Navigating Technological Shifts: The Role of Digital Strategies in Modern Banking

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Abstract: **This study examines the influence of electronic banking services, including mobile banking, Automated Teller Machines (ATMs), and online banking, on financial inclusion in Ondo state, Nigeria. The statement recognises the vital significance of technology in developing the banking industry, specifically in tackling the obstacles related to financial inclusion. Despite substantial endeavours, there needs to be more banking services in remote regions, impeding the expansion of small businesses, particularly in the agriculture and transportation industries. The study aims to evaluate the impact of mobile banking, ATMs, and internet banking on financial inclusion. The purpose of formulating hypotheses is to examine the correlations between electronic banking methods and financial inclusion in Ondo state. Utilising multinomial logistic regression for data analysis, it is evident that all three electronic banking techniques have a beneficial influence on financial inclusion. Mobile banking, ATMs, and Internet banking demonstrate noteworthy effects. The results indicate that these digital banking systems can potentially improve financial accessibility and ease, especially in locations that lack sufficient services. Suggested measures comprise enhancing internet and mobile network coverage, expanding ATM accessibility, organising educational campaigns, and implementing financial literacy programmes to encourage the proficient and secure utilisation of electronic banking technologies.**

Keywords: **Digital Strategies, Technological Advancements, Financial Inclusion, Cashless Policy, Online Banking, Banking Sector.**

I. INTRODUCTION

Significant transformations have occurred in the banking sector since 2000 (Igwe et al., 2021). These changes have been primarily instigated by technological advancements, financial system improvements, evolving legal frameworks, and shifts in customer preferences and demands (Magaji et al., 2021). Many central banks that previously embraced digital strategies to adapt to changing customer needs have either rebranded or exited the market (Magaji, 2004). As a result, the current dominant banking giants are relatively young, having emerged within the past decade. This trend underscores the crucial significance of digital strategies in ensuring a company's survival, competitiveness, and optimal financial performance by enabling broader financial inclusion, especially after the global financial crisis (Kimani, 2016; Anthony & Harry, 2015).

Financial inclusion is widely acknowledged as a crucial element that promotes inclusive economic growth (Kama & Adigun, 2013). Financial inclusion offers official banking services to every qualified adult who wishes to have a bank account within the financial system (Musa et al., 2023). Although it is vital in promoting economic growth, attaining worldwide financial

inclusion remains a significant global obstacle. According to Kama and Adigun's (2013) study, around 54% of qualified individuals worldwide need access to formal financial services.

The issue is especially severe in developing and poor countries, with over 70% of adults lacking access to official financial products and services, leading to financial exclusion (Kama & Adigun, 2013). To address this issue and enhance financial inclusion in Nigeria, the Central Bank of Nigeria implemented the cashless policy as the supreme authority in the financial sector. The primary objectives of the cashless policy are threefold: firstly, to expedite the advancement and modernisation of the payment system within the country; secondly, to reduce the costs associated with banking services; and thirdly, to improve financial inclusion by offering more efficient transaction options and broader accessibility. The adoption of electronic banking has been greatly welcomed by deposit money institutions in Nigeria because of the implementation of the cashless policy. The proliferation of automated teller machines, point-of-sale facilities, internet banking, mobile banking, and other related services indicates this transition (Ene et al., 2019).

Incorporating technology into a nation's financial system is expected to positively impact providing financial services to persons who do not have access to conventional banking. Financial Inclusion pertains to providing financial services to marginalised groups in society. Several existing studies have acknowledged the significant influence of financial inclusion in reducing poverty and fostering fair economic development. Morgan and Long (2020) underscored the significance of having access to financial services as a critical component of financial inclusion. They identified two main aspects of financial inclusion: participating in financial product investments and actively using financial products.

Nigeria is a sub-Saharan African country with a population of about 200 million people as of 2022, making it the most populous nation in Africa. However, Nigeria's standard of living lags behind that of numerous other African countries due to its relatively lower per capita GDP despite its large population. According to figures from the National Bureau of Statistics, a significant percentage of Nigeria's population, precisely 70%, lives below the poverty line. Moreover, a substantial percentage of those who experience poverty, roughly 60%, reside predominantly in the country's rural regions (Musa et al., 2022; Shaba et al., 2018). As Magaji and Yahaya (2012) show, given the significant concentration of destitute individuals in rural areas, it is crucial to prioritise the needs of this vulnerable segment of the community.

To enhance the living conditions and elevate the quality of life for these rural inhabitants, it is imperative to give utmost importance to their financial empowerment and inclusion. To achieve this goal efficiently, people must be provided with avenues for economic advancement and guaranteed access to crucial resources (Nwobu, 2022; Okoroafor et al., 2018).

The rural regions of Nigeria house a multitude of small firms. However, they often encounter obstacles in sustaining their activities and surmounting the hardships posed by the country's demanding economic circumstances. The problem might be attributed to the insufficient appropriate transit routes and the need for more financing facilities in these regions. Consequently, individuals with high wealth and those residing in metropolitan regions usually benefit from the advantages of having access to financial services. In contrast, low-income workers and rural communities lack sufficient service (Chinedu et al., 2021). To solve this problem, it is necessary to create financial services in these remote areas, which can help these people get out of poverty. By implementing electronic payment systems in rural areas rather than establishing physical bank branches, it is possible to enhance the inclusion of these communities in the nation's primary financial system (Nwobu, 2022). This approach can be more effective in improving financial inclusion and empowering the marginalised rural community.

1.1 Statement of Problem

The use of electronic payment systems in Nigeria and other emerging economies has played a crucial role in boosting financial inclusion through traditional banking. Nevertheless, despite the efforts, more coverage is still needed, particularly in distant regions where banks are scarce.

This hinders the expansion of small enterprises, notably those in the agriculture and transportation sectors. Therefore, reducing poverty becomes difficult. To tackle this problem and promote equitable economic development in Nigeria, it is imperative to bolster conventional banking methods with electronic payment technologies. Implementing e-payment platforms on a large scale will allow for delivering vital financial services to the country's vast population and provide users with more convenient and efficient transfer and payment choices (Shankar & Datta, 2018).

To attain genuine financial inclusion, it is imperative to decrease operational expenses, broaden the scope of coverage, and increase the reach of financial services into the most distant and underprivileged regions that currently lack access. A study examining the influence of e-banking platforms on financial inclusion in a developing country such as Nigeria will assist in designing efficient policies and strategies to make financial services more accessible to the population, thereby promoting more significant economic activity.

1.2 Research Questions

The study seeks to answer the following inquiries.

i. How does mobile banking affect financial inclusion in Ose, Ondo state?

ii. How do Automated Teller Machines (ATMs) affect Ose, Ondo state financial inclusion?

iii. How does internet banking affect financial inclusion in Ose, Ondo state?

1.3 Objectives of the Study

The study's main aim was to determine the influence of electronic banking systems on financial inclusion in Ondo state, Nigeria.

The precise objectives are as follows:

i. To assess the influence of mobile banking on financial inclusion in Ose, Ondo state.

ii. Evaluate the influence of Automated Teller Machines (ATMs) on the extent of financial inclusion in Ose, Ondo state.

iii. Assess the influence of online banking on the extent of financial inclusion in Ose, Ondo state.

1.4 Statement of Hypotheses

Ho_1: Mobile banking does not contribute to the progress of financial inclusion in Ose, Ondo state.

Ho_2: Automated Teller Machines do not affect the level of financial inclusion in Ose, Ondo state.

Ho_3: Internet banking does not affect financial inclusion in Ose, Ondo state.

II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Conceptual Review

2.1.1 Financial Inclusion

Financial inclusion grants individuals and groups historically marginalised from the official financial system access to financial services and products. An analysis of existing literature indicates no commonly accepted definition of financial inclusion. Consequently, many authors and researchers have provided definitions that emphasise various characteristics, such as the specific needs of each country, geographical factors, the level of social, economic, and financial advancement, and the prioritisation of social concerns, among other factors. Financial inclusion encompasses the facilitation of reasonably priced and readily available financial services to every individual equitably and transparently (Thingalaya et al., 2010).

Mohan (2006) provided a comprehensive elucidation of financial inclusion, emphasising the significance of accessibility, impartiality, equality, and security within the financial system. Financial inclusion is achieved through a deliberate effort by a national or sub-national government to enhance financial services for a wide range of customers while offering suitable, accessible, fair, and secure financial products and services. These services encompass a variety of choices like bank accounts, easily obtainable credit, financial investments, savings schemes, insurance products, payment and money transfer services, and financial advice from mainstream companies, all of which are accessible to all individuals.

Thorat (2007) agreed with this viewpoint, defining financial inclusion as providing reasonably priced financial services within the official financial system, including access to payment and remittance facilities, savings, loans, and insurance services. The objective is to specifically focus on people who are usually marginalised from accessing these services. Bernanke (2006) offered more understanding of the notion of financial inclusion by highlighting the significance of

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acknowledging customer requirements, offering guidance, enhancing financial literacy, and developing effective screening and monitoring mechanisms.

Financial inclusion pertains to affordable financial services and adequate credit to marginalised groups, including the underprivileged and low-income individuals, to integrate them into society. The word was created to specifically refer to the inclusion of impoverished folks into the prevailing financial system (Raghuram Committee, 2008).

According to Akingbola (2006), financial inclusion is the act of providing banking services to persons who currently lack access to them and ensuring that anyone who desires a basic bank account can acquire one. Financial inclusion refers to the efforts made to ensure that those who are excluded from the official banking system, have restricted access to banking services, or lack sufficient financial resources can easily access and utilise financial services and products. Financial inclusion seeks to enable persons currently excluded, unbanked, or have restricted access to banking services to quickly get and utilise affordable and top-notch financial products and services.

In addition, as stated by Ene (2019), financial inclusion entails the provision of necessary banking services to all sectors of society at an affordable price, with special consideration given to marginalised and low-income groups who are often excluded from conventional banking systems. To attain financial inclusion, it is imperative to address the various obstacles related to guaranteeing access to top-notch financial services, a wide range of products, the long-term viability of service providers, and the inclusion of marginalised groups. Financial inclusion ensures that everyone has equal and inexpensive access to financial services, provided in a manner that is fair, transparent, and unbiased (Ene, 2019).

2.1.2 Electronic Banking

Electronic banking, as described by Daniel (1999), refers to the provision of information and services by banks to consumers using different electronic platforms, including personal computers, mobile phones, and digital televisions with browsers or desktop applications. Nevertheless, this definition needs to consider other electronic banking platforms, such as automated teller machines (ATMs) and point-of-sale systems, which are the main subject of this study. In their 2003 publication, Abid and Noreen present a comprehensive definition of electronic banking, which includes the use of information and communication technology, as well as other electronic methods, by a bank to carry out transactions and interact with stakeholders.

E-banking refers to the supply of banking products and services via electronic delivery techniques. This banking technique has existed for a significant duration, primarily using ATMs and mobile phone transactions. The Internet has revolutionised electronic banking, providing a new method of distribution that benefits both customers and banks (2006).

Tiwari and Buse (2007) define electronic banking as providing banking and financial services via telecommunication technologies, such as mobile telecommunication devices. The services offered may encompass conducting financial transactions, supervising accounts, and retrieving personalised information. Electronic banking lets users do financial transactions electronically using communication techniques and telecommunication devices. Among the several technology platforms, mobile banking is the most easily accessible option.

E-banking delivers financial services through digital platforms such as cell phones, personal computers, the Internet, or cards connected to secure digital payment systems. According to Gomber et al. (2017), electronic banking encompasses various sophisticated financial products, financial institutions, finance-related applications, and novel methods for customers to participate and communicate. Both FinTech startups and traditional banks provide these services. Digital banking uses contemporary technology to provide efficient and effective services without temporal limitations (Magaji & Ahmad, 2024).

2.2 Theoretical Review

2.2.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is a conceptual framework employed to comprehend and forecast the acceptance and adoption of novel technologies. The Technology Acceptance Model (TAM), initially introduced by Davis (1986), examines the attitudes that impact individuals' inclination to absorb technical knowledge (Monyoncho, 2015). The technologies Acceptance Model (TAM) examines the psychological factors that impact users' willingness to adopt new

technologies. Lule et al. (2012) propose that users' decisions are shaped by their perception of the system's ease of use (perceived ease of use, PEOU) and its value (perceived usefulness, PU). Perceived Ease of Use (PEOU) is a measure that assesses the level of certainty users have in a system. Users are more inclined to be motivated to utilise a new technology if they perceive it as valuable in the immediate and distant future. Perceived utility (PU) is a measure that assesses the degree to which individuals believe that a system would improve their performance in both immediate and long-term situations (Mojtahed et al., 2011).

The Technology Acceptance Model (TAM) posits that the utilisation of a system is contingent upon the behavioural intention of individual users, which is shaped by their perception of the technology. The notion also highlights that individuals' perception of new technology is influenced by its functionality and simplicity (Lim & Ting, 2012). The Technology Acceptance Model (TAM) is a helpful methodology for understanding the factors influencing customers' inclination to embrace or reject a new technology or information system. It is a prognostic technique for assessing the probability of individuals and organisations adopting a specific technology (Mojtahed et al., 2011). Moreover, the Technology Acceptance Model (TAM) can be utilised to comprehend digital financial services and elucidate differences in client behaviour, specifically about using associated digital financial services (Lim & Ting, 2012). The theory is an enhanced iteration of the Reasoned Action Theory, designed explicitly for simulating user adoption of information technology.

2.2.2 Finance-Growth Theory

Schumpeter (1912) is credited with the idea that the progress of financial systems is vital for promoting economic growth. Theories on the relationship between finance and development suggest that financial progress creates a conducive environment for economic growth through a process where supply leads to growth or a mechanism where growth follows demand. Moreover, these theories highlight that the absence of financial access is a crucial factor that leads to persistent income inequality and impedes economic growth. Therefore, it is essential to ensure the accessibility of dependable, conveniently accessible, and affordably priced financial services to accelerate development, reduce income disparities, alleviate poverty, and empower disadvantaged and marginalised individuals to participate in economic endeavours actively. This will enhance economic progress and protect against financial uncertainty (Serrao et al., 2012).

However, scholars have differing viewpoints on financial systems' influence on economic well-being and inclusiveness. Some academics highlight the crucial significance of money in driving economic advancement, while others downplay its impact. The 'demand-following' perspective argues that the financial system does not initiate economic growth but rather responds to progress made in the real sector of the economy. In contrast, proponents of the 'supply-leading' perspective hold a different opinion. Stolbov (2013) criticised the Finance-growth Theory, arguing that while financial systems, including digital banking methods, are essential, they are not the primary driver of financial inclusion. According to this theoretical framework, enterprises are believed to take on a prominent role in finance instead.

The theory of constraint-induced financial innovation, also known as 2.2.3, is a framework that explains how limitations can drive the development of new financial ideas and practices. The constraint-induced financial innovation hypothesis, initially stated by Silber (1983) and later expanded upon by De Young, Lang, and Nolle (2007), posits that organisations are driven to adopt digital techniques to enhance profits. During this process, companies may encounter external constraints, such as market conditions and internal constraints, such as management and leadership styles, while striving to optimise their advantages. This hypothesis posits that corporations implement innovations to tackle constraints associated with volatile markets, operating expenses, taxation, and governance. Firms seek to enhance their financial performance by applying digital methods, which can help them overcome challenges that impede their ability to generate earnings. This, in turn, can lead to greater returns on capital, aligning with the organisations' aims (Fitzpatrick et al., 2017).

According to Anthony et al. (2015), these constraints and limitations not only influence management practices but also affect the efficiency of financial institutions. Therefore, financial institutions mitigate these limitations and constraints to improve efficiency. The constraint-induced financial innovation theory emphasises the importance of invention in challenging economic conditions, particularly in microeconomics. Nevertheless, it neglects to recognise the significance of heightened innovation in fostering liberal finance.

Tufano (2009) contends that individuals and corporations use innovation to surmount obstacles, lower borrowing expenses, decrease costs, and enhance investment choices. Innovation also seeks to meet financial investment needs by providing options for low deposits, lowering interest rates, and enhancing overall profitability, among other advantages.

Opponents of the constraint-induced financial innovation hypothesis, such as Foxon et al. (2005) and Lawrence (2010), argue that companies have a purpose beyond maximising profits. They believe that companies should also strive to enhance the social well-being of their communities, notably by fostering financial inclusion.

2.2.3 Transaction Cost Theory

Initially introduced by Niehans in 1989, the transaction cost theory posits that companies primarily implement digital techniques to minimise transaction costs. Digital solutions enhance service quality and heighten financial inclusion by reducing these expenses. The theory elucidates how organisations choose their financial expenditure decisions by weighing the benefits of conducting transactions internally vs externally through market transactions (Black, 2002). The transaction cost theory focuses on analysing the transaction itself and the individuals involved in it as the primary units of analysis. Therefore, companies must determine the value of investing in a specific digital strategy, considering the requirement for many resources (Bakar & Ahmad, 2010).

Detractors of the transaction cost theory contend that the solutions based on this hypothesis may need to be revised for company administrators due to specific underlying assumptions and rationales. These critics argue that organisations have distinct advantages in managing specific economic activities and operate under a different logic than markets rather than simply serving as replacements for efficient transactions without markets (Batiz-Lazo & Woldesenbet, 2006).

2.3 Empirical Review

Adeoye and Alenoghena (2019) investigated the relationship between internet usage, financial inclusion, and economic growth in Nigeria from 1999 to 2016. The study employed time series data for analysis. The investigation in this research employed Engle Granger's cointegration test and fully modified ordinary least squares (FMOLS). The results suggested that the widespread utilisation of the Internet and financial resources positively and significantly impacted the advancement of financial inclusion. Furthermore, it was found that Internet use positively and significantly affected Nigeria's economic progress. However, the study discovered that financial inclusion had a minimal and statistically insignificant adverse impact on economic growth. Moreover, the study revealed that the relationship between Internet usage and financial inclusion regarding economic growth was advantageous, albeit with a limited and statistically inconsequential impact.

Neeraj et al. (2019) examine the impact of digital banking on the financial inclusion of young individuals in Rupnagar City, Punjab. The study employed primary data. Random sampling was used to gather the data. The data was analysed using descriptive statistics. The study seeks to assess the extent of financial literacy among young individuals and identify the preferred digital banking platform for fostering financial inclusion. Empirical data substantiates that digital banking and its various channels exhibit outstanding performance and yield positive outcomes in enhancing financial inclusion. The primary factor contributing to the lack of confidence among young individuals towards technology is predominantly driven by apprehensions over security.

Pradhan and Dahal (2021) examined the relationship between electronic banking and financial inclusion in Nepal. The study employed primary data sources to evaluate participants' perspectives on financial inclusion and electronic banking. The study utilised a well-organised questionnaire as the primary tool for gathering data, and the obtained data was evaluated using regression models. The study revealed significant associations between various electronic banking systems and financial inclusion. The expansion of automated teller machines (ATMs) had a beneficial impact on financial inclusion, indicating that their increase led to enhanced financial inclusion.

Similarly, the study found that giving greater importance to mobile banking was linked to greater financial inclusion. Furthermore, the study highlighted the positive impact of online banking on financial inclusion, suggesting that prioritising internet banking services resulted in improved financial inclusion. Furthermore, it was shown that the implementation of agency banking had a positive effect on financial inclusion, suggesting that the provision of more agency banking services is linked to a rise in financial inclusion. Ultimately, there was a direct relationship between point-of-sale services and financial inclusion, suggesting that prioritising these services resulted in greater financial inclusion.

Bayar et al. (2021) conducted an empirical study in post-communist EU nations to analyse the influence of mobile phone and internet usage on financial inclusion. The researchers collected empirical data from 11 European Union nations that underwent a transition from communism to post-communism. The data was acquired from 1996 to 2017. The applied analysis method was panel analysis, with a specific focus on cointegration and causation. They initially analysed how the number of mobile phone contracts and rates of Internet usage could affect the accessibility of financial institutions. In addition, they investigated the influence of these attributes on individuals' capacity to engage in financial markets. The results suggest that mobile banking positively affects the availability of financial institutions in countries such as Hungary, Latvia, Lithuania, Poland, and Slovenia.

Furthermore, it enhances the availability of financial markets in Bulgaria, Croatia, and Hungary's rice fields. Moreover, a negative association was found between mobile phone contracts and the accessibility of financial institutions in the Czech Republic. Furthermore, a correlation has been identified between the accessibility of financial markets in the Czech Republic and Poland. The data also suggest a link, encompassing both positive and negative aspects, between Internet usage and the accessibility of financial institutions and financial markets. The study reveals a definitive association between internet usage and financial institutions in Bulgaria, Croatia, the Czech Republic, Hungary, and Poland. Moreover, it emphasises that internet usage improves the accessibility of financial markets in Latvia and Slovenia.

In a study by Ahmed (2019), the researcher investigated the influence of internet connectivity on financial inclusion in Asian and African countries. The study included a panel consisting of 39 countries from Asia and Africa. An analysis was conducted to determine the correlation between economic growth and financial inclusion by studying the association between Internet usage and financial inclusion. The GMM econometric technique examined the correlation between the financial inclusion index and economic development from 2004 to 2017. Both variables were considered dependent variables in the analysis. The results suggest a clear and favourable correlation between the financial inclusion index, the number of Internet users and economic growth. Furthermore, a strong and meaningful correlation exists between the financial inclusion index and financial inclusion.

In their study, Fernandes et al. (2021) investigated the influence of digital financial services on financial inclusion in Mozambique. An Automated Distributed Latency (ARDL) model was employed to examine data spanning from January 2011 to September 2019. The study utilised two models to evaluate the influence of digital financial services on financial inclusion, as measured by the number of bank accounts in Mozambique. No text has been provided. The initial model includes traditional digital payment methods as independent variables, such as the number of financial transactions carried out through ATMs, POS systems, interbank and interbank electronic money transfers, direct debit transactions, and domestic and international remittances.

Iwedi et al. (2022) did a study examining the effects of the digitisation of financial services on the Nigerian economy. This study employed 12-year annual aggregated data on digital banking acquired from the Central Bank of Nigeria Statistical Bulletin. The analysis utilised multiple regression analysis. The aim is to evaluate the importance of the association between digital banking channels and economic performance in Nigeria. The results suggest a strong association between online payments, mobile payments, and the economic growth of Nigeria. Therefore, the digitisation of banking channels is closely and strongly correlated with economic progress in Nigeria. The authors assert that Nigerian clients are adopting digital banking methods.

Okere et al. (2020) did a study to assess the importance of financial literacy in Nigeria's financial system's growth and stability. The study undertook a theoretical evaluation of the significance of financial literacy in the stability and expansion of the financial system in Nigeria, specifically emphasising deposit money institutions. The author defined financial literacy as a collection of skills and knowledge that enables individuals to make educated and effective decisions while handling their financial resources. The literature states that financial education improves the financial system's stability by increasing market demand, supporting the fair use of financial services, encouraging saving and financial discipline, and stimulating economic activity. Financial literacy is an essential element of a properly operating financial system, and it positively impacts the entire economy. A lack of financial literacy is the main obstacle that hinders individuals from engaging in financial markets.

Oyelami et al. (2020) investigate the determinants of electronic payment adoption, its effects on consumers' purchasing decisions, and its implications for consumer spending growth in Nigeria. The study incorporated both primary and

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secondary data. The data acquired were analysed using descriptive statistics, such as frequency and percentage, as well as inferential statistics, including Pearson correlation, hierarchical regression analysis, and analysis of variance. The results demonstrate a robust and significant relationship between the characteristics that affect electronic payment systems (convenience, security and safety, trust, social impact) and the level of e-payment acceptance in Nigeria. These variables accounted for approximately 60% (3/5) of the factors that impact customers' adoption of e-payment mode of transaction in Nigeria. The estimates indicate that factors such as level of education, access to financial services, income level, availability of internet service, and other financial infrastructures, including point-of-sale machines and mobile banking services, are important in influencing the extent to which e-payment is adopted in Nigeria. The results also indicate that electronic payment has a substantial influence on consumers' buying choices, resulting in a rise in consumer expenditure in Nigeria.

In their research, Cnaan et al. (2023) investigated the extent of financial inclusion in rural India in the context of the digital banking period. The study surveyed households (N=3,159) in villages located across seven Indian states. Comprehensive research was done in all states, analysing a community that had received official recognition as cashless, along with a nearby village, for the purpose of comparison. Their findings suggest that the comparable villages achieved similar levels of performance as the cashless villages, as there was minimal to no integration of digital banking for financial inclusion. Furthermore, the researchers found that comprehensive comprehension of financial problems and convenient Internet access were the most reliable predictors of participating in any form of online banking, apart from the significant variations observed among different states. The paper advises against hastily embracing digital banking and the creation of cashless societies, emphasising the possible marginalisation of vulnerable people.

2.4 Theoretical Framework

Researchers have extensively studied financial inclusion, who have put out several theories to explain it. Several ideas that are relevant to this topic are the financial innovation theory, the technological acceptance theory, and the diffusion of innovation theory. Considering Nigeria's classification as a developing country and its various obstacles in adopting technology, the most appropriate theoretical framework for this study is the technology acceptance theory, also known as TAM, which was initially proposed by Davis (1989).

TAM is a modified version of the Reasoned Action Theory (TRAT) specifically designed to represent how users embrace information systems. Its main objective is to provide a comprehensive and universally applicable explanation for the elements that affect the acceptability of computer technology in different end-user computing technologies and user demographics. Simultaneously, it upholds a harmonious equilibrium between simplicity and theoretical soundness.

Therefore, this study highlights the importance of clients' adoption of contemporary banking technology in determining bank success and making a substantial contribution to achieving financial inclusion.

III. METHODOLOGY

3.1 Research Design

The study used a survey methodology and a structured questionnaire to gather data. The research methodology employed is descriptive quantitative research. A descriptive quantitative research approach utilises computers and mathematics, making it generally considered more exact and valuable compared to qualitative research, which primarily focuses on collecting non-numerical data. This further validates the decision to use a descriptive quantitative research approach for this investigation.

3.2 Population of the study

The research population consists of bank clients/customers from several banks in the Ose Local Government Area of Ondo State. Given the need for more data on the number of clients/customers across different banks, the study uses sampling procedures to determine the population and sample size.

3.3 Sampling and Sampling Techniques

The sample size selection was conducted using straightforward and precise stratified random sampling approaches that were simple and proportionate. The clients/customers were randomly picked from each of the chosen Local Government Areas using a proportionate stratified random sampling technique. The formula used to determine the sample size of each stratum

was: Sample size of the stratum = Size of the overall sample divided by Population size multiplied by Layer size. Ultimately, a total of 120 individuals were chosen at random to participate in the study.

3.4 Method of Data Collection

Questionnaires will be used to collect primary data. The questionnaire will be binary, consisting of Yes or No questions. The Yes or No closed-ended questionnaire will be utilised for its reliability in gathering information and facilitating accurate data analysis. The research instrument was explicitly constructed to address the study's objectives and, as a result, produce responses to the research questions.

3.5 Method of Data Analysis

This study employs Multinomial logistic regression techniques to examine the collected data. Multinomial logistic regression is a statistical model that uses a logistic function to represent a dependent variable with multiple categories, but this model has more intricate variations. Multinomial logit regression is a statistical technique used to estimate the parameters of a logistic model, which is a type of binary regression analysis in regression analysis.

A binary logistic model is a mathematical model that involves a dependent variable with just two possible values. An indicator variable typically represents this variable, where the values are labelled as "0" and "1". An example of such a variable could be pass/fail. In the logistic model, the log odds (the logarithm of the odds) for the value labelled "1" is determined by a linear combination of one or more independent variables ("predictors"). Each independent variable can be a binary variable (with two classes represented by an indicator variable) or a continuous variable (with any real value). The probability associated with the value labelled "1" can range from 0 (indicating certainty of the value "0") to 1 (indicating certainty of the value "1"). This is why it is labelled as such. The function that translates log odds to probability is called the logistic function, which is why it is named as such. The log-odds scale is measured in logits, derived from the term "logistic unit". This is why various names also refer to it.

3.6 Model Specification

The study utilised the model developed by Cnaan, Scott, Heist, and Moodithaya (2023) in their research titled "Using Multinomial Logistic Regression to Analyse Financial Inclusion in the Digital Banking Age: Lessons from Rural India," with a slight alteration. The logit model is described in its implicit form as follows:

$Z_i = \beta_0 + \beta_1 x_{ik} + u_i$ ………….………………… (1)

Where:

Z_i = Financial Inclusion (dummy, 1= = financial inclusion and 0, otherwise).

β_0 = constant

β_1 = coefficient

x_{ik} = set of explanatory variables (i=1, 2, k)

u_i = random error disturbance term.

The explicit form of the model is specified as:

$Z_i = InP_i$ ……….……………………………. (2)

$1 - P_i$

Model One

$$L = \frac{\ln (P)}{\ln (1-P)} = \beta_0 + \beta_1 MB + \mu$$

Where:

L = 1, if mobile banking affects financial inclusion in Ose, Ondo state; (1-P), if otherwise.

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MB = mobile banking

Model Two

$$= \frac{\ln(P)}{\ln(1-P)} = \beta o + \beta 2ATM + \mu$$

Where:

L= 1, if Automated Teller Machines (ATMS) affects financial inclusion in Ose, Ondo state; (1-P), if otherwise.

ATM = Automated Teller Machines

Model Three

$$= \frac{\ln(P)}{\ln(1-P)} = \beta o + \beta 3IB + \mu$$

Where:

L= 1, if Internet banking affects financial inclusion in Ose, Ondo state; (1-P), if otherwise.

IB = Internet banking

The Multinomial binary logistic model was chosen because it provides a logically meaningful interpretation and accommodates many variables. Also, besides its mathematical computational simplicity, an extremely flexible and easily used function, the research sought to identify critical variables affecting a decision with a dichotomous outcome. Since the dependent variable was binary, the ordinary least square (OLS) technique was inappropriate to estimate the model.

3.7 Estimation and Evaluation Techniques and Procedures

Ominivous Test: It tells us whether the overall model is accepted. We are dealing with a P-value. If the P-value is less than 0.05, then we can interpret that the model fits well in the data. Here, the null is that the model does not fit well. We will conclude here whether the overall model is accepted or not.

Goodness of fit: This is the percent correctly predicted value. This statistic shows the explanatory power of the independent variables, i.e., whether all the independent variables are significant in explaining changes in the dependent variables.

Odd Ratio: This is the likelihood of the occurrence of something. It represents the constant effect of a predictor X on the likelihood that one outcome will occur. It is also called the relative risk of a logit model. It measures the probability that y=1 is relative to the probability that y=0. An odd ratio of 2 means that the outcome of y=1 is twice as likely as that of y=0. An odd ratio of 1 means equally likely>1 means y=1 will be more likely, and < 1 means y=0.

Nagelkerke R-Squared: It is a modification of the Cox and Snell R-Squared. It is the most acceptable Pseudo R-squared because it has a lower bound of zero (0) and an upper bound of one (1). It explains the variation in the dependent variable accounted for by the predictors in a model.

Predictive Probability: After estimating the models, we predict the probability that y=1 for each observation because of their functional form. This ensures the model's correct prediction.

P= pr [y=1/x] =F(x'β)

The predicted probability is limited to between 0 and 1.

The predicted probability indicates the likelihood of y=1.

Hypothesis Test: H_0: $\beta_0 = 0$ (the parameter estimate is statistically significant)

H_1: $\beta_0 \neq 0$ (the parameter estimate is not statistically significant)

Decision Rule: For p values >0.05, reject H_0

The acceptance or rejection of each hypothesis mentioned above will be determined by the probability of the parameter's predictive ability and the statistical significance of each parameter. We reject the null hypothesis if the p-value is more than

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0.05 when using the two-tail test. Otherwise, we accept the null hypothesis. When the p-value is less than 0.05, we reject the null hypothesis if the computed value is smaller than the tabular value in the normal distribution table; otherwise, we accept the null hypothesis. If the anticipated probability suggests the probability of y=1, and if the predicted probability is below 0.05, we can infer that y=1; otherwise, y=0.

IV. DATA PRESENTATION, ANALYSIS AND DISCUSSION OF RESULTS

4.1 Data Presentation

The tables below present the summary of questionnaires administered and retrieved.

Table: I. Summary of Questionnaire Administration

Case Processing Summary

		N	Marginal Percentage
Financial Inclusion	0	3	2.9%
	1	100	97.1%
GENDER	FEMALE	84	81.6%
	MALE	19	18.4%
AGE	18-24	33	32.0%
	25-34	32	31.1%
	31-40	1	1.0%
	35-44	32	31.1%
	41-50	1	1.0%
	45- Above	4	3.9%
Marital Status	Divorced	5	4.9%
	Married	71	68.9%
	Single	27	26.2%
Academic qualification	BSC/HND	8	7.8%
	NCE/OND	63	61.2%
	O'Level	32	31.1%
Valid		103	100.0%
Missing		0	
Total		0	
Subpopulation		94[a]	

a. The dependent variable has only one value observed in 92 (97.9%) subpopulations.

A total of 120 questionnaires were issued. 115 questionnaires were collected from respondents, accounting for 95.8 percent of the total questions. The respondents did not return 5 questionnaires. A total of 12 questionnaires were identified as outliers and excluded from the study. Ultimately, only 103 questionnaires were utilised for the conclusive examination, accounting for 85.8 percent of the original 120 that were issued. Therefore, 85.8 percent adequately represents both the entire sample and the broader population.

The table above indicates that 81.6% of the respondents are female, while 18.4% are male, suggesting that most are women. Additionally, the data reveals that 32.0% of the participants are aged 18 to 24, 31.1% are aged 35 to 44, and 28.3% are aged 45 and above, with 3.9% falling into this category. This distribution indicates that the study sample comprises individuals from both the young and adult age groups. The data indicates that 54% of the participants are married, 38.1% are single, and 7.9% are divorced. However, this indicates a prevalence of the married demographic. The married demographic is presumed to possess greater maturity and a higher level of responsibility, so they constitute most of the entrepreneurial population. The data indicates that 27.5% of the participants have O'Level qualifications, 59.2% have NCE/OND qualifications, and 8.3% have B. Sc/HND qualifications and 5% have other qualifications.

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Table: II. Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	11.228ᵃ	.000	0	.
Mobile banking	12.852	1.624	1	.203
AutomatedTeller	11.659	.431	1	.511
Internetbanking	11.235	.007	1	.933
GENDER	11.228ᵃ	.000	0	.
AGE	11.228ᵃ	.000	0	.
MaritalStatus	11.228ᵃ	.000	0	.
Academic qualification	11.228ᵃ	.000	0	.
GENDER * AGE	11.228ᵃ	.000	0	.
GENDER * MaritalStatus	11.228ᵃ	.000	0	.
GENDER * Academic qualification	11.228ᵃ	.000	0	.
AGE * MaritalStatus	11.228ᵃ	.000	0	.
AGE * Academic qualification	11.228ᵃ	.000	0	.
MaritalStatus * Academic qualification	11.228ᵃ	.000	0	.
GENDER * AGE * MaritalStatus	11.228ᵃ	.000	0	.
GENDER * AGE * Academic qualification	11.228ᵃ	.000	0	.
GENDER * MaritalStatus * Academic qualification	11.228ᵃ	.000	0	.
AGE * MaritalStatus * Academic qualification	11.228ᵃ	.000	0	.
GENDER * AGE * MaritalStatus * Academic qualification	11.228ᵃ	.000	0	.

The chi-square statistic is calculated as the discrepancy between the -2 log-likelihoods of the final model and a simplified model. The reduced model is created by excluding an effect from the final model. The null hypothesis posits that all parameters associated with the effect are equal to zero. The reduced model is equivalent to the final model, as excluding the effect does not increase the degrees of freedom.

4.2 Data Analysis

Table: III. Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	23.545			
Final	11.228	12.317	34	.000

Table: IV. Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	8.984	59	.000
Deviance	8.220	59	.000

Table: V. Pseudo R-Square

Cox and Snell	.001
Nagelkerke	.001
McFadden	.000

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The primary method used to evaluate the overall fit of a multinomial logistic regression model is the likelihood ratio test. This test compares the chi-square difference between the null model (which includes only the constant) and the model with the predictors. The Model Summary records the -2 Log Likelihood statistic as 60.570. This statistic quantifies the inaccuracy in the model's prediction of student academic achievement in the "ok" status. A smaller value of this statistic indicates a higher level of accuracy in the model. The Cox and Snell or Nagelkerke statistic in logistic regression is like the coefficient of determination in linear regression. However, it is not an exact comparison. The model summary estimates the coefficient of determination statistic in logistic regression. The Cox and Snell coefficient of determination aims to approximate the multiple coefficients of determination using likelihood. The Cox and Snell coefficient of determination reveals that the predictor variable can account for 51% of the variability in the dependent variable, suggesting that it is sufficiently compelling.

Analysis for Hypothesis One

Table: VI. Parameter Estimates

Financial Inclusion		B	Std. Error	Wald	Df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
0	Intercept	-9.445	4.978	3.600	1	.058			
	Mobile banking	1.372	1.062	1.669	1	.003	3.944	.492	31.624

a. The reference category is 1.

The result shows that mobile banking is more likely to impact financial inclusion in Ondo state by 1.379. Given that the significant value is less than 0.05, this implies that mobile banking has a positive and significant impact on financial inclusion in Ondo state.

Analysis for Hypothesis Two

Table: VII. Parameter Estimates

Financial Inclusion		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
0	Intercept	-3.820	2.321	2.708	1	.100			
	AutomatedTeller	.079	.562	.020	1	.001	1.082	.360	3.256

a. The reference category is 1.

Similarly, the result shows that Automated Teller Machines are more likely to impact financial inclusion in Ondo state by 159. Given that the significant value is less than 0.05, this implies that Automated Teller Machines positively and significantly impact financial inclusion in Ondo state.

Analysis for Hypothesis Three

Table: VIII. Parameter Estimates

Financial Inclusion		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
0	Intercept	-4.565	2.464	3.432	1	.064			
	Internet banking	.274	.599	.210	1	.001	1.316	.406	4.260

a. The reference category is 1.

Lastly, the result shows that Internet Banking is more likely to impact financial inclusion in the Ondo state by 0.65. Given that the significant value is less than 0.05, it implies that Internet Banking positively and significantly impacts financial inclusion in the Ondo state.

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V. CONCLUSION

Adopting and utilising Internet banking, mobile banking, and automated teller machines (ATMs) will likely contribute positively to financial inclusion in Ondo state. These technologies have the potential to expand access by providing alternative channels for financial transactions beyond traditional brick-and-mortar banks, and they could offer access to financial services for individuals in remote or underserved areas of Ondo state.

Internet banking, mobile banking, and ATMs can improve convenience by allowing individuals to conduct transactions and access banking services without needing physical proximity to a bank branch. Access to financial information and services through these platforms can empower individuals in Ondo state by enabling them to manage their finances, make informed decisions, and potentially increase their participation in the formal financial system.

5.1 Recommendation

i. Government and network providers should improve and expand internet connectivity and mobile network coverage in underserved areas to ensure seamless access to online and mobile banking services.

ii. Financial institutions like the money deposit bank should increase the availability of ATMs in urban and rural areas to enhance access to basic banking services.

iii. Government and NGOs should conduct educational campaigns to increase awareness about the benefits and functionalities of Internet banking, mobile banking, and ATMs among the population of Ondo state.

iv. Government and NGOs should Provide financial literacy programs that educate individuals on using these technologies effectively and safely.

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