordingly, financial development and the monetary policy decisions of central banks may be related in two opposing ways. First, financial developments, as well as financial innovations, may weaken the role of traditional financial institutions in providing finance to the real sector when these developments and innovations deepen capital market liquidity. This may, in effect, weaken the credit channel, since households and firms may switch from traditional financial institutions, such as commercial banks, as the external finance premium of bank funding rises (Oyadeyi 2023). Secondly, financial development can also strengthen the monetary transmission process, since economic agents operating in highly developed financial markets are more likely to influence activities within the financial system, and their decisions tend to be connected with the policy authorities (Meneses-González et al. 2022).

Based on this opposing position, Okpara and Theophilus (2026) alert that digital money's emergence may exclude certain components of the money stock in the economy outside the monetary authority's influence. This may affect the central bank's ability to implement monetary policy effectively. For instance, in a cashless economy, the central bank can monitor agents' transactions and balance sheets, but there are higher costs associated with adopting and operating digital applications, which may limit their widespread use.

Furthermore, the future of monetary policy will be affected by the extent and method of adoption of digital currencies. There are three possible methods of adoption: global adoption, regional bloc adoption, and multipolar intense competition, particularly regarding Central Bank Digital Currencies (CBDCs). For countries experiencing rising and volatile inflation and foreign exchange instability, stablecoins and CBDCs will likely replace domestic currency as a store of value and unit of account, leading to currency substitution. Currency substitution can impede the central bank's control of domestic liquidity since a component of the money stock is now outside its direct influence. Consequently, the convenience and accessibility of digital currencies will drive currency substitution faster, especially with lower costs, as remittances flow more easily.



Economic agents will have to monitor exchange rates in the case of global or regional bloc adoption, particularly with CBDCs. This may spur price adjustments frequently. For countries with a less developed financial sector relative to the size of the economy, capital outflows can occur more efficiently, affecting the stock of money and monetary policy conduct. Therefore, adopting digital currencies can have significant implications for the future of monetary policy. Central banks must consider these implications and strategize accordingly to maintain control over domestic liquidity and ensure monetary stability. Therefore, policymakers need to consider the impact of digital money on monetary policy formulation and ensure that it complements, rather than undermines, their efforts.

Theoretically, this study is anchored on Task-Technology Fit by Goodhue and Thompson (1995) and the Unified Theory of Acceptance and Use of Technology by Vantakesh et al. (2003).

The Task-Technology Fit Model developed by Goodhue and Thompson (1995) believes that the match between task requirements and technology characteristics predicts the utilization of the technology and individuals' performance. The theory was directed at explaining the utilization of technology by examining the fit of technology to users' tasks/requirements. Marikyan and Papagiannidis (2025) note that the purpose of the theory was to add to the body of knowledge on technology utilization in the private and public contexts, which had limited explanations of how the acceptance of technology contributes to individuals' performance.

Task-technology fit represents the interdependence between an individual (a technology user), technology (data, hardware, software tools, and the services they provide), and task (activity carried out by individuals to produce the required output) characteristics. The degree to which technology is capable of performing a user's tasks is contingent on the degree to which individual abilities, task requirements, and technology functionalities match (Goodhue & Thompson, 1995). The utilization component reflects the act of using the system evaluated by the frequency or diversity of use. The utilization is determined by a number of attitudinal and belief factors, contributing to the use of technology in both mandatory and voluntary settings. These factors include, but are not limited to, social norms, attitudes to behavior, and expected consequences.

Conceptually, TTF includes five constructs that represent the model, namely, task characteristics, technology characteristics, task-technology fit, technology utilization, and performance impact. While task characteristics and technology characteristics reflect the specific dimensions of the technology and its utilization, the general task-technology fit factor captures individuals' perceptions of task-technology fit (Goodhue & Thompson, 1995; Goodhue, 1992). The TTF model also has three propositions. The first proposition states that the user's evaluation of task-technology fit is determined by both task characteristics and the



characteristics of the technology. The degree to which a system assists an individual in performing his or her portfolio of tasks is measured by users' rating of eight dimensions: quality, locatability, authorization, compatibility, production timeliness, systems reliability, ease of use/training, and relationship with users.

How have technology and financial innovation fit the model in the growing world of technology and innovation? The changing landscape in the world of commerce and finance requires enabling technology to ensure speedy and efficient performance of tasks. Apparently, the current invention of e-money and the drive towards a cashless society mean the products of technology must be qualitative, must not be restricted to a particular location, must have the authorization of governmental authority to ensure the security of users, and must be compatible with the needs of the users. It has been noticed that digital finance in the form of cryptocurrencies demonstrates that technology fits the yearning of the people and the task expected to be performed with it.

The Unified Theory of Acceptance and Use of Technology (UTAUT), proposed by Venkatesh et al. (2003), was designed proposed by Venkatesh et al. (2003) was to provide a holistic understanding of technology acceptance and to examine the acceptance of technology, determined by the effects of performance expectancy, effort expectancy, social influence, and facilitating conditions. As explained by Marikyan and Papagiannidis (2025), performance expectancy is defined as "the degree to which an individual believes that using the system will help him or her to attain gains in job performance." Effort expectancy is defined as "the degree of ease associated with the use of the system. Social influence is defined as "the degree to which an individual perceives that important others believe he or she should use the new system. "Facilitating conditions" is defined as "the degree to which an individual believes that an organization's and technical infrastructure exist to support the use of the system."

The use of the two theories is appropriate in the sense that, the advances in information communication technology (ICT) have dramatically changed the way organizations conduct business. The application of the technologies in the workplace has redefined inter- and intra-organizational communication thereby streamlining business processes to ensure benefits, such as higher productivity, the wellbeing of employees and the satisfaction of consumers (Marikyan & Papagiannidis, 2025). To achieve such benefits, companies make massive spending on technologies. However, investment in ICT implementation does not guarantee successful deployment and often bring low returns (Davis, 1989; Venkatesh et al., 2003).

Various studies have amplified the significance of technology and financial innovation in financial inclusion and economic growth. However, only a few had really bordered on technology and financial innovation in the monetary system.

In a study by Omankhanlen et al. (2022), the effect of financial development on economic growth in Nigeria covering 1990-2019 was explored. Though the focused research goals were to investigate the linkages among market capitalization, money supply, and credit to the private sector on the economy's growth, findings showed that the market capitalization and ratio of money supply to GDP of the financial development have a bigger impact on the economic growth in Nigeria. However, the ratio of credit to the private sector to GDP of financial development was inversely not significant to economic growth in Nigeria.

In another study, Maryaningsih et al. (2022) attempted to explain the differences in Central Bank Digital Currency (CBDC) adoption across emerging and advanced countries using an ordered probit model. Based on a cross-country dataset, it was found that wholesale CBDC is more advanced in countries with developed financial markets and greater cross-border transactions. Retail CBDC is more advanced in countries with lower financial inclusion and a large informal economy. This study finding aligned with the task-technology fit theory, which posits that technology, when it fits a given task, results in performance. This explains why wholesale CBDCs thrive in countries with higher technology.

Babarinde (2023) specifically examined the relationship between elements of financial innovation and banking, proxied by sectorial credit allocation of deposit money banks in Nigeria. The study, which employed a quantitative approach, found digital finance and banks' credit allocation to have a strong and positive correlation in Nigeria. The study revealed further that the value of POS transactions had a negative and non-significant impact on credit allocation, while the value of ATM and WEBPAY transactions had positive but non-significant impacts on banks' credit allocation in Nigeria. It was concluded that, while a strong and positive correlation exists between digital finance and banks' credit allocation, digital finance does not exert significant impact on the credit allocation function of deposit money banks in Nigeria in the period of study.

A study by Babarinde et al. (2024) on the impact of digital finance on stock market performance in Nigeria specifically assessed the influence of automated teller machine (ATM), point of sales (POS), mobile payment (mobile pay), and web-based payment (webpay) digital finance transactions on stock market capitalization ratio in Nigeria. Utilizing fully modified ordinary least squares regression to investigate the impact of digital finance on stock market performance in Nigeria, the study revealed that ATM, POS, mobile pay, and web-based digital finance transactions had a positive and significant impact on the stock market capitalization ratio in Nigeria and therefore concluded that digital finance contributes to enhancing stock market performance in the country.

A study by Enebeli-Uzor (2024) on the interplay between digitalization and banking industry stability and economic growth in Nigeria employed annual time series data spanning

1981 to 2022. Using the least squares estimator to analyze the multiple regression model, the study found that digitalization and financial deepening negatively impact economic growth due to digital prematurity and financial shallowness. However, bank stability and bank assets positively influence economic growth. In conclusion, the study asserts that, although digitalization and financial deepening have the potential to enhance growth for other nations, Nigeria's digital maturity level is too low to propel economic growth effectively. Nonetheless, stability in the Nigerian banking industry and bank assets contribute positively to the country's economic growth trajectory.

Olugbenga and Ashogon (2024) employed time series data to examine the relationship between financial innovation, economic growth, and sustainable development in an emerging market. Statistical data analysis techniques were employed to evaluate the secondary data on financial innovation. Findings indicated that financial innovation has a significant impact on both economic growth and sustainable development in Nigeria and therefore suggested that financial institutions should prioritize easy and secure access to financial services when developing their financial innovation strategies.

Ishioro (2023), in an attempt to establish a link between e-payment systems and financial inclusion (FI) in Nigeria, adopted the normalized cointegration technique to test for a long-run relationship among the variables. Findings suggested that a long-run positive relationship existed between the surrogates of e-payments and financial inclusion in Nigeria and recommended the widening and deepening of the e-payment mechanism in Nigeria to enhance sustainable financial inclusion.

Oyadeyi (2024) examined the asymmetric cointegration and asymmetric effects of financial development and monetary policy on monetary transmission mechanisms in the Nigerian context using annual data spanning the period from 1986 to 2023. The findings established the existence of asymmetries in both the short and long run, revealing that the impacts of financial development and monetary policy on the different monetary policy channels are not uniform. These asymmetries indicate that the responses of various economic variables to monetary policy actions differ depending on the level of financial development.

Zwigina et al. (2023) empirically investigated the impact of electronic payment systems on economic growth in Nigeria between 2009 and 2018. The study employed descriptive statistics, correlation analysis, and an Auto Regressive Distributed Lag (ARDL) model to draw inference. The result of the ARDL Model revealed that electronic payment systems had a positive impact on economic growth in Nigeria within the period under review.

Abstracting from the empirical review, it can be admitted that financial innovation has differing impacts on different macroeconomic variables. While most of the review focus had been on the impact of digital finances on economic growth, there is scanty mention of the

impact of digital finances on banking and monetary policy. More so, none of the reviews undertook a comprehensive impact of digital finances on banking and monetary policy simultaneously. The present study makes an attempt at filling this gap.

Methodology

The study adopted a mixed research approach, where both qualitative and quantitative methods were used. In examining the impact of financial innovation on banking, it was necessary to adopt a quantitative approach so as to establish a causal relationship between the two variables. In the case of the implication of financial innovation on FinTech, it was necessary to use a descriptive approach since the element of measurability of FinTech is blurred. Consequently, in attempting to examine the implication of financial innovation on monetary policy, it was also necessary to look at the causal relationship between the two, and the use of a quantitative approach is justified. Thus, to examine the implications of technology and financial innovation on banking, indices of banking intermediation, such as bank credit to private sectors and deposit money bank loans, were used as proxies for banking, while proxies for financial innovation included ATM, mobile pay, web pay, POS, and NEFT. Also, while examining the implications of technology and financial innovation on monetary policy, monetary policy channels such as broad money supply (M2), exchange rate, and monetary policy rate were used.

Data on all selected variables were obtained from the Central Bank of Nigeria (CBN) statistical bulletin, 2024 edition. To determine the causal relationship between the selected variables, Ordinary Least Square (OLS) estimator in functional forms were used. For the indices of financial innovation, volume of their transactions were used. Exchange rate was the official exchange rate for the dollars, money supply was the nominal value of M2 in N'billion.

Model Specification

Based on the nature of the study which seeks to establish the impact of financial innovation on banking and monetary policy, the functional model is presented as;

$$\text{Banking} = f(\text{FI}) \quad 1$$

Where FI = financial innovation

Again, the relationship between financial innovation and monetary policy can be expressed as;

$$\text{MP} = f(\text{FI}) \quad 2$$

Where MP = monetary policy

Disaggregating banking in (1) into indicators like credit to private sector (CPS) and Deposit money bank loan (DMBL), we can rewrite (1) into two distinct equations as;

$$\text{CPS} = f(\text{FI}) \quad 1.1$$

$$\text{DMBL} = f(\text{FI}) \quad 1.2$$

Where CPS and DMBL are as earlier explained.

Also, substituting the proxies for financial innovation (ATM, Cheque, mobilepay, NEFT, POS and webpay) into (3.1) and (3.2), we have

$$\text{CPS} = f(\text{ATM, Cheque, mobilepay, NEFT, POS, webpay}) \quad 1.1.1$$

$$\text{DMBL} = f(\text{ATM, Cheque, mobilepay, NEFT, POS, webpay}) \quad 1.2.1$$

Consequently, the implication of financial innovation on monetary policy as expressed in (2) can be expanded to look as;

$$\text{MP} = f((\text{ATM, Cheque, mobilepay, NEFT, POS, webpay})) \quad 2.1$$

Disaggregating monetary policy into credit channel, exchange rate channel and interest rate channel, we have;

$$\text{BMS} = f((\text{ATM, Cheque, mobilepay, NEFT, POS, webpay})) \quad 2.1.1$$

$$\text{EXCH} = f((\text{ATM, Cheque, mobilepay, NEFT, POS, webpay})) \quad 2.1.2$$

$$\text{MPR} = f((\text{ATM, Cheque, mobilepay, NEFT, POS, webpay})) \quad 2.1.3$$

Amending 1.1.1- 2.1.3 for econometric estimation in any functional form, we have;

$$\text{CPS} = \beta_0 + \beta_1\text{ATM} + \beta_2\text{CHQ} + \beta_3\text{mobilepay} + \beta_4\text{NEFT} + \beta_5\text{POS} + \beta_6\text{webpay} + \mu t \quad 3.1$$

$$\text{DMBL} = \beta_0 + \beta_1\text{ATM} + \beta_2\text{CHQ} + \beta_3\text{mobilepay} + \beta_4\text{NEFT} + \beta_5\text{POS} + \beta_6\text{webpay} + \mu t \quad 3.2$$

Furthermore, 2.1.1-2.1.3 can be presented explicitly as;

$$\text{BMS} = \beta_0 + \beta_1\text{ATM} + \beta_2\text{CHQ} + \beta_3\text{mobilepay} + \beta_4\text{NEFT} + \beta_5\text{POS} + \beta_6\text{webpay} + \mu t \quad 4.1$$

$$\text{EXCH} = \beta_0 + \beta_1\text{ATM} + \beta_2\text{CHQ} + \beta_3\text{mobilepay} + \beta_4\text{NEFT} + \beta_5\text{POS} + \beta_6\text{webpay} + \mu t \quad 4.2$$

$$\text{MPR} = \beta_0 + \beta_1\text{ATM} + \beta_2\text{CHQ} + \beta_3\text{mobilepay} + \beta_4\text{NEFT} + \beta_5\text{POS} + \beta_6\text{webpay} + \mu t \quad 4.3$$

Where;

CPS = credit to private sector

DMBL = deposit money bank loan

BMS = Broad money supply (M2)

EXCH= Exchange rate

MPR = monetary policy rate (interest rate)

β_0 = intercept

$\beta_1 - \beta_6$ = parametres

μt = error term

Presentation and Analysis of Findings

This study adopted OLS estimation technique in determining the impact of financial innovation proxied by ATM, cheque, mobilepay, NEFT, POS and webpay on banking and monetary policy. The functional forms of the estimates are presented and analyzed in this section.

Table 1: Functional forms of the impact of financial innovation on Banking (DMBL)

Variables	Coeff.	Std.error	t-test	Prob.	R ²	Adj. R ²	DW
Linear	—				0.88	0.81	1.5
C	15669.86	6423.237	2.439558	0.0374			
ATM	-8.12E-06	4.45E-06	1.821849	0.1018			
CHQ	-		-				
	0.000241	0.000207	1.160021	0.2759			
Mobilepay	4.09E-05	1.54E-05	2.650711	0.0264**			
NEFT	0.000168	0.000111	1.503865	0.1669			
POS	-2.09E-05	8.86E-06	2.362446	0.0424**			
Webpay	1.46E-06	7.69E-07	1.902842	0.0895			
Log-linear					0.95	0.93	1.78
C	12.72371	3.510511	3.624460	0.0047			
ATM	-		-				
	0.222548	0.060902	3.654182	0.0044**			
CHQ	-		-				
	0.163747	0.162761	1.006056	0.3381			
Mobilepay	0.099641	0.092840	1.073257	0.3084			
POS	0.065249	0.096066	0.679213	0.5124			
NEFT	-	-	-	-	-	-	-
Webpay	0.057186	0.050055	1.142451	0.2799			
Exponential					0.88	0.83	1.68
C	144346.7	116226.7	1.241940	0.2426			
ATM	-		-				
	7974.084	2016.362	3.954689	0.0027**			
CHQ	-		-				
	3232.979	5388.736	0.599951	0.5619			
mobileppay	2283.457	3073.771	0.742885	0.4746			
NEFT	-	-	-	-			
POS	699.8177	3180.583	0.220028	0.8303			
Webpay	1770.601	1657.247	1.068399	0.3105			
Semi-log					0.89	0.82	1.46
C	9.523624	0.300206	31.72362	0.0000			
ATM	-6.81E-11	2.08E-10	0.326864	0.7512			
CHQ	-1.99E-08	9.69E-09	2.051589	0.0704			
Mobilepay	1.49E-09	7.21E-10	2.065283	0.0689			
NEFT	6.17E-09	5.21E-09	1.185446	0.2662			

POS	-7.29E-10	4.14E-10	1.761246	0.1120
Webpay	5.13E-11	3.59E-11	1.427843	0.1871

** - significance at 0.05 level

A look at the functional forms' estimation of the impact of financial innovation proxies on banking proxy indicates that at least one of the financial innovation proxies in three of the four functional forms indicates a significant impact on the banking proxy. In the linear functional form, mobile pay exhibits a positive significant impact on deposit money bank loans, while POS exhibits a negative significant impact. The implication of these findings is that, as the use of mobile pay increases, loans from deposit money banks increase. Conversely, a reduction in the use of POS will invariably lead to a decrease in bank loans. Furthermore, the total variation in the response variable is explained by 88% variation in the exogenous variables. In the log-linear and exponential functional forms, ATM exhibits a negative significant impact on bank loans. It is obvious from the outcomes that financial innovation, either wholly or in part, significantly impacts banking either wholly or partially.

Table 2: Functional forms of the impact of financial innovation on Banking (CPS)

Variables	Coeff.	Std.error	t-test	Prob.	R ²	Adj. R ²	DW
Linear	—				0.88	0.80	1.51
C	16853.07	6208.080	2.714699	0.0238			
ATM	-7.87E-06	4.31E-06	1.828626	0.1007			
CHQ	-		-				
Mobilepay	0.000210	0.000200	1.045195	0.3232			
NEFT	4.10E-05	1.49E-05	2.749393	0.0225**			
POS	0.000166	0.000108	1.543940	0.1570			
Webpay	-2.11E-05	8.56E-06	2.467323	0.0357**			
	1.32E-06	7.43E-07	1.782160	0.1084			
Log-linear					0.93	0.90	1.65
C	12.48319	3.504475	3.562072	0.0052			
ATM	-		-				
	0.206731	0.060797	3.400318	0.0068**			
CHQ	-		-				
	0.122995	0.162481	0.756979	0.4665			
Mobilepay	0.084069	0.092681	0.907085	0.3857			
NEFT	-	-	-	-			
POS	0.053456	0.095901	0.557407	0.5895	-	-	-

webpay	0.049789	0.049969	0.996388	0.3426			
Exponential					0.86	0.79	1.62
C	149786.8	120077.0	1.247423	0.2407			
ATM	-		-				
	7657.721	2083.158	3.676015	0.0043**			
CHQ	-		-				
	3482.617	5567.249	0.625554	0.5456			
mobileppay	2315.366	3175.596	0.729112	0.4827			
NEFT	-	-	-	-			
POS	390.7542	3285.947	0.118917	0.9077			
Webpay	1700.433	1712.147	0.993159	0.3441			
Semi-log					0.89	0.82	1.56
C	9.617474	0.246712	38.98266	0.0000			
ATM	-8.90E-		-				
	11	1.71E-10	0.519893	0.6157			
CHQ	-1.43E-		-				
	08	7.97E-09	1.796136	0.1060			
Mobilepay	1.39E-09	5.92E-10	2.352053	0.0432**			
NEFT	5.63E-09	4.28E-09	1.316334	0.2206			
POS	-6.89E-		-				
	10	3.40E-10	2.023353	0.0737			
Webpay	4.27E-11	2.95E-11	1.444399	0.1825			

**-significance at 0.05 level

The impact of financial innovation on another proxy of banking that is credit to the private sector, indicates that proxies of financial innovation exhibit either a positive or negative significant impact on banking. For example, in the linear functional form, mobile pay exhibits a positive significant impact, while POS exhibits a negative significant impact on banking. In the log-linear and exponential functional forms, ATM exhibits a negative significant impact on banking, while mobile pay exhibits a significant positive impact on banking in the semi-log functional form. It goes to show that financial innovation has a significant impact on banking.

Table 3: Functional forms of the impact of financial innovation on monetary policy (BMS)

Variables	Coeff.	Std.error	t-test	Prob.	R ²	Adj. R ²	DW
Linear	—				0.87	0.59	1.56
C	26094.45	15148.88	1.722534	0.1191			
ATM	-1.94E-05	1.05E-05	1.845981	0.0980			
CHQ	-		-				
	0.000397	0.000489	0.811046	0.4383			
Mobilepay	0.000103	3.64E-05	2.830102	0.0197**			
NEFT	0.000433	0.000263	1.649541	0.1334			
POS	-5.39E-05	2.09E-05	2.579226	0.0297**			
Webpay	3.47E-06	1.81E-06	1.911018	0.0883			
Log-linear					0.94	0.91	1.20
C	12.17831	4.749925	2.563896	0.0305			
ATM	-		-				
	0.207426	0.079560	2.607151	0.0284**			
CHQ	-		-				
	0.137358	0.220622	0.622593	0.5490			
Mobilepay	0.060624	0.134422	0.450995	0.6627			
NEFT	-	-	-	-			
POS	0.099441	0.142940	0.695685	0.5042	-	-	-
Webpay	0.085168	0.064951	1.311272	0.2222			
Exponential					0.85	0.77	1.57
C	356452.3	300207.2	1.187354	0.2625			
ATM	-		-				
	17878.21	5208.150	3.432737	0.0064**			
CHQ	-		-				
	9051.078	13918.80	0.650277	0.5302			
mobileppay	4948.132	7939.379	0.623239	0.5471			
NEFT	-	-	-	-			
POS	-		-				
	149.4044	8215.269	0.018186	0.9858			
Webpay	5392.412	4280.577	1.259740	0.2364			
Semi-log					0.91	0.85	1.72
C	9.961220	0.308171	32.32367	0.0000			
ATM	-1.51E-11	2.14E-10	0.070719	0.9452			
CHQ	-1.83E-08	9.95E-09	1.837151	0.0994			
Mobilepay	1.89E-09	7.40E-10	2.551149	0.0311**			

NEFT	8.13E-09	5.34E-09	1.521745	0.1624
POS	-9.39E-10	4.25E-10	2.208960	0.0545
Webpay	5.41E-11	3.69E-11	1.465586	0.1768

The impact of financial innovation on the proxy of monetary policy indicates a positive significant impact of mobile pay and negative significant impact of ATM on monetary policy. It goes to means that, financial innovation significantly impacts monetary policy

Table 4: Functional forms of the impact of financial innovation on monetary policy (EXCH)

Variables	Coeff.	Std.error	t-test	Prob.	R ²	Adj. R ²	DW
Linear	—				0.74	0.57	1.43
C	330.3107	256.2652	1.288941	0.2296			
ATM	-3.40E-07	1.78E-07	1.910718	0.0884			
CHQ	-4.80E-06	8.27E-06	0.580228	0.5760			
Mobilepay	1.49E-06	6.15E-07	2.416294	0.0388**			
NEFT	6.15E-06	4.44E-06	1.384926	0.1994			
POS	-8.21E-07	3.53E-07	2.323388	0.0452**			
Webpay	4.99E-08	3.07E-08	1.625383	0.1385			
Log-linear					0.86	0.79	1.72
C	11.87636	6.502729	1.826366	0.0978			
ATM	-0.299959	0.112813	2.658911	0.0239**			
CHQ	-0.240002	0.301492	0.796046	0.4445			
Mobilepay	-0.054278	0.171973	0.315617	0.7588			
NEFT	-0.138036	0.177949	0.775703	0.4559	-	-	-
POS	0.120521	0.092721	1.299825	0.2228			
webpay							
Exponential					0.66	0.49	1.82
C	6700.032	5341.529	1.254328	0.2382			
ATM	-235.5800	92.66762	2.542204	0.0293**			
CHQ	-207.9061	247.6546	0.839500	0.4208			

mobileppay	35.43710	141.2639	0.250858	0.8070			
NEFT	-	-	-	-			
POS	-	-	-	-			
	149.4044	8215.269	0.018186	0.9858			
Webpay	5392.412	4280.577	1.259740	0.2364			
Semi-log					0.76	0.61	1.33
C	5.472776	0.470384	11.63471	0.0000			
ATM	-1.08E-	-	-	-			
	10	3.26E-10	0.329850	0.7491			
CHQ	-1.46E-	-	-	-			
	08	1.52E-08	0.963252	0.3606			
Mobilepay	1.84E-09	1.13E-09	1.626333	0.1383			
NEFT	6.49E-09	8.16E-09	0.795866	0.4466			
POS	-9.29E-	-	-	-			
	10	6.49E-10	1.431739	0.1860			
Webpay	5.95E-11	5.63E-11	1.057279	0.3179			

** - significance at 0.05 level.

The impact of financial innovation on another proxy of monetary policy-exchange rate is found to be significantly positive with regard to mobile pay and significantly negative with regards to ATM. Though not all the components of financial innovation are significantly impactful on the proxy of monetary policy, it can be said that, financial innovation either wholly or in part has significant impact on monetary policy.

Table 5: Functional forms of the impact of financial innovation on Monetary policy (MPR)

Variables	Coeff.	Std.error	t-test	Prob.	R ²	Adj. R ²	DW
Linear	—				0.73	0.55	1.94
C	16.74822	3.945270	4.245141	0.0022			
ATM	-4.40E-	-	-	-			
	09	2.74E-09	1.608579	0.1422			
CHQ	-2.35E-	-	-	-			
	07	1.27E-07	1.846034	0.0980			
Mobilepay	1.49E-08	9.47E-09	1.575557	0.1496			
NEFT	4.82E-08	6.84E-08	0.704656	0.4989			
POS	-7.97E-	-	-	-			
	09	5.44E-09	1.464855	0.1770			
Webpay	6.68E-10	4.72E-10	1.415454	0.1906			
Exponential					0.60	0.41	1.66

C	52.38530	86.19454	0.607757	0.5569
ATM	-	-	-	-
	1.915361	1.495348	1.280880	0.2291
CHQ	-	-	-	-
	1.764620	3.996323	0.441561	0.6682
mobileppay	1.332919	2.279529	0.584734	0.5717
NEFT	-	-	-	-
POS	0.562707	2.358742	0.238563	0.8163
Webpay	-	-	-	-
	0.329606	1.229026	0.268185	0.7940

The result of the impact of financial innovation on interest rate proxied by monetary policy rate shows no significant impact. It therefore implies that, financial innovation has no significant impact on interest rate.

Discussion of Findings

The focus of this study was to assess the implication of technology and financial innovation on banking, fintech, and monetary policy. Financial innovation made possible by advancement in technology has affected significantly some proxied variables for banking and monetary policy. While some variables are not significantly impacted, Oyadeyi (2024) noted earlier that the existence of asymmetries in both the short and long run is an indication that the impacts of financial development and monetary policy on the different monetary policy channels are not uniform. Nonetheless, there is collaboration in findings between this study and an earlier study by Babarinde (2023), who established a correlation between financial innovation and sectoral credit allocation by banks; and Babarinde (2024), who noticed a positive significant impact of mobile pay on stock market capitalization but contradicts Enebeli-Uzor (2024), who noticed a negative impact of digitalization on economic growth. It should also be noted that the financial innovations that have been found to significantly impact banking and monetary policy consistently are mobile pay and ATMs. POS, as a financial innovation, sparingly impacts banking and monetary policy. The evolution of different banking apps and platforms has made banking operations seem redundant and the operation of monetary policy non-effective. Consequently, at the onset of financial innovation, ATMs had been very popular as a means of financial transactions among parties. This technology required visiting bank branches to effect transactions. However, the Covid-19 pandemic necessitated the invention of more effective and proactive digital payment platforms.

The coming to the scene of a mobile ATM (POS) caused the interest in the standby ATM to wane. This invention no doubt reduced traffic to banks' facilities while also saving the



cost of transactions. Again, the introduction of mobile pay into the payment ecosystem has made banking operations less rigorous and does not require visits to banks to effect any financial transactions. Credit facilities are now sought and executed online without any physical interaction between the lender and the borrower. No pressure on collateral. The invention no doubt increases the speed of doing business but not without some associated risks. There is increasing concern for cybersecurity as digital platforms are susceptible to manipulation by fraudsters. On whether technology and financial innovation have impacted banking, fintech, and monetary policy, it is obvious from the findings of this study that banking activities have assumed a completely new dimension due to financial innovation and that financial innovation has brought about more innovations and inventions for fintech firms besides creating residual employment for citizens of the country. The non-significant impact of financial innovation on monetary policy rates is a clearer indication that financial transactions associated with financial innovation cannot be stalled by interest rates and that interest rates are never a factor in the new financial architecture. However, there is a need for an effective regulatory framework to regulate the operationalities of digital space within a given economic domain.

Summary, Conclusion, and Recommendations

Technological advancement and financial innovation have significantly transformed the banking industry by increasing operational efficiency, broadening access to financial services, and improving overall customer experience. Despite these advantages, they also introduce notable challenges, such as heightened cybersecurity threats, gaps in regulatory frameworks, and possible risks to financial system stability.

To fully harness the gains from innovation, it is important for policymakers to adopt strategic measures. These include updating and strengthening regulatory systems to align with evolving technologies, enhancing cybersecurity capacity within financial institutions, and fostering partnerships between traditional banks and fintech companies. Additionally, there is a need to invest in robust digital infrastructure, promote financial literacy among users, and support continuous skill development for the workforce to adapt to technological changes. Ultimately, achieving a balance between innovation and effective regulation is crucial for ensuring that technological progress supports a resilient, inclusive, and sustainable financial system.



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