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Financial Inclusion Measures and Performance of Small And Medium Enterprises in Nigeria

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ABSTRACT

This study investigates the empirical relationship between financial inclusion measures and the performance of Small and Medium Enterprises (SMEs) in Nigeria, with particular emphasis on Internet Banking (IB) and Unstructured Supplementary Service Data (USSD) transactions. The study adopts an ex-post facto research design and utilizes secondary quarterly time-series data sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin and publications of the Nigeria Deposit Insurance Corporation (NDIC), covering the period 2009–2023. SME performance is proxied by loans and advances to micro, small, and medium enterprises, while financial inclusion is measured using Internet banking and USSD transactions. Econometric analysis is conducted using regression techniques, and hypotheses are tested at a 5 percent significance level. The findings reveal that Internet banking transactions have a positive and statistically significant effect on SME performance in Nigeria, indicating that increased online banking activities enhance SMEs' access to credit. Similarly, USSD transactions exhibit a positive and significant relationship with SME loans, underscoring the importance of mobile-based financial services in promoting financial inclusion, especially among underserved enterprises. The results confirm that digital financial platforms play a critical role in improving credit accessibility for SMEs in Nigeria. Based on these findings, the study concludes that financial inclusion initiatives, particularly Internet banking and USSD services, are effective tools for enhancing SME performance through improved access to finance. The study therefore recommends that financial institutions and policymakers strengthen digital financial infrastructures, promote the adoption of Internet banking among SMEs, and expand USSD-based financial services to deepen financial inclusion and support SME growth in Nigeria.

INTRODUCTION

Financial inclusion, according Nwanko & Nwanko (2014), is the availability and use of a broad spectrum of reasonably priced, easily accessible, easy financial services. All of these services, such as savings, credit, insurance, payments, and remittances, help to bring underprivileged groups into the financial mainstream. Financial inclusion has been underlined by researchers like Beck & Honohan (2009), Onaolapo & Odetayo (2012), Stephen & Sibert (2014), Godwin (2011), and Pallavi & Bharti (2013) as a key tactic to handle the structural and financial difficulties SMEs all around are facing.

FI provides a creative and complementing framework for tackling poverty, promoting equitable growth, and reaching the Sustainable Development Goals (SDGs) set by the UN. Its main goal is to provide unbanked people access to complete financial goods and services so they may be formally entered into the financial industry. While simultaneously helping to restructure and modernize financial institutions, effective financial intermediation improves capital allocation efficiency, hence bridging the gap between savers and investors. Real financial inclusion, according to Aduda & Kalunda (2012), calls for all population segments, especially underprivileged and low-income groups, to have fair, open, and reasonably priced access to important financial services via controlled institutions.

Where access to financial services is more extensive and strong than in emerging economies, developed countries as the United States, United Kingdom, Germany, China, and Japan clearly show the advantages of financial inclusion (Nkwede, 2015). Well developed financial systems in these nations enable resilience and economic mobility.

On the other hand, traditional banks and official financial institutions have historically concentrated on servicing high-net-worth individuals, big companies, and established firms in Nigeria, therefore sometimes disregarding low-income people and unofficial businesses. For certain portions of the population, this exclusion has ingrained cycles of poverty and hindered economic mobility (Ibenta & Amana, 2010). Still, this trend has changed gradually as creative microfinance organizations and lobbying for financial services catered especially to underprivileged and low-income neighborhoods have emerged.

Recognizing the critical role financial inclusion plays in national development, the Nigerian government has developed numerous targeted policies. Among these are microfinance projects, encouragement of mobile and agent banking, loosened Know-Your-Customer (KYC) rules, and efforts meant to increase credit availability. These initiatives are meant to help SMEs—identified

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as essential generators of employment, innovation, and economic diversification—to grow and include the financially excluded people into the official economy (Aduda & Kalunda, 2016).

Financial inclusion, according to the Nigerian Central Bank (CBN), is the provision of formally accessible, reasonably priced, user-oriented financial services to every adult Nigerian (CBN, 2019:9). Access to credit is a key component of this definition as SMEs need it to stay strong in the face of economic difficulties, control their finances, and continue development (Oyelaran-Oyeyinka & Adelaja, 2017). High lending rates, strict collateral requirements, and poor financial literacy are among the several obstacles SMEs in Nigeria must overcome despite their significance to ensure their potential to flourish (Ibrahim & Shuaibu, 2020).

In response to these challenges, the Nigerian government has launched a number of measures working with development partners and financial institutions. These comprise tie-red KYC systems to streamline account creation, agent banking networks, and financial products specifically for SMEs and informal workers (Central Bank of Nigeria, 2020). Notwithstanding these efforts, empirical studies assessing the success of these financial inclusion programs in increasing loan availability for SMEs still show a clear disparity. With an eye on their influence on access to credit for SMEs especially, this research seeks to evaluate the efficiency of financial inclusion policies in Nigeria critically. The results should provide insightful analysis that will guide next governmental decisions, add to scholarly publications, and help to shape more efficient financial inclusion strategies for equitable economic growth.

Statement of Problem

Nigeria has seen a clear rise in financial technology (FinTech) advances in recent years. These changes have together changed the financial scene of the nation. Important developments include the widespread use of Automated Teller Machines (ATMs), the explosion of computerized banking systems, the advent of agency banking, and the rising use of mobile money transfer technologies. Among these, agency banking and mobile money stand out for their ability to provide financial services to once underprivileged and isolated populations—especially in rural areas. Millions of low-income Nigerians may now interact with official financial institutions more inexpensively and effectively thanks to the much expanded reach and accessibility of credit, savings, and payment technology. Enhanced credit allocation, more general economic engagement, better income distribution, and general national economic development have all benefited from this in turn (Aduda & Kalunda, 2016).

Still, financial inclusion in Nigeria falls below world standards even with these technological developments. Low-income nations like Nigeria still battle with financial accessibility whereas high-income and many middle-income nations have reached banking penetration rates above 90%. A great number of people still underuse formal financial services such bank accounts, insurance, and mobile money systems. Recent statistics show that just 64% of Nigerians have access to such services by 2023, less than the national goal of 95% financial inclusion by 2024. Furthermore, only around 52% of individuals have a conventional bank account, meaning almost half of Nigerian citizens are not included into the official financial system. Insufficient income is the main recognized cause of this disparity; many people are unable to satisfy the minimal criteria for financial service access (EFInA, 2020).

The development and viability of Micro, Small, and Medium Enterprises (SMEs) in Nigeria are seriously hampered by this ongoing disparity in access to financial services. In order to guarantee credit, organize money, and run operations, these companies mostly rely on inclusive financial systems. Lack of thorough financial access inhibits their capacity for size, creativity, and substantial contribution to national economic growth.

While several studies have looked at the link between financial inclusion and economic growth, clear empirical data on the precise effect of financial inclusion on SME access to credit in Nigeria is still lacking and contradictory. Scholars including Ibenta & Amana (2010), Mbam (2012), Nwosa & Oseni (2013), Uduakobong (2014), Owolabi & Nasiru (2017), Imoughele & Ismaila (2014), Amadasu (2017), and Abusomwan & Arodoye (2017) have added to the conversation, but many of these studies rely mostly on a small range of indicators—such as the number of ATMs per capita, the presence of bank branches, or the volume of digital transactions—as proxies for financial inclusion. Although helpful, these proxies fall short in properly capturing the complex nature of financial inclusion or its wider socioeconomic consequences.

This paper suggests a more thorough and complex analytical strategy in order to close this disparity in the literature. Apart from conventional indicators, the study will include enlarged measures like frequency and volume of online banking usage and activities carried out using Unstructured Supplementary Service Data (USSD) platforms. This approach seeks to provide more strong and representative empirical findings on how financial inclusion policies affect SME access to credit in Nigeria

Aim and Objectives

The main aim of the study is to investigate the empirical relationship between financial inclusion measures and performance of SMEs in Nigeria. The specific objectives are;

- To examine the impact of Internet banking transactions on performance of SMEs in Nigeria.
- To assess the extent to which USSD transactions impact on performance of SMEs in Nigeria.

Hypotheses

The study was guided by the following hypotheses:

H01: Internet banking transactions does not have any significant impact on MSMEs credit in Nigeria.
H02: USSD transactions does not have any significant impact on MSMEs credit in Nigeria.

LITERATURE REVIEW

Financial Inclusion in Nigeria

Challenges stemming from Nigeria's historically cash-based economy have impacted the country's financial inclusion (FI) path. Systemic constraints, such as a lack of banking infrastructure, financial literacy issues, and economic inequality, made it extremely difficult for certain groups, especially those living in rural areas or on the margins of society, to have access to and participate in the financial system until the recent drive towards inclusive finance. Academics, government organizations, and lawmakers have long been concerned about these barriers, which has led to initiatives to increase access to formal financial services.

The government of Nigeria has responded by implementing many policies meant to increase access to formal financial services. Notably, programs were launched with the aim of providing formal financial services to those who did not have access to them before. One such project was the creation of rural deposit-taking organizations. To ensure that people from all socioeconomic backgrounds have equal access to financial services, broader interventionist initiatives, institutional changes, and regulatory frameworks have all been put into place.

The creation of the Financial System Strategy 2020 (FSS 2020) was a significant policy move in this area. It aimed to restructure the financial sector so that it might play a role in driving economic development. Kama and Adigun (2013) state that the FSS 2020 had the stated goal of bringing Nigeria's economy into the top 20 worldwide by 2020 with reforms that prioritized equitable financial growth. Financial technology service providers, insurance companies, capital market players, pension fund administrators, non-bank financial institutions, and regulatory agencies were the six main stakeholder groups identified by the strategy as being essential to the advancement of financial inclusion.

The administration implemented six significant programs to fortify the domestic financial system, with a focus on financial inclusion in four of them. A national savings culture was promoted, payment infrastructure was modernized, credit systems were improved, and a variety of financial products were developed to meet the needs of neglected communities. A variety of reasonable, suitable, and dignified financial services should be available to all persons aged 18 and above, since this was the main goal.

These programs have had a discernible effect. In the years after these rules were put into place, Arogundade (2019) found that the rates of financial exclusion dropped dramatically. The 2018 poll by Enhancing Financial Innovation and Access (EFInA) found that 63.6% of Nigerians use formal financial services, a decrease from 46.3% in 2010 to 36.4%. The poll measured development along several axes, such as the number of people with bank accounts, how they save money, how they send money abroad, how easy it is to get a loan, and how agents help customers.

The phenomenal increase in the use of digital payment methods deserves special mention. From 5,000 in 2011 to more than 30 million in 2018, the amount of card transactions processed by POS terminals skyrocketed. At the same time, there was a surge in the number of point-of-sale terminals installed, going from 10,000 to 200,000 (Arogundade, 2019). These changes are the result of the synergistic effect of technical advancements and government regulations that aim to increase access to credit.

The ability of financial inclusion to solve systemic flaws in the financial system and enhance efficiency in the public and commercial sectors is what makes it so important (CBN, 2014). In the past, most transactions in Nigeria's economy were done with cash, and a significant amount of the country's restricted money supply was kept outside of banks. This tendency started to turn around when literacy rates rose and the government made more deliberate attempts to improve education.

Around 61.1 percent of the money supply in the 1960s was in forms of currency not held by banks. Interventions like the rural banking plan, which the Central Bank of Nigeria implemented to encourage banks to extend their services to underserved areas, drove this ratio down to 44.3% in the 1970s and even lower to 40.9% in the 1980s (CBN, 2013). More people were able to use the formal financial system as a result of these programs.

People no longer had faith in banks after the financial crisis of the '90s. A return to non-banking cash hoarding, which reached 47.7 percent by decade's end was a direct result of pervasive economic mismanagement, notably by political elites. The government's response was to restart the financial system and restore faith in it through a number of programs. Stabilizing the industry was just one goal of these changes; another was to increase inclusion by boosting employment and income.

In 2004, there was a major shift due to the banks consolidation effort. More dependence on official financial services and fortified banks were the goals of this reform. By the end of 2005, the percentage of money kept outside the banking system had dropped to around 38% (CBN, 2013), indicating a favorable trend toward wider financial inclusion, thanks to the consolidation effort.

A 2010 survey by Enhancing Financial Innovation and Access (EFInA) indicated that merely 30.7 million out of 85 million Nigerians aged 18 and above had access to formal financial services, including those offered by deposit money banks and other regulated financial institutions (CBN, 2013). This resulted in 54 million individuals either depending on informal financial institutions or being entirely unbanked. Among the 30.7 million nominally banked persons, 25.4 million utilised

banking goods and services predominantly as paid workers or entrepreneurs. Of the total, 5.3 million used services from alternative formal institutions, including microfinance banks and financial houses (CBN, 2021).

Financial exclusion in Nigeria is far higher than in other African countries. Nigeria's adult population experiencing financial exclusion was documented at 46.3%, markedly surpassing South Africa's 26.0%, Botswana's 33.0%, and Kenya's 32.7% (EFInA, 2010). This gap highlights the pressing necessity for more study to determine solutions that could enhance financial inclusion (FI) in Nigeria. This research is crucial for comprehending the possible beneficial effects of financial inclusion on economic development and poverty reduction, hence underscoring its significance in tackling these vital concerns.

Financial Inclusion Measurement

In the preliminary phase of theoretical and empirical research on financial inclusion (FI), researchers have employed many characteristics of FI to formulate complete and cohesive indicators. These multidimensional indexes are crucial for precisely evaluating the extent and profundity of financial inclusion across various populations and economies. Kempson, Atkinson, and Pilley (2006) assert that a comprehensive and effective measure of financial inclusion must include three essential criteria:

- The ability to incorporate as many dimensions as practical.
- Simple calculations.
- The comparability across countries.

Camara and Tuesta (2014) analyse the degree of FI development based on three fundamental dimensions including usage, barrier and access. First, the usage dimension was considered using three indicators, namely (i) owning at least one financial product, (ii) having savings accounts, and (iii) having a loan with a formal financial institution.

The second component of financial exclusion, known as the barrier dimension, includes the impediments that impede individuals from obtaining formal financial services. Barriers are often evaluated by four primary indicators: proximity to financial institutions, service affordability, paperwork prerequisites, and the degree of confidence individuals have in financial institutions. Each of these characteristics significantly influences the accessibility of participation in the formal financial system.

The access dimension of financial inclusion is assessed by four variables, especially emphasising the presence of financial service locations. This frequently encompasses the quantity of Automated Teller Machines (ATMs) and deposit-accepting bank branches, usually quantified per 100,000 adults or per 1,000 square kilometres. These indicators facilitate the assessment of the physical availability and accessibility of financial services within a specific region.

The data underpinning these dimensions are sourced from esteemed global entities, specifically the Global Findex Database administered by the World Bank and the Financial Access Survey (FAS) executed by the International Monetary Fund (IMF). Researchers utilise modern statistical methods, including two-stage Principal Component Analysis (PCA), to amalgamate multiple variables into a singular, complete metric, culminating in the creation of a composite Index of Financial Inclusion (IFI).

Mialou, Amidzic, and Massara (2017) employed factor analysis to create a composite IFI, a statistical technique aimed at mitigating objections related to the subjectivity and arbitrariness in weighting various indicators and dimensions. This approach improves the index's impartiality by allowing the data to identify the most critical factors influencing financial inclusion.

Sarma (2008) made a significant early contribution to the measurement of financial inclusion by proposing an Index of Financial Inclusion (IFI) based on indicators primarily associated with the banking sector, encompassing availability, usage, and penetration. The indicators were consolidated into a single-country index utilising the normalised inverse Euclidean distance (IED). Sarma contended that the Euclidean Distance Method (EDM) is mathematically robust, straightforward to implement, and guarantees consistency in index formulation.

Sarma (2012) subsequently refined and updated the IFI framework, examining its correlation with economic development levels and reinforcing the notion that financial inclusion is intricately linked to broader economic outcomes. Utilising this methodology, Park and Mercado (2015) created a comparable multidimensional index, incorporating a significant alteration—they employed an average of financial inclusion indicators over a span of seven years rather than a singular temporal measurement. Their extensive analysis encompassed 180 countries, subsequently ranked to enable international comparisons of financial inclusion levels.

Automated Teller Machines (ATMs)

One major technical development that has the potential to greatly enhance the efficiency, accessibility, and speed of financial services is the Automated Teller Machine, more often known as an ATM. Offering a wide range of services such cash withdrawals, deposits, money transfers, utility bill payments, credit card settlements, and requests for check books, among others, this invention has become a vital part of modern banking systems (Isa & Yusuf, 2011). In response to customers' ever-changing wants and demands, banks have embraced automated teller machines (ATMs) for their convenience and the extra money they bring in.

ATMs were one of the first developments that allowed the public to have access to financial services through computers. Their launch shook up the banking industry by making services available outside of normal business hours, giving clients more freedom to access their money and do important transactions whenever and

wherever they wanted. Users are able to make deposits, withdrawals, print mini-statements, and bill payments using automated teller machines (ATMs), which were designed to streamline fundamental banking activities. A combination of a personal identification number (PIN) and a plastic card with a magnetic chip that identifies each customer is used in a secure system to grant access to these services (Ebiringa, 2010). Despite their "Plastic Money" moniker, ATM cards offer unparalleled safety and ease of use. Furthermore, ATMs' simplicity of use in paying bills has led to their widespread adoption, and this trend has extended to Nigeria, where their incorporation into banking systems is now essential for maintaining financial market competitiveness.

The now-defunct Society General Bank of Nigeria (SGBN) was an important step in the development of modern banking practices in 1989, when automated teller machines (ATMs) first appeared in Nigeria. In the time after, banks across have rushed to install ATMs in an effort to meet the ever-changing demands of their customers. Nearly every bank in Nigeria currently has an ATM, a sign of how important they are to the country's financial system.

Despite the revolutionary benefits, ATMs encounter many obstacles that make their use less than ideal. According to Mohammed (2010), there are still certain places where using ATMs is a bit of a novelty. With that comes a whole host of problems, such the possibility of fraud, network outages during important transactions, customers not knowing all the services that ATMs offer, and long lines at the machines themselves. In light of these problems, it is clear that better infrastructure, security measures, and education are required for ATMs to reach their full potential.

The negative effects of automated teller machines (ATMs) as a means of providing banking services in Nigeria were investigated by Ogunniyi, Onuaoha, and Izogo (2012). The researchers surveyed 600 people from the states of Anambra and Lagos, Nigeria, to provide a good representation of the country's varied population. They came to the conclusion, using chi-square analysis, that randomly placing ATMs might increase security vulnerabilities. While automated teller machines (ATMs) make banking more convenient, their research suggests that some criminals take advantage of people's weaknesses to commit more crimes.

Relatedly, Mohammed (2010) looked at how satisfied Pakistani bank customers were with the level of service they received from ATMs. The research used regression analysis to examine six hypotheses with the help of 500 participants representing both domestic and foreign banks. Improving service quality might greatly increase customer contentment and loyalty, as the results showed a substantial positive association between customer satisfaction and ATM service quality.

Consumer perceptions regarding ATMs were the subject of another study by Moutinho and Brownlie (2019), which found that many users have a good impression of ATMs because of how easy they are to use, how accessible they are, and how convenient they are. Because of these features, automated teller machines (ATMs) have become an integral part of contemporary banking and have gained broad acceptance and reliance. In order to maintain their position as a foundation of modern financial services, their study highlights the significance of improving the design and operating efficiency of ATMs.

Internet Banking (IB)

Internet banking denotes the utilization of a web-based platform enabling clients to access various financial services online. This service is especially advantageous for Micro, Small, and Medium Enterprises (MSMEs), offering continuous access to vital financial services, such as account administration, loan applications, and online payment capabilities. Internet banking reduces the necessity for costly physical infrastructure, allowing banks to broaden their services to a wider customer base, particularly previously underserved MSMEs (Adewale, 2021).

Besides its accessibility advantages, online banking enhances transparency in financial activities, hence reducing the overall cost of banking services. By diminishing the necessity for physical branches and personnel, it renders loans more economical and attainable for enterprises that may have difficulties in accessing conventional banking services. Moreover, online banking allows financial institutions to scrutinize transaction histories and evaluate clients' creditworthiness with greater efficacy. This data-driven methodology enables banks to make educated lending decisions, hence enhancing the accessibility of credit to MSMEs (Ejiogu & Edeh, 2019).

Small and Medium Scale Enterprise Performance

It is common practice to compare the actual accomplishments of small and medium-sized businesses (SMEs) with their previously established goals and objectives when assessing their performance. The three main criteria that Richard (2009) uses to evaluate the performance of SMEs are financial results, product market accomplishments, and returns to shareholders. All things considered, these standards offer a thorough framework for evaluating the degree to which SMEs achieve their goals and contribute to the economy as a whole.

Small and medium-sized enterprises (SMEs) in Nigeria face a wide range of difficulties, many of which are universal among SMEs in developed and developing countries. Many countries have put measures in place to help small and medium-sized enterprises (SMEs) thrive because they know these companies are essential to economic growth. Infrastructure and associated services, as opposed to direct subsidies or protective measures, are the primary emphasis of such assistance. Some examples of such programs are infrastructure development, tax incentives, training and capacity-building programs,

increased access to commercial loans and venture capital, and assistance for research and development (R&D). To improve SMEs' operational efficiency, these resources are generally provided in a collaborative effort by local government agencies, industry associations, and occasionally non-governmental organizations (NGOs) (Abbasi *et al.*, 2017).

Small and medium-sized enterprises (SMEs) in Nigeria have unique requirements when it comes to funding and operational assistance, therefore the government has set up a number of initiatives and established a plethora of organizations to help. The credit guarantee scheme for small and medium enterprises (SMES), the Bank of Industry (BOI), the Small and Medium Enterprises Development Agency of Nigeria (SMEDAN), state-level initiatives by ministries of industry, the Nigerian Industrial Development Bank (NIDB), which started operations in 1964, the Nigerian Bank for Commerce and Industry (NBCI), which was founded in 1973, and the SMEs Apex Unit of the Central Bank of Nigeria, which was launched in 1989, are all important entities (Wang, 2019).

The small and medium enterprise (SME) sector in Nigeria is still struggling to adapt to the complex and sometimes unexpected business climate, even though various institutions and efforts have been put in place. The nation's continued dedication to tackling these challenges is seen by recent government actions including the establishment of the BOI, SMEDAN, and the Credit Guarantee Scheme. Positive response has been received about the Bankers Committee's institutionalization of SMIEIS. It is expected that the Credit Guarantee Scheme will improve access to credit, SMIEIS will provide prospects for equity financing, and SMEDAN will offer crucial non-financial support. These methods are designed to help small and medium-sized enterprises (SMEs) run more smoothly, grow in a sustainable way, and make a bigger impact on Nigeria's economy (Wang, 2019).

The Finance Gap Theory

The Organization for Economic Cooperation and Development (OECD, 2006) proposed the Finance Gap Theory to elucidate the difficulties encountered by micro, small, and medium companies (MSMEs) in obtaining formal financial services. Empirical research indicates that a significant section of the financially excluded population globally mainly low-income persons and MSMEs cannot get external financing due to capacity limitations and widespread market flaws. The financial gap denotes the considerable challenge small firms encounter in acquiring external money necessary for operational funding, income generation, and future expansion of their organizations.

In Nigeria, there is a substantial cohort of young entrepreneurs, jobless graduates, and MSMEs with feasible and lucrative business plans. These enterprises has the capacity to utilize resources effectively to stimulate growth and economic advancement. Nevertheless, the constrained availability of cheap credit and stringent lending policies in traditional financial markets prevent many of these firms from obtaining essential finance. Thus, this financial divide limits their capacity to expand operations and perpetuates ongoing financial exclusion in the nation.

Previous Studies

Yusuf and Solomon (2023) assessed the efficacy of financial inclusion strategies in promoting MSME growth in Nigeria. Their research indicated that comprehensive and effectively executed policies lead to improved access to financing and sustainable development of MSMEs. They promote continuous policy reform emphasizing inclusion.

A study conducted in Nigeria examined the availability of micro, small, and medium-sized enterprise (MSME) loans and financial inclusion programs (Okafor and Mbah, 2023). Their findings highlight the increasing efficacy of non-traditional lending strategies, especially those fueled by developments in financial technology. In order to increase access to credit and financial services, they pushed for partnerships between FinTech companies and conventional banks.

Using a cross-sectional survey and regression analysis, Eton, Mwosi, Okello-Obura, Turyhebwa, and Uwonda (2021) investigated how financial inclusion affected the growth of small and medium-sized enterprises (SMEs) in Uganda. Despite the high service prices and restricted usability that still prevented full-scale adoption, their data showed a substantial beneficial connection.

Researchers Okpala and Ifeoma (2022) looked at how microfinance institutions helped small and medium-sized enterprises (SMEs) in Nigeria get loans. Regulatory roadblocks and high interest rates limit the usefulness of these organizations, notwithstanding their increased lending capability. In order to facilitate more effective microfinance operations, the report suggested revising regulatory frameworks.

The effect of digital financial technology on micro, small, and medium-sized enterprises (MSMEs) in Nigeria's ability to get loans was studied by Ibekwe and Adebola (2022). They found that more people having access to smartphones and the internet meant easier access to credit, and they also stressed the importance of improving people's digital literacy.

Adeyemi and Balogun (2022) looked examined the impact of certain financial inclusion initiatives on funding for micro, small, and medium enterprises (MSME). In particular, they found that underprivileged areas benefited greatly from personalized credit products and increased financial literacy, which greatly increased access to financing.

To help narrow the financial gap that micro, small, and medium-sized enterprises (MSMEs) in Nigeria confront, Bello and Adeyemi (2020) looked at digital financial services. Their findings corroborated the positive impact of digital platforms on credit accessibility, especially in

rural areas. To fully realize digital finance's potential, they advocated for more cooperation between banks and internet companies.

Financial inclusion and loan accessibility among Nigerian MSMEs owned by women were examined by Umoren and Inyang (2020). Their results, based on descriptive data from 100 businesses, demonstrated that female entrepreneurs had better access to finance as a result of inclusion initiatives. To guarantee fair access to funding, they pushed for regulations that took gender into account. Atueyi, Nkechukwu, and Jacobs (2021) used time-series data spanning 1981–2021, to investigate the correlation between financial inclusion and the success of small and medium-sized enterprises (SMEs) in Nigeria. The study utilized the Augmented Dickey-Fuller (ADF) test, Johansen cointegration, and an Error Correction Model (ECM) to determine that deposits and loans from rural commercial banks had a substantial effect on the growth of small and medium-sized enterprises (SMEs). To further boost financial access, they advocated for reduced loan rates and expanded deployment of ATMs and POS technology.

The developments in financial inclusion in Sub-Saharan Africa from 2005 to 2015 were examined by Biliqees and Oyebola (2019). Their research showed that after the Maya Declaration of 2011, which prompted changes in legislation that encouraged financial deepening, financial inclusion has been steadily increasing. On the other hand, the study did find that development slowed down from 2014 to 2015, which contradicts Yorulmaz's (2013) assertion that financial inclusion has been dropping but somewhat agrees with Andrianaivo and Yartey's (2010) views.

In their 2019 study, Jiang, Tong, Hu, and Wang used static and dynamic panel models to assess how the Inclusive Finance Development Index in China affected rural entrepreneurship. Despite finding geographical differences in financial inclusion, the research confirmed that rural areas would see a substantial uptick in entrepreneurial activity with better inclusive financing.

MATERIALS AND METHODS

The study employs an ex-post facto research design, suitable for investigating cause-effect relationships among variables that cannot be manipulated by the researcher. This research employed secondary quarterly time series data sourced from many issues of the Central Bank of Nigeria (CBN) Statistical Bulletin and publications from the Nigeria Deposit Insurance Corporation (NDIC), spanning the years 2009 to 2023. This period was chosen based on the initiation and development of electronic banking (e-banking) transactions in Nigeria. The dependence on secondary data is warranted due to the measurable, objective, and verifiable characteristics of the analyzed variables. The variables encompass Loans and Advances to SMEs, Internet Banking (IB) transactions and Unstructured Supplementary Service Data (USSD) transactions.

The model used by Onaolapo (2015), in which FINTECH stands in for financial inclusion, was modified for this study. Internet Banking (IB) and Unstructured Supplementary Service Data (USSD) transactions are all included in this proxy. A re-specified model that was customized for this investigation included these variables. The re-modified functional model is specified below:

SMEP = f (IB, USSD,) .....(1)

The function can be written as:

Where:

SMEP = Small and Medium Scale Enterprise measured by Loan and Advances to MSMEs

IB = Internet Banking

USSD = Unstructured Supplementary Service Data

However, specifying equation (1) in econometrics form results to equation (2) as follows:

$SMEP = \alpha + \beta 1IB + \beta 2USSD + \mu$ .....(2)

Where all the variables remained as defined above:

μ = The stochastic/error term

$\beta 0$ = The intercept

$\beta 1$ and $\beta 2$, are estimation parameters of the respective variables in the model.

Results and Discussions

Data used in the study comes from the Nigeria Deposit Insurance Corporation (NDIC) publications and the Central Bank of Nigeria (CBN) Statistical Bulletin, and it covers the years 2009–2023.

Table 1: Unit Root Test (Augmented Dickey-Fuller Test)

Variables	Level	1st difference	Model	Critical Value @ 5%	Order of Integration
LSMEP	-6.103033*	-	Trend and Intercept	-3.487845	I(0)
LIB	-5.355001*	-	Trend and Intercept	-3.487845	I(0)
LUSSD	-3.109613	-8.353424*	Trend and Intercept	-3.489228	I(1)

*Note * represent 5% level of significance*

Source: Author's Computation with the use of E-view 9.

For every variable that was part of this investigation, Table 4.1 summarizes the findings of the Augmented Dickey-Fuller (ADF) unit root tests. Since the ADF test statistics for Loans and Advances to MSMEs (SMEP), Internet Banking (IB) surpass the critical values at the 5% significance level, we can conclude that these natural logarithms are stationary at their levels (I(0)). However, after implementing the first difference

transformation, which results in integration of order one, I(1), the variable Unstructured Supplementary Service Data (USSD) transactions become stationary, despite initially being non-stationary. In light of these results, the research deduces that the variables display a combination of integration orders, specifically I(0) and I(1). The limits testing process, also known as the Autoregressive Distributed Lag (ARDL) bounds testing approach, may be applied to co-integration because of its combination. The approach is well-suited for studying long-run equilibrium connections among variables with varying orders of integration but not more than I, as well as short-term dynamics (1).

Table 2: Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-188.6657	NA	0.000787	7.042390	7.224875	7.112958
1	45.06651	416.4684	4.00e-07	-0.547873	0.547036*	-0.124463*
2	65.41048	32.55035	4.84e-07	-0.378563	1.628770	0.397689
3	96.39108	43.93612	4.13e-07	-0.596039	2.323718	0.533054
4	130.1842	41.78061*	3.38e-07*	-0.915790*	2.916392	0.566146
5	145.6488	16.30812	5.86e-07	-0.569048	4.175558	1.265729

* indicates lag order selected by the criterion

Source: Author's computation, 2025

The process of the ARDL bound test begins by obtaining the appropriate lag length for our model. An optimal lag of 4 was chosen for the empirical model based on Akaike Information Criterion.

ARDL Co-integration Result

According to Pesaran *et al.* (2001), the Autoregressive Distributed Lag (ARDL) method should be used for empirical analysis in this study due to the features of the dataset. Datasets containing variables that display mixed orders of integration, namely a combination of I(0) and I(1) series, are well-suited to the ARDL cointegration approach, as suggested by Nkoro and Uko (2016). Because of its adaptability, the ARDL technique is perfect for representing complicated connections; it efficiently and robustly estimates the short-run dynamics as well as the long-run equilibrium relationships among variables that have different integration qualities.

This study uses the ARDL paradigm to examine how different financial inclusion programs in Nigeria affect the availability of loans for micro, small, and medium-sized businesses. To find out if there is a stable long-term relationship (cointegration) between the financial inclusion proxies (such as mobile banking, internet banking, USSD, and point-of-sale transactions) and the availability of MSME loans, we use the F-statistic values shown below, which are obtained from the bounds testing procedure. The policy implications for improving MSME funding through enhanced financial inclusion hinge on this stage, which is crucial for establishing the presence of long-term links.

Table 3: ARDL Bounds Test

Sample size: 56	
Test Statistic	Value
F-statistic	8.586889

Bounds Critical Values

	10%		5%		1%	
Sample Size	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
55	2.345	3.280	2.763	3.813	3.738	4.947
60	2.323	3.273	2.743	3.792	3.710	4.965
Asymptotic	2.200	3.090	2.560	3.490	3.290	4.370

** I(0) and I(1) are respectively the stationary and non-stationary bounds.*

Source: Author's computation, 2025, from Eviews 13

According to Table 3, which summarizes the findings of the limits testing process, the computed F-statistic value of 8.586889 surpasses the lower critical bound of 2.763 and the upper critical bound of 3.813 at the 5% significance level. Because of this result, the null hypothesis, which states that the variables do not have any kind of long-term association, is rejected. As a result, we can say with certainty that, throughout the course of the research period, there was a substantial long-run equilibrium relationship between financial inclusion measures and MSMEs' access to credit in Nigeria. Because it proves the existence of cointegration, which means these variables

move together over time despite short-term oscillations, this discovery is very significant. In order to examine the nature and extent of the association between financial inclusion indicators and MSME loan accessibility, the study estimates the ARDL long-run model. Table 4 presents the findings of this analysis, which provide evidence of a stable long-term linkage.

Table 4: ARDL Error Correction model on financial inclusion and access to credit (Loans and advances) for MSMEs in Nigeria

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COINTEQ*	-0.821978	0.108254	-7.593077	0.0000
D(LIB)	0.747878	0.298194	2.508020	0.0157
D(LIB(-1))	-0.826594	0.309711	-2.668918	0.0104
D(LUSSD)	0.007573	0.255071	0.029688	0.9764
D(LUSSD(-1))	-0.687345	0.262470	-2.618756	0.0118
R-squared	0.728713	Mean dependent var		0.067730
Adjusted R-squared	0.682536	S.D. dependent var		0.720880
S.E. of regression	0.406172	Akaike info criterion		1.182143
Sum squared resid	7.753846	Schwarz criterion		1.507646
Log likelihood	-24.10000	Hannan-Quinn criter.		1.308340
F-statistic	15.78103	Durbin-Watson stat		2.039281
Prob(F-statistic)	0.000000			

* p-values are incompatible with t-Bounds distribution.

Source: Author's computation using Eviews 13

Table 5: Estimated Long-Run Coefficients Using Result of ARDL (1, 2, 0, 4, 2) Model.

ARDL Cointegrating Relationship
Deterministics: Rest. constant (Case 2)
CE = LSMEP (-1) - (2.253831*LIB(-1) + 0.171637*LMB - 0.682087*LPOS(-1) +
0.643006*LUSSD(-1) + 5.467927)

Cointegrating Coefficients

Variable *	Coefficient	Std. Error	t-Statistic	Prob.
LIB(-1)	2.253831	0.831600	2.710235	0.0091
LMB	0.171637	0.380995	0.450495	0.6543
LPOS(-1)	-0.682087	0.200039	-3.409767	0.0013
LUSSD(-1)	0.643006	0.251847	2.553160	0.0137
C	5.467927	2.345643	2.331100	0.0237

*Note: * Coefficients derived from the CEC regression.*

Source: Author's computation, 2025

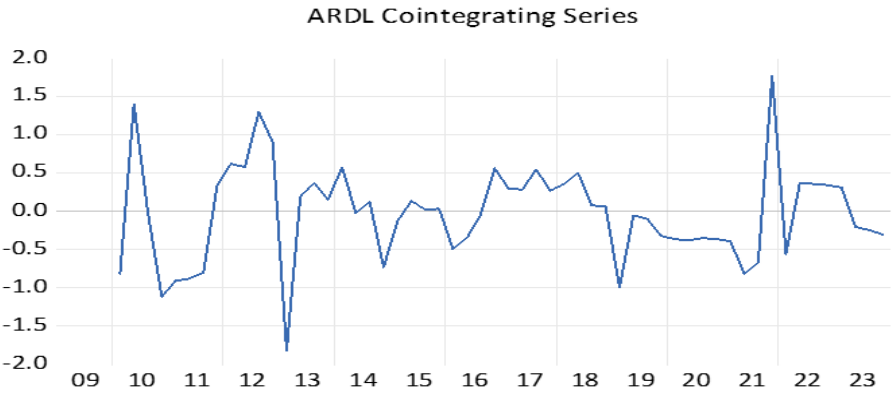

Figure 1: ARDL Cointegrating Series

Source: Generated by Author from data used for the study

The predicted long-run coefficients from the chosen ARDL (1, 2, 0, 4, 2) model in Tables 4a and 4b. The {COINTED} lag term in the co-integrating equation represents the system's capacity to stabilize the loan availability level for MSMEs through ongoing financial inclusion initiatives. A powerful and quick adjustment mechanism returns to equilibrium, as the error correction term (ECT) coefficient of -0.821978 shows that about 82.2% of any departure from the long-term equilibrium produced by shocks in the previous period is corrected during the present period. Financial inclusion initiatives in Nigeria successfully contribute to the increase of MSME credit access over time, since this coefficient is statistically significant with a p-value of 0.0000, much below the customary 5% threshold.

Internet banking transactions (IB) have a strong positive effect on micro, small, and medium enterprise (MSME) loans when looking at the individual financial inclusion proxies, with a coefficient of 2.253831 and a significance level of 0.0091. This highlights the critical importance of digital banking platforms in enabling access to credit, as a one-unit increase in online banking transactions is linked to an astounding 225.38% increase in loans and advances to MSMEs. Also, USSD (Unstructured Supplementary Service Data Transactions) have a positive and statistically significant impact (0.643006, p=0.0137), which goes to show how important mobile-enabled financial services are for improving MSME funding.

On the other hand, there is a statistically significant negative correlation between MSME credit availability and point-of-sale (POS) transactions. This may be due to difficulties or inefficiencies associated with POS systems, as the p-value of 0.0013 and coefficient of -0.682087 indicate that there is a negative correlation between the two variables and a decrease in the availability of loans to micro, small, and medium enterprises (MSME). At the same time, MB shows a positive coefficient of 0.171637, but the correlation is not statistically significant (p-value = 0.6543), hence using MB did not significantly impact MSME credit accessibility during the research period.

The findings highlight the importance of financial inclusion initiatives in increasing the availability of loans to micro, small, and medium-sized enterprises (MSMEs) in Nigeria. These efforts should prioritize the use of online banking and USSD services. Additional research into the operational or contextual variables that restrict the beneficial impact of POS transactions is warranted in light of the negative effect that has been identified. Previous studies have also found strong positive correlations between financial inclusion and the increase of micro, small, and medium enterprise (MSME) loans; for example, Ibor, Offiong, and Mendie (2017), Salman *et al.* (2015), and Babajide *et al.* (2015).

Table 5 shows the ARDL model's coefficients for the short-run dynamics, where the best lag selection was guided by the Akaike Information Criterion (AIC). The financial inclusion factors explain around 90.19 percent of the variation in MSME loans and advances (as measured by the model's adjusted R-squared value of 0.901908), whereas random error fluctuations account for the remaining 9.81 percent from 2009 to 2023. Durbin-Watson statistic of 2.105862 further confirms robustness of the model by indicating no serial autocorrelation. An F-statistic p-value of 0.000000 confirms that the model is suitable for influencing policy decisions and that it is highly statistically significant overall.

Statistical analysis of lag effects revealed no significant relationship between past loan volumes and present MSME loan access (p-value = 0.5865) when looking at loans and advances from the previous year (LA(-1)). There is still a robust and statistically significant beneficial impact of USSD Transactions and Internet Banking Transactions (IB) at the second lag. Despite the negative long-term effect, point-of-sale transactions (POS) reach statistical significance and show the anticipated positive association by the third lag, indicating more complicated short-term dynamics. Even if there is a positive coefficient of 0.472178 for mobile banking transactions at this latency, the impact is not statistically significant (p-value = 0.296).

The validity of the model specification is further supported by the fact that, on the whole, the short-run estimates match theoretical predictions. Diagnostic tests further proved the ARDL model's stability and lack of serial correlation; the results are presented in Figure 1 and the Appendix, both in tabular and graphical formats, guaranteeing the findings' dependability for practical implementation.

Table 6: Serial Correlation test

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	0.387169	Prob. F(2,40)	0.6815
Obs*R-squared	1.063486	Prob. Chi-Square(2)	0.5876

Source: Author's computation using Eviews 13

Stability Test Results

The Cumulative Sum (CUSUM) was used to check the structural stability of the ARDL model. A model is stable if its recursive residual is located within the two critical bounds.

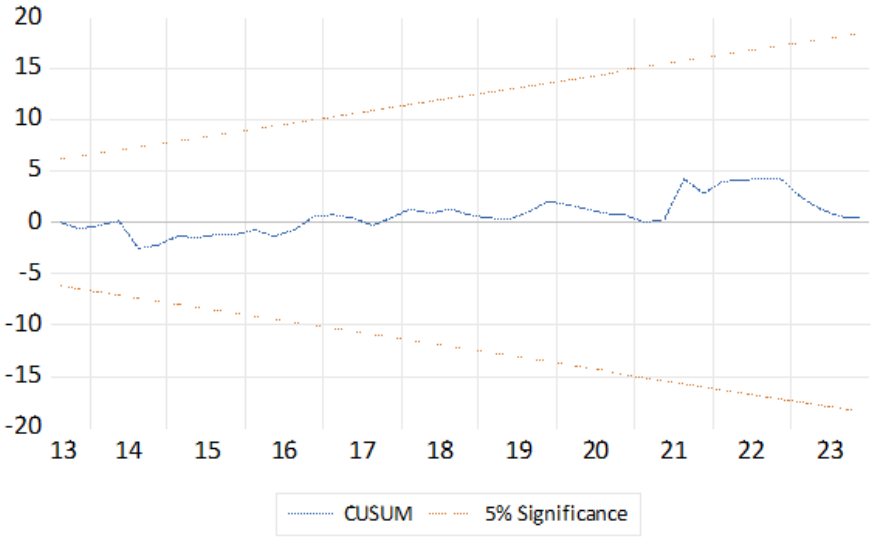

Figure 2: Cumulative Sum (CUSUM) Test for Stability

In addition, Figure 1 above presents the stability tests of our model. The model passed the Cumulative Sum (CUSUM) test as recursive residual is located within the two critical bounds. Thus, the model is still reliable for policy making.

Test of Hypotheses

Examining the probability (p-) values linked to the variable coefficient estimates in Table 4.4 allowed us to decide whether to accept or reject the null hypotheses. The standard for these evaluations was a significance level (α) of 0.05. Evidence to reject the null hypothesis is adequate when the probability value is less than 0.05; evidence to retain the null hypothesis is insufficient when the probability value is more than 0.05.

The first hypothesis is that SME loans in Nigeria are substantially impacted by online banking activities. The online banking t-statistic (2.831600) and p-value (0.0091) in Table 4 are not statistically significant ($p<0.05$). This finding disproves the null hypothesis and confirms that there is a positive and statistically significant relationship between online banking transactions and the availability of loans to micro, small, and medium enterprises (MSME). This outcome corroborates the empirical findings of Allen *et al.* (2016), who underscored that digital financial services—especially online banking—are crucial in enhancing loan accessibility for small firms. They contended that these platforms diminish transaction costs and furnish lenders with verified financial histories, both of which are crucial for expediting loan applications for MSMEs.

The second hypothesis revealed that mobile money transfers have a major impact on micro, small, and medium enterprise loans in Nigeria. The results show that the t-statistic for USSD transactions is 2.553160 and the p-value is 0.0137. With a p-value less than 0.05, we may conclude that the null hypothesis is not true. This proves that USSD transactions have a favorable and statistically significant impact on the availability of financing for MSME. This observation corresponds with the findings of Demirguc-Kunt *et al.* (2017), who emphasized the significance of affordable mobile technologies such as USSD in advancing financial inclusion, especially for underrepresented businesses in developing nations. These platforms function as essential gateways to the official financial system, hence enhancing access to credit.

CONCLUSION

The research shows that financial inclusion initiatives significantly influence MSMEs' access to credit in Nigeria. Internet banking (IB) and USSD services significantly enhance credit accessibility, demonstrating their efficacy in providing financial assistance to MSMEs. Point of Sale (POS) transactions exhibit a substantial influence; nevertheless, the negative coefficient indicates a more intricate or indirect correlation. Conversely, mobile banking (MB), although widely used, did not have a significant impact on enhancing loan availability for MSMEs over the research period.

On the basis of these findings, and in other to promote SME credit access in Nigeria, the study recommends that Financial institutions have to actively facilitate the adoption of internet banking (IB) among MSMEs by optimizing the onboarding process and providing incentives to stimulate registrations. Furthermore, specialized training programs must to be implemented to inform MSME operators about the advantages of online banking, especially in augmenting their financial profiles and facilitating access to loans. By illustrating how IB may enhance transaction efficiency, improve financial management, and provide simpler access to formal financial services, these initiatives can promote

financial inclusion and assist MSMEs in their growth and development.

Considering the extensive availability of USSD platforms, financial institutions and fintech enterprises have to provide more inclusive microcredit offerings accessible via USSD channels. This will significantly aid MSMEs in rural regions with restricted internet connectivity, guaranteeing their access to vital financial services. Moreover, authorities must to establish conducive rules that promote the extensive utilization of USSD for savings and credit services among MSMEs. By promoting the utilization of USSD platforms, regulators may assist in closing the financial inclusion gap, especially for enterprises in underserved areas, therefore facilitating their access to formal financial services more efficiently.

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