



Financial technology solutions as a tool for enhancing financial inclusion among the unbanked population in Nigeria

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Abstract

The study examined financial technology solutions as a tool for enhancing financial inclusion among the unbanked population in Nigeria. The specific objectives of this study were to: examine the impact of automated teller machine (ATM) technological solution on cash dispensing service among the unbanked population in Nigeria and ascertain the impact of internet banking (IB) technological solution on online purchase service among the unbanked population in Nigeria. Research design was descriptive survey research. Study Area is South East, Nigeria. The population of this study comprised of 3,406,000 unbanked population (adult population 18 and above) in South East Nigeria. The choice for only unbanked population in Nigeria was because of important of financial services towards the economic growth (Source: EFINA Access to Financial Services in Nigeria 2020). The study adopted the Slovin's sampling technique to get sample size of 378 respondents. The study adopted structured questionnaire to obtain data. Research questions of the study were answered using mean score and standard deviation. The hypotheses stated were tested using logistic least square statistic. The empirical results showed that automated teller machine (ATM) technological solution has significant impact on cash dispensing service among the unbanked population in Nigeria (t-statistic = 6.446; P-value (0.000) < Sig-value (0.05) and internet banking (IB) technological solution has significant impact on online purchase service among the unbanked population in Nigeria (t-statistic = 11.826; p-value (0.000) < Sig-value (0.05). The study recommended that financial services providers should advance the use of mobile banking and web payment innovations by customers as this will help reduce the number of unbanked persons especially in the rural economy and also improve the financial performance of the banks.

Keywords: Financial technology solutions, Financial inclusion, Unbanked population, ATM, Internet Banking

1.1 Background to the study

The adoption of universal banking and the cashless policy have boosted the emergence of financial technology (Fintech) in Nigeria. The Central Bank of Nigeria (CBN) and the Bankers Committee joined forces to introduce the cashless policy, with the objective of addressing long-standing obstacles to financial inclusion for millions of Nigerians. This policy facilitated the provision of mobile payment services, enabling secure and convenient financial transactions across urban, semi-urban, and rural regions (Abu, Dare, & Kajo, 2025) [1]. The financial sector is one area where there has been an uptick in interest in adopting innovations designed to keep up with the dynamic nature of the market place. New and improved technology, financial instruments, institutions, and markets that facilitate communication, commerce, and the transfer of funds are considered innovations in the financial services sector (Ayodele & Afolabi, 2023) [7].

Financial inclusion is defined the availability of finance and financial services for all in fair, transparent and equitable manner at an affordable cost. It also refers to the situation whereby basic banking services are delivered at an affordable cost to all section of the society. These definitions summarily portray financial inclusion as the incorporation of all citizens of a nation in formal banking transactions. The involvement of

the citizens in financial mainstream is expected to fuel investment, create jobs and stimulate growth. In Nigeria, the government through the Central Bank of Nigeria has tried to achieve a financial inclusion as an integral part for promoting sustainable and inclusive growth by formulating policies that are expected to encourage country wide access to financial services at affordable cost particularly to the less privilege and vulnerable group (Iwedi, Edeh, Mark & Turakpe, 2023) [16]. The intent of these policies and mechanisms is to reduce the number of persons excluded from organized financial system by getting more people involved in the organized financial system. These consistent attempts to sustain and deepen financial inclusion have included the deployment of technological innovations in the financial sector.

Digital technologies also offer cheap and ease to consumers of financial services to prevent, make remittances, access credit, and obtain insurance. Banks are now spending heavily on the acquisition of the latest technological infrastructures to meet the state of the art in order to meet the demand of their customer (Ujam & Ofor, 2025) [28]. Technological innovation has become essential for addressing the diverse needs of customers, particularly in the wake of Nigeria's transition towards a cashless economy. The Central Bank of Nigeria (CBN) has been instrumental in promoting this shift through policies that

encourage financial institutions to innovate and enhance digital service delivery. Consequently, deposit money banks have invested significantly in technology-driven solutions to retain customers and expand their market base (Isa-Olatinwo, Uwaleke, & Ibrahim, 2022). Mobile banking, for instance, provides a convenient platform for executing transactions, while internet banking offers access to comprehensive financial services from the comfort of homes or offices. Similarly, the integration of POS terminals into retail environments and advancements in ATM functionalities are pivotal in extending banking services to underserved populations (Okonkwo & Ekwueme, 2022; Anozie, Nwaimo & Chris-Ejiogu, 2026) [5]. Another financial innovation tool that is widely recognized for providing electronic access for banks' clients is the Automated Teller Machine (ATM). This device has allowed financial institutions banks to expand their services outside their physical locations by connecting them with retail banking customers for various routine banking transactions (Akinyemi & Mushunje, 2020) [2].

CBN and other stakeholders have introduced innovations such as Automated Teller Machines (ATMs), Point of Sale (POS) terminals, and mobile money platforms to bridge the inclusion gap. These services have expanded access to banking by providing alternatives to traditional brick-and mortar branches. ATMs make cash and essential services more accessible, POS terminals extend retail-level banking even in semi-urban and rural areas, and mobile money has allowed millions to transact without needing a bank account. These fintech-driven solutions have shown potential to reshape the financial landscape by enabling greater deposit mobilization, promoting savings, and encouraging electronic transactions. However, the impact of fintech adoption in Nigeria remains mixed. On one hand, mobile banking and USSD services have encouraged savings and deposits among populations historically excluded from the financial system (Amah, Charles-Olimene, 2025) [3].

The financial landscape in Nigeria has undergone a significant transformation over the past two decades, driven by rapid advancements in technology and the increasing adoption of digital financial services by deposit money banks. These services, which include mobile banking, internet banking, Point of Sale (POS) terminals, and automated teller machines (ATMs), have reshaped how customers interact with banks and conduct financial transactions. This evolution is aligned with global trends where digital financial services are becoming pivotal to improving operational efficiency, expanding financial inclusion, and enhancing customer satisfaction (Anane & Nie, 2022; Chukwunulu, 2019) [4, 8]. In Nigeria, where financial accessibility and efficiency have been longstanding challenges, the adoption of digital financial services presents both opportunities and critical areas for performance evaluation among banks.

1.2 Problem of the statement

Financial technological solutions play a central role in this process by providing customers with seamless, efficient, and accessible banking experiences. For instance, mobile banking

enables customers to perform transactions at their convenience, while internet banking enhances service accessibility beyond physical branch hours. Likewise, POS terminals and ATMs extend banking services to more locations, reducing the reliance on traditional banking infrastructure (Gbongli, Xu & Amedjonekou, 2019) [10]. Understanding the specific impact of these services on customer retention is therefore crucial for banks aiming to optimize their digital strategies.

Many Nigerian banks struggle with service reliability, technological constraints, and cybersecurity issues, which often undermine customer trust and satisfaction (Iwedi, Owakah & Wofuru-Nyenke, (2023) [17]. For example, technical glitches in mobile banking platforms or network failures in POS terminals can lead to transactional delays, eroding customer confidence. Similarly, ATMs with limited functionality or frequent downtimes are common complaints among customers. These issues, coupled with competition within the banking sector, compel deposit money banks to continuously innovate and improve their digital offerings (Njoku, Nwadike & Azuama, 2020) [19].

The importance of banking the unbanked or underbanked arises from the problem of financial exclusion of people and firms from the formal financial services across the world. According to World Bank report titled "The Global Findex Database 2021: Financial Inclusion, Digital Payments, and Resilience in the Age of COVID-19" revealed that about 64 million Nigerians of its nearly 200 million people still do not have a bank account with a financial institution or mobile money platform. According to the report, Nigeria is among the seven countries in the world with half of the worlds unbanked or financially excluded. Other countries include Bangladesh, China, India, Indonesia, Mexico, and Pakistan. However, despite the progress made in the journey of financial inclusion. It is worrisome that 35.9% Nigerians are still unbanked from gaining access to banking services and product in 2022 for several reasons bordering on limited access to brick and mortar banks due to distance from dwelling places, poverty, cost of banking services, irregular income and unemployment and finally institutional exclusion (EFInA, 2020) [12]. Of the 106 million adult Nigerians in 2020, 44.8% were banked, while 5.7% and 13.6% were served by other formal channels and informal financial service providers such as ajo, esusu. This is the current reality of Nigeria's financial inclusion campaign, 10 years after the big push for financial inclusion began in 2012.

In recent times, Nigeria has witnessed the emergence of FinTech. Currently there are about 200 financial technology companies delivering banking and financial services for customers with the aid of internet-mediated technologies such as Mobile phones, point of sale machines, tablets among others (CBN, 2022). These financial technology firms are creating a never before experienced pressure to traditional banks by uncovering new value propositions through innovation and non-traditional technology led business models. Therefore, it is in the light of the above this study is carried out to examine the financial technology solutions as a tool for enhancing financial inclusion among the unbanked population in Nigeria.

1.3 Objectives of the study

The main objective of this study is to examine financial technology solutions as a tool for enhancing financial inclusion among the unbanked population in Nigeria. The specific objectives of this study are to:

- Examine the impact of automated teller machine (ATM) technological solution on cash dispensing service among the unbanked population in Nigeria.
- Ascertain the impact of internet banking (IB) technological solution on online purchase service among the unbanked population in Nigeria.

1.4 Research questions

The study is channeled to answer the following questions:

- What is the impact of automated teller machine (ATM) technological solution on cash dispensing service among the unbanked population in Nigeria?
- To what extent does internet banking (IB) technological solution impact on online purchase service among the unbanked population in Nigeria?

1.5 Significance of the study

The study will be of an immense significance to the following groups, Bank Manager, Bank customers, government and researchers.

Bank manager: The study of financial technology solutions empower bank managers to operate with operational efficiency, reducing costs through automation, improving risk management, and providing data-driven insights for decision-making

Bank customer: The study of financial technology solutions, such as mobile apps, AI, and digital wallets, provide customers with 24/7 convenience, real-time transaction tracking, and enhanced security.

Government: The study of financial technology solutions provide significant benefits to governments by enhancing economic growth, improving financial regulation, and increasing the efficiency of public services.

Researchers: The study will be benefit future researchers who will go deep in this research because it will provide them a huge of knowledge on which to carry on the related topic. Also, it will be of huge benefit to other researchers attempting to delve into financial technology solutions as a tool for enhancing financial inclusion among the unbanked population in Nigeria.

2.1 Conceptual literature

2.1.1 Financial technological solution

The phrase "financial technology" (FinTech) refers to a broad category of innovations and applications that use digital technology to deliver financial services. These include blockchain applications, Automated Teller Machines (ATM), Point of Sale (POS) systems, mobile and online banking, artificial intelligence (AI), and machine learning algorithms (Olubukola, Ikpefan, Akinrinola & Itai, (2023) [22]. Through the provision of faster, more efficient, and more secure financial services, FinTech is transforming traditional banking operations for

banks and other financial institutions. The implementation of FinTech has become more and more essential to the operations success of Deposit Money Banks (DMBs). For Examples, Customers can use ATMs to conduct routine task like cash withdrawals and checks without going to banking hall. By enabling real-time electronic payments, point-of-sale (POS) systems promote cashless transactions. Online and mobile banking platforms enable 24/7 account access and transaction execution from nearly everywhere, simplifying transactions and reducing traffic at physical branches (EFinA (2021; EFinA (2019) [13, 11].

According to Kagan (2020), financial technology (FinTech) is used to describe new technology that seeks to improve and automate the delivery and use of financial services. At its core, FinTech is utilized to help companies; business owners and consumers better manage their financial operations by utilizing specialized software that are used on computers.

According to Osigwe, Ezu and Osakwe, (2025) [24], Fintech refers to computer software and other technology employed to support banking and financial service delivery. The Financial Technology definition used in this study draws essentially from the one given by the Yinusa, Olowofela, Yunusa and Folami, (2021) [29]. These are represented by ATM, POS Terminal, and Mobile Banking. In this context, operational performance refers to how effectively and efficiently a financial institution executes its internal processes to deliver value to its customers. In this regard, customer satisfaction, system uptime, cost reduction, transaction processing speed, and service delivery quality are typically considered key performance indicators (KPIs) (Ramos & Olweny, 2021; Amah & Charles-Olimene, (2025) [25, 3]. Rapid change in technology in the payments system has increased financial inclusion thus changing the trend of undertakings of the traditional banking system (Ujam & Ofor, 2025) [28].

A Financial Technology Solution (Fintech) is the use of innovative software, applications, and technology to enhance, automate, and digitize financial services for businesses and consumers. These solutions ranging from mobile banking and payment apps to robo-advisors—aim to make financial services faster, more secure, and more accessible, often bypassing traditional banking infrastructure. The term fintech, or financial technology, refers to innovations and technologies used in the financial services sector. Although it seems simple, it is a collective term covering a huge number of services that continue to change in the new digital era (EFinA 2019) [11].

Fintech combines the terms "finance" and "technology" and refers to any technology that improves or automates financial services and processes. The term encompasses a rapidly growing industry that serves the interests of consumers and businesses in multiple ways. From mobile banking and insurance to cryptocurrencies and investment instruments, fintech has a seemingly endless array of applications. One of the driving factors in the fintech sector is that many traditional banks are supporting and embracing the technology by actively investing in, acquiring, or partnering with fintech companies. Financial technology (fintech) combines finance

and technology to enable innovation in the financial sector. Technology-driven innovation in finance, more commonly referred to as fintech, has become an increasingly important part of financial services (“EFInA 2020)^[12], “.

2.1.2 Components of financial technological solutions

Automatic Teller Machine (ATM)

Automated Teller Machines (ATMs) have revolutionized banking in Nigeria by enabling 24/7 access and empowering consumers to perform operations like withdrawals, balance inquiries, and fund transfers without the help of bank employees or going to the bank premises. Notwithstanding these advantages, there are still problems, such as long queues, long wait times, poor user awareness, technical difficulties, and service outages. Ilo, Ani & Chioke, (2024)^[15] emphasized the need for customer education and technical advancements to improve satisfaction and usability, while Olu (2019) suggested installing more ATMs to cut down on wait times using queuing theory.

An automated teller machine (ATM) is an electronic banking outlet that allows customers to complete basic transactions without the aid of a branch representative or teller. Anyone with a credit card or debit card can access cash at most ATMs, either in the U.S. or other countries. ATMs are convenient, allowing consumers to perform quick self-service transactions such as deposits, cash withdrawals, bill payments, and transfers between accounts. Fees are commonly charged for cash withdrawals by the bank where the account is located, by the operator of the ATM, or by both. Some or all of these fees can be avoided by using an ATM operated directly by the bank network that holds the account. Using an ATM abroad can cost more than using one in the U.S. due to exchange rates or transaction fees (Austin, Beetseh, Abbas & Joshua, 2025)^[6].

Internet banking (IB) transaction

Internet banking has been traced back to its origins in 1995, with the use of the internet as a remote channel for the delivery of banking services, allowing banks to offer informational as well as transactional services (Furst, Lang & Nolie, 2022). The term "internet banking" describes the practice of delivering financial services remotely via the Internet. These services include newer ones like electronic bill presentment and payment (which lets clients receive and pay invoices on a bank's website) and more conventional ones like opening a deposit account or moving money between accounts. Online banking is provided by banks in two primary methods. In addition to its conventional distribution routes, an established bank with physical locations can create a website and provide Internet banking to its clients (Olelewe & Onwumere, 2024). Internet technology has had a significant impact on the global financial industry, blurring the conventional boundaries that define product, market and customer. The growth of Internet banking has significantly affected barriers to entry and accelerated financial disintermediation. Through internet banking, a bank can expand its market reach. This is possible by being able to serve a larger geographic area with the need

for additional brick and mortar branches. Customer congestion and waiting times at physical branches can be significantly reduced. The breadth of a bank's product line can be increased through internet banking. It is possible to offer a greater number of products per customer, as well as to customize products to specific customers. "One-stop shopping" would now be possible, creating opportunities for cross selling by encouraging customer traffic to a bank's website (Govender and Wu, 2018).

2.2 Financial inclusion

Osigwe, Ezu and Osakwe, (2025)^[24] in India defined financial inclusion as the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as the weaker sections and low income groups at an affordable cost. This definition clearly identified the focus of financial inclusion on the vulnerable member of the society. It also captures ease of accessibility to credit. According to Iwedi, Edeh, Mark and Turakpe, (2023)^[17] financial inclusion is the extension of the benefits of banking to the have-nots. The study further explained that it simply means banks will offer a basic account to anyone who want to have. The concept of financial inclusion explains how the financial excluded, unbanked and under-banked people in the society are made to be accessible and uses the affordable, quality financial services and product in convenience manner (CBN, 2019).

Comprehensively, Amah and Charles-Olimene, (2025)^[3] outlined financial inclusion as a delivering of basic banking services at an affordable cost to all sections of the society, especially the vast disadvantaged and low-income groups who tend to be excluded from formal banking system. Financial inclusion requires that attention is given to human and institutional issues, such as quality of access, affordability of products, provider sustainability, and outreach to the most excluded populations. Financial inclusion can therefore be defined as access to finance and financial services for all in fair, transparent and equitable manner at an affordable cost. Financial inclusion is widely considered as a right of all citizens to social inclusion, better quality of life and a tool for strengthening the economic capacity and capabilities of the poor in a nation BCB. Such submissions and obvious increasing importance of financial inclusion as a catalyst for economic growth and development has motivated policymakers to view financial inclusion as catalyst for the achievement of developmental goals by ensuring basic access to formal banking system for all citizens.

2.3 Theoretical review

The following theories guided the study; Technology Acceptance Model (TAM) and diffusion of innovations theory (Rogers, 2003).

2.3.1 Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) is one of the most successful measurements for computer usage effectively among practitioners and academics (Davis, 1989)^[9]. TAM is

consistent with (Rogers, 1983) theory on diffusion of innovation where technology adoption is a function of a variety of factors including; relative advantage and ease of use.

Two particular beliefs are addressed through TAM; perceived usefulness and perceived ease of use. Perceived usefulness is defined as being the degree to which a person believes that the use of a system will improve his performance. Perceived ease of use refers to the degree to which a person believes that the use of a system will be effortless. TAM attempts not only for prediction but also for explanation to help researchers and practitioners identify why a particular system may be unacceptable and pursue appropriate steps.

The research theoretical framework to be applied in this study is based on the model of the organisation (Leavitt, 1965). He suggested that an organisation consists of four interrelated components: structure, task (strategy), people, and technology as presented. Organization's structure refers to systems of communication, systems of authority, and systems of workflow; organization's strategy can be defined as the establishment of the basic long-term objectives of an enterprise, and the adoption and commitment of resources to a course of action intended to obtain these corporate objectives (Chandler, 1962); People refers to individuals working in the organisation and; Technology can be defined as the tools, techniques, and actions used to transform organisational inputs into outputs (Daft, 1995). Leavitt (1965) reported that if any of the four components changes, the other three must also change. It is the interaction between these four components that determines the fate of an organization. This framework has been chosen for this study because it covers many critical issues that could lead us to a comprehensive understanding of the relationship between information technology and organisations. This study focuses on the impact of information technology on the organisation which is part of the technology component, and organisational characteristics.

2.3.2 Diffusion of innovations theory

Rogers proposed the notion of diffusion of innovations theory in 2003. The hypothesis attempts to provide an explanation on how, why, and how quickly new innovative ideas and technologies spread. Rodgers (2003) defines diffusion as the method through which an invention is disseminated through time among the members in a social system. An innovation is defined as a novel concept, activity, or item seen by a person. Communication is the process through which parties generate and exchange information with one another in order to achieve mutual understanding (Rogers, 2003). According to diffusion of innovation theory, acceptance of a new concept, behavior, product, or invention does not occur instantaneously throughout a social system; instead, it is a process in which some individuals embrace the innovation before others. There are five distinct types of adopters. Innovators, early majority, early adopters, laggards and late adopters are examples of these groups.

In support with objective one to three of the study; this theory has been adopted to explain how the cashless banking paradigm

has been implemented in the Nigerian banking sector. According to an examination of the literature, the banking industry's implementation of the cashless banking concept was not consistent. On a worldwide scale, the cashless banking idea started in South America, notably in Mexico and Brazil and South American banks may be seen as the inventors in terms of cashless banking models. Cashless banking has been implemented at various periods in the Nigerian banking system during the previous several years. Currently, the African continent as a whole leads the globe in the use of mobile financial services (Nwala and Ohurogu, 2021).

2.4 Empirical literature

2.4.1 Automated teller machine (ATM) innovation and cash dispensing service

Olatoke, Idris and Ahmad, (2025) ^[21] examined the impact of financial technology on the performance of deposit money banks (DMBs) in Katsina metropolis. The study adopted cross-sectional survey research design utilizing questionnaire as the research instrument. The population of the study comprised the 120 staff of the 20 DMBs in Katsina metropolis. Given the small size of the population, a census study was adopted. The data used for the study were analyzed by simple percentage, ANOVA and Multiple Linear Regression Analysis (MLRA). Findings indicate that all the three indicators of financial technology, that is, Automated Teller Machine (ATM), Point of Sale (POS), and Mobile Banking (MB) have a significant positive impact on deposit money bank's performance. The study therefore concludes that ATMs, POS and MB are crucial drivers of bank operational performance. Therefore, the study recommends those DMBs banking services should be enhanced by upgrading ATM infrastructure and mobile banking features to improve reliability, security and user experience.

Austin, Beetseh, Abbas, and Joshua (2025) ^[6] evaluates the impact of digital financial services on customer retention in Nigerian deposit money banks, with a focus on mobile banking, internet banking, Point of Sale (POS) terminals, and Automated Teller Machines (ATMs). The study was conducted in Lagos and Abuja, Nigeria, using a stratified random sampling technique to select 350 respondents from five top-ranked deposit money banks. Data were collected through structured questionnaires and analyzed using multiple regression to determine the relationship between digital financial services and customer retention. The findings reveal that mobile banking has the most significant effect on customer retention ($\beta = 0.558, p < 0.001$), followed by POS terminals ($\beta = 0.365, p < 0.001$). Internet banking ($\beta = 0.089, p < 0.001$) and ATMs ($\beta = 0.065, p = 0.001$) also contribute positively, though to a lesser extent. Collectively, these variables account for 83.7% of the variation in customer retention ($R^2 = 0.837$). The study concludes that digital financial services are critical to sustaining customer loyalty in Nigeria's banking sector. Key recommendations include prioritizing investments in robust digital infrastructure, improving system reliability, and enhancing customer support and education.

2.4.2 Internet banking (IB) innovation and online purchase service

Abu, Dare and Kajo, (2025) ^[1] examined the impact of ICT Usage on the Performance of selected Deposit Money Banks in Nigeria. The main objective of the study was to investigate and analyze the impact of ICT usage on the performance of selected Deposit Money Banks in Nigeria. The study adopted quantitative research method for analysis and the population of the study was 170 respondents where the sample size used was 119 respondents. Simple regression and other statistical tools via SPSS were used to analyze the data collected. Base on the findings, it shows that ICT usage has significant impact on strategic decision, competitive advantage and customers' satisfaction of the three selected Deposit Money banks in Nigeria. The study established that there is a significant impact of ICT usage on the operational performance of the selected commercial banks in Nigeria. The study recommends that top management of the banks should adopt and implement ICT that will boost their business intelligence, use of robots in banking operations and higher profitability.

Mgbada, Ele, Uguru and Tebepah, (2024) ^[18] examined the effects of technological innovations on the financial performance of Deposit Money Banks (DMBs) in Nigeria. The specific objectives of the study were to: ascertain the effect of internet banking on the financial performance of Deposit Money Banks in Nigeria, examine the effect of Automated Teller Machines on the financial performance of Deposit Money Banks in Nigeria and ascertain the effect of mobile banking on the financial performance of Deposit Money Banks in Nigeria. The study used secondary time series data sourced from the Central Bank of Nigeria statistical bulletin and were analyzed using Autoregressive Distributed Lag (ARDL). The findings of the study indicated that Internet Banking have significant and negative effect on the financial performance of Deposit Money Banks in Nigeria, Automated Teller Machines had significant and positive effect on the financial performance of Deposit Money Banks in Nigeria while the result further revealed that significant and positive effect exist between mobile banking and financial performance of Deposit Money Banks in Nigeria. The study among others recommended that relevant agencies such as Central Bank of Nigeria, Deposit Money Banks etc should ensure adequate security for financial innovations installations to improve confidence to loyalties.

2.5 Research gap

There exist research gap between this study and past researches. The research gap covers subject gap, gap on geographical location of the study and gap on the variables.

Subject gap: The subject matter of this work and some reviewed empirical studies have some differences. There are limited studies on financial technology solutions as a tool for enhancing financial inclusion among the unbanked population in Nigeria. The study is geared to bridge the time gap in literature.

Gap on geographical location of the study: This work covers unbanked population in Nigeria and specifically unbanked population that operate in South East. None of the past studies carried study in the selected indigenous unbanked population and most of the past studies were done outside South East Nigeria.

Gap on the variables and contents of the study: The variables used in this study includes automated teller machine (ATM) innovation, internet banking (IB) innovation, Point of sales transaction (POS) innovation and mobile banking and unstructured supplementary service data (USSD) as proxies for financial technological solutions (for independent variable) while cash dispensing service, transfer payment service, bills payment service and loan provision service are proxies for financial inclusion (for dependent variable) were not used by past researches.

3.1 Methodology

Research design was descriptive survey research. Study Area is South East, Nigeria. The choice of location is based on proximity. The population of this study comprised of 3,406,000 unbanked population (adult population 18 and above) in South East Nigeria. The choice for only unbanked population in Nigeria was because of important of financial services towards the economic growth (Source: EFINA Access to Financial Services in Nigeria 2020) ^[12]. The study adopted the Slovin's sampling technique to get sample size of 378 respondents. The study adopted structured questionnaire to obtain data. Research copies of questionnaire were distributed to respondents by hand and collected after the respondents have duly completed them. Research questions of the study were answered using mean score and standard deviation. The hypotheses stated were tested using logistic least square statistic with the help of Statistical Package for Social Science (SPSS) a computer Application Software.

4.1 Data presentation and analysis

Table 1: Summary of questionnaires distributed

Title	Frequency	Percentage
Questionnaires distributed	378	100%
Returned questionnaires	358	94%
Not returned questionnaires	20	06%
Gender		
Female	213	59.5%
Male	145	40.5%
Age bracket		
20-30 Years	153	42.7%
31-40 Years	111	31.0%
41-50 Years	66	18.4%
51Years – above	28	7.8%
Marital status		
Married	223	62.3%
Single	125	34.9%
Widow/widower	7	1.9%
Divorce	3	0.8%
Educational qualification		
First Leaving	161	45%
SSCE	89	25%
ND/HND	68	19%
B.sc	27	8%
MBA/M.sc	11	3%
Ph.D	2	1%

Sources: Field survey, 2026

Three hundred and seventy eight (378) copies of questionnaire were designed and distributed to the respondents. Out of the 378 Questionnaires distributed, 358 (94%) were completed and returned while 20 (06%) were not returned. Therefore, 90 percent respondents were a good representation. The table showed the respondents profile in frequency and percentage distribution of gender, age bracket, marital status, educational

qualification, and working experience.

4.2 Data analysis

Question One: What is the impact of automated teller machine (ATM) technological solution on cash dispensing service among the unbanked population in Nigeria?

Table 5: Mean rating of responses on what is the impact of automated teller machine (ATM) technological solution on cash dispensing service among the unbanked population in Nigeria

S/N	Question Items	VGE (5)	GE (4)	ME (3)	LE (2)	VLE (1)	Total	Mean	SD
1	An ATM provides 24/7 hours banking services to members of the society in account to improve living condition	780	496	174	24	8	1475	4.14	0.0029
		156	124	58	12	8	358		
		44%	34%	16%	3%	2%	100%		
2	An ATM saves time visiting the bank whenever someone needs to make a transaction.	620	624	144	40	10	1438	4.02	0.0027
		124	156	48	20	10	358		
		35%	44%	13%	5%	2%	100%		
3	Accessibility of ATMs have reduced the burden on bank employees. No lines, or very short lines.	1065	364	126	18	3	1576	4.40	0.0034
		213	91	42	9	3	358		
		59%	25%	12%	2%	0.8%	100%		
4	ATM provides security to savings of members of the society, storage of cash in a secure location (the bank) instead of one's pocket.	985	416	111	24	8	1544	4.31	0.0032
		197	104	37	12	8	358		
		55%	29%	10%	3%	2%	100%		
Grand Mean								4.218	0.0031

Source: Field survey, 2026

This table shows that the respondents indicated their option on what is the impact of automated teller machine (ATM) technological solution on cash dispensing service among the unbanked population in Nigeria. The research items 1,2,3,4,5 have mean score of above 3.5 point respectively and it was rated great extent by respondents. The study showed that automated teller machine (ATM) technological solution has significant impact on cash dispensing service among the

unbanked population in Nigeria since accessibility of ATMs have reduced the burden on bank employees. No lines, or very short lines (Grand mean (4.146) is greater than cut-off mean (3.00).

Question two: To what extent does internet banking (IB) technological solution impact on online purchase service among the unbanked population in Nigeria?

Table 6: Mean rating of responses on what extent does internet banking (IB) technological solution impact on online purchase service among the unbanked population in Nigeria

S/N	Question Items	VGE (5)	GE (4)	ME (3)	LE (2)	VLE (1)	Total	Mean	SD
1	Internet banking (IB) provides a platform that permit the society to check their account details, make payments and transfer money between accounts within short span of time	900	400	144	46	7	1497	4.18	0.0030
		180	100	48	23	7	358		
		50%	30%	13%	6%	1%	100%		
2	Internet banking (IB) put an end stress of long queues for simply requesting financial transaction	630	632	192	40	10	1504	4.20	0.0030
		126	158	64	20	10	358		
		35%	44%	18%	5%	2%	100%		
3	Internet banking (IB) provides payment of bills automatically each month with easy-to-set-up auto payment	1000	404	135	18	3	1560	4.36	0.0033
		200	101	45	9	3	358		
		59%	28%	13%	2%	0.8%	100%		
4	Internet banking (IB) provides Issuance of demand drafts online with advancement technologies that would help in bigger growth	950	444	105	24	10	1533	4.28	0.0032
		190	111	35	12	10	358		
		53%	31%	9%	3%	2%	100%		
Grand Total								4.255	0.0031

Source: Field survey, 2026

This table shows that the respondents indicated their option on what extent does internet banking (IB) technological solution impact on online purchase service among the unbanked population in Nigeria. The research items 1,2,3,4,5 have mean score of above 3.5 point respectively and it was rated great

extent by respondents. The study showed that internet banking (IB) technological solution has significant impact on online purchase service among the unbanked population in Nigeria since internet banking (IB) provides a platform that permit the society to check their account details, make payments and

transfer money between accounts within short span of time (Grand mean (4.146) is greater than cut-off mean (3.00).

4.3 Test of hypotheses

The two hypotheses were formulated for this study and will be tested and a decision taken is based on the rule below. **Decision rule: Reject H_0 if p value > 0.01.**

4.3.1 Hypothesis one

H_2 = Automated teller machine (ATM) technological solution has no significant impact on cash dispensing service among the unbanked population in Nigeria.

Model Summary				
Model	R	R square	Adjusted R square	Std. error of the estimate
1	.931 ^a	.866	.865	.26055

a. Predictors: (Constant), Automated teller machine (ATM)

ANOVA ^a						
Model	Sum of Squares	Df	Mean Square	F	Sig.	
1	Regression	57.077	1	57.077	18.604	.000 ^b
	Residual	886.652	357	3.068		
	Total	943.729	358			

a. Dependent Variable: Cash dispensing service, b. Predictors: (Constant), Automated teller machine (ATM)

Coefficients ^a						
Model	Unstandardized coefficients		Standardized coefficients	T	Sig.	
	B	Std. error	Beta			
1	(Constant)	1.614	.089		18.111	.000
	Automated teller machine (ATM)	.529	.082	.931	6.446	.000

a. Dependent Variable: Cash dispensing service

In testing this hypothesis, automated teller machine (ATM) was regressed against cash dispensing service. The result of the single-regression analysis showed the model to examine the impact of automated teller machine (ATM) technological solution on cash dispensing service among the unbanked population in Nigeria.

Cash dispensing service = 1.614 + 0.529 Automated teller machine

The empirical result showed that the coefficient of automated teller machine (ATM) has positive impact on cash dispensing service; it means that automated teller machine (ATM) has positive and direct impact on cash dispensing service. The results of the t – statistics denoted that the coefficient of automated teller machine (ATM) was statistically significance. This is because observed values of t – statistics (6.446) was greater than its p -values (0.000). The results of the F – statistical test showed that the overall regression of the hypothesis two was statistically significance. This was because observed value of the F – statistics (18.604) was great than its P -value (0.000). Again, our empirical result showed that the Pearson product moment correlation analysis (r) was 0.931.

The strength of relationship between the two variables was high. However, we rejected the null hypothesis and concluded that automated teller machine (ATM) technological solution has significant impact on cash dispensing service among the unbanked population in Nigeria.

4.3.2 Test of hypothesis two

H_2 = Internet banking (IB) transaction technological solution has no significant impact on online purchase service among the unbanked population in Nigeria.

Model summary				
Model	R	R square	Adjusted R square	Std. error of the estimate
1	.931 ^a	.866	.865	.26055

a. Predictors: (Constant), Internet banking (IB) transaction

ANOVA ^a						
Model	Sum of squares	Df	Mean square	F	Sig.	
1	Regression	43.789	1	43.789	9.184	.000 ^b
	Residual	1377.952	357	4.768		
	Total	1421.741	358			

a. Dependent Variable: Online purchase service, b. Predictors: (Constant), Internet banking (IB) transaction

Coefficients ^a						
Model	Unstandardized coefficients		Standardized coefficients	t	Sig.	
	B	Std. error	Beta			
1	(Constant)	.418	.075		5.568	.000
	Internet banking (IB) transaction	.201	.017	.969	11.826	.000

a. Dependent Variable: Online purchase service

In testing this hypothesis, internet banking (IB) transaction was regressed against online purchase service. The result of the single-regression analysis showed the model to ascertain the impact of internet banking (IB) technological solution on online purchase service among the unbanked population in Nigeria.

Online purchase service = 0.418 + 0.201 Internet banking (IB) transaction

The empirical result showed that the coefficient of internet banking (IB) transaction has positive impact on online purchase service; it means that internet banking (IB) transaction has positive and direct impact on online purchase service. The results of the t – statistics denoted that the coefficient of internet banking (IB) transaction was statistically significance. This was because observed values of t – statistics (11.826) was greater than its P -values (0.000). The results of the F – statistical test showed that the overall regression of the hypothesis three was statistically significance. This was because observed value of the F – statistics (9.184) was greater than its P -value (0.000). Again, our empirical result showed that the Pearson product moment correlation analysis (r) was 0.931. The strength of relationship between the two variables was high. However, we rejected the null hypothesis and

concluded that internet banking (IB) transaction technological solution has significant impact on online purchase service among the unbanked population in Nigeria.

4.4 Discussion of findings

In this study, findings were discussed in line with stated study objectives-

4.4.1 Impact of Automated Teller Machine (ATM) technological solution on cash dispensing service among the unbanked population in Nigeria

The findings of the study revealed that automated teller machine (ATM) technological solution has significant impact on cash dispensing service among the unbanked population in Nigeria since accessibility of ATMs have reduced the burden on bank employees. No lines, or very short lines (t-statistic = 6.446; p value (0.000) < Sig-value (0.05).

The result agreed with the work of Olatoke, Idris and Ahmad, (2025) ^[21] that examined the impact of financial technology on the performance of deposit money banks (DMBs) in Katsina metropolis. The study adopted cross-sectional survey research design utilizing questionnaire as the research instrument. The population of the study comprised the 120 staff of the 20 DMBs in Katsina metropolis. Given the small size of the population, a census study was adopted. The data used for the study were analyzed by simple percentage, ANOVA and Multiple Linear Regression Analysis (MLRA). Findings indicate that all the three indicators of financial technology, that is, Automated Teller Machine (ATM), Point of Sale (POS), and Mobile Banking (MB) have a significant positive impact on deposit money bank's performance.

4.4.2 Impact of Internet Banking (IB) technological solution on online purchase service among the unbanked population in Nigeria

The findings of the study revealed that internet banking (IB) technological solution has significant impact on online purchase service among the unbanked population in Nigeria since internet banking (IB) provides a platform that permit the society to check their account details, make payments and transfer money between accounts within short span of time (t-statistic = 11.826; p value (0.000) < Sig-value (0.05).

The study agrees with conclusion of Abu, Dare and Kajo, (2025) ^[1] conducted a study on the impact of ICT Usage on the Performance of selected Deposit Money Banks in Nigeria. The main objective of the study was to investigate and analyze the impact of ICT usage on the performance of selected Deposit Money Banks in Nigeria. The study adopted quantitative research method for analysis and the population of the study was 170 respondents where the sample size used was 119 respondents. Simple regression and other statistical tools via SPSS were used to analyze the data collected. Base on the findings, it shows that ICT usage has significant impact on strategic decision, competitive advantage and customers' satisfaction of the three selected Deposit Money banks in Nigeria. The study established that there is a significant impact of ICT usage on the operational performance of the selected commercial banks in Nigeria.

5.1 Summary of findings

This study has the following findings:

- The study showed that automated teller machine (ATM) technological solution has significant impact on cash dispensing service among the unbanked population in Nigeria since accessibility of ATMs have reduced the burden on bank employees. No lines, or very short lines (t-statistic = 6.446; p -value (0.000) < Sig-value (0.05).
- The study showed that internet banking (IB) technological solution has significant impact on online purchase service among the unbanked population in Nigeria since internet banking (IB) provides a platform that permit the society to check their account details, make payments and transfer money between accounts within short span of time (t-statistic = 11.826; p -value (0.000) < Sig-value (0.05).

5.2 Conclusion

The study concluded that financial technology solutions are significant driver of financial inclusion among the unbanked population in Nigeria. The survival of deposit money banks in Nigeria is heavily influenced by the adoption and integration of various financial innovations, which are increasingly becoming crucial in the competitive banking sector. Internet banking (IB) in Nigeria provides 24/7 access to services, reducing the need for physical branch visits, minimizing long queues, and enabling real-time account monitoring. It enhances financial inclusion, lowers transaction costs, improves security over physical cash, and facilitates faster payments.

ATMs in Nigeria provide 24/7 banking access, reducing branch congestion and increasing operational efficiency, with a 30% rise in transaction efficiency by 2020. They enable widespread cash withdrawal and fund transfers, boosting financial inclusion and enabling a shift toward a cashless society while lowering operational costs for banks.

5.3 Recommendations

Based on the findings of this study, the following recommendations were made.

- Financial services providers should advance the use of mobile banking and web payment innovations by customers as this will help reduce the number of unbanked persons especially in the rural economy and also improve the financial performance of the banks.
- Financial services providers should incorporating ATM, POS, and MB into single platform supported by real-time data analytics and cloud computing. This allows consistent user experience across channels, while enabling personalized services, proactive fraud detection and seamless cross-platform transactions.

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