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# Effect of Agent Banking on Banking Sector Efficiency in Nigeria

**Nmorsi, Japhet[1], Egungwu, I. Ph.D[2] and Nduka, A. J. Ph.D[3]**
Department of Banking and Finance, Chukwuemeka Odumegwu Ojukwu University, Igbariam, Anambra State
**Correspondence**: japhnmorsi@gmail.com

**ABSTRACT**: This study examined the effect of agent banking on banking sector efficiency in Nigeria. To achieve this objective, relevant data used spanning from 2009-2022 were sourced from Central Bank of Nigeria Statistical Bulletin, for the period under review. Descriptive statistics, Augmented Dickey Fuller (ADF) test, Granger causality and Ordinary Least Square (OLS) were the analytical tools for this study. Return on Equity (ROE) as a proxy for banking sector efficiency was used as the dependent variable while Automated Teller Machine (ATM), Mobile Banking (MOB), Point-of-Sale terminal (POS) and Web/internet banking (WEB) as independent variables proxied for agent banking as the independent variables. Based on the analysis, the variables were stationary at their respective levels, the F-statistic of the regression output stood at 0.609231, this implies that the regression plane was not statistically significant, $R^2$ = 0.213075 implies that about 21.31% of the total variation was accounted for by the independent variables, the variables does not granger cause each other. Durbin-Watson statistic of approximately 2.02 showed the absence of autocorrelation or serial correlation in the model specified. The variables showed negative association with ROE, and were not statistically significant as the P-values of 0.6248, 0.6954, 0.4469, and 0.5495 for ATM, MOB, POS, and WEB respectively, were greater than the intended 0.05 level of significance. Also, the overall level of significance, Prob.(F-Statistic) 0.666344 is greater than the 0.05 level of significance, indicating that all the independent variables cannot jointly influence the dependent variable for the period under review. The study concluded that though, the variables were stationary at their respective levels, but has not contributed positively and significantly to banking sector efficiency in Nigeria. The study therefore recommended that the migration of our normal banking system to agent banking system would require some reform and a lot of effort and sensitization especially for low income customers, who are currently deeply rooted in using cash and see it as a convenient and easy way of receiving and making payments any point in time.

**Keywords:** ROE, ATM, Mobile Banking, POS terminal and Web/internet banking.

## INTRODUCTION

Developing countries including Nigeria are increasingly embracing branchless banking as a means of delivering banking services to many unreached people especially low-income households. Globally, it is estimated that near to 400 million people currently don't have a bank account in a formal way (Cetorelli & Goldberg, 2012). Alam, Bhowmik & Bhowmik (2020), opined that agent banking is one of the prominent nonconventional banking windows offering financial services, through a specified as well as defined channel, outside bank branches. According to Nwankwo & Idachaba (2016), agent banking is a tool that aided banking services to customers especially in the rural areas and very efficient in terms of transaction cost for both the customers and the financial institutions.

Agent banking, according to Investopedia (2020), is when a syndicate manager receives a mandate from a creditor to arrange a syndicated loan. Agent Banking has been recommended as a result of the increased demand for customer deposit in Nigerian banks, especially the new generation banks that have realized the imperative of goods and prompt customer services it will provide.

Due to the dynamic, competitive and advancement in the financial system of this recent time, all banks have been on research trying to come out with the possibility means to increase and improve customers' accessibility and profitability in order to still control their market share. As a result, the CBN has proposed Agent-banking as one of the potential ways for banks provides better service to both active and disabled customers. Automated Teller Machines (ATMs), Point-of-Sale Machines (POS), Mobile Phone Banking, Online Banking Systems, and other instruments can be used to achieve agent banking.

Relative lack of interest amongst Deposit Money Banks (DMBs) in taking financial services down markets. Almost all the existing new generation banks base their feasibility and viability studies in areas with promising increase in economics growth before establishing branches. This makes them not to bother about bringing in these services to the people in the remote areas of the country.

Relative small number of POS machine and the lack of inter-operability. This is one of the problems that the agent banking system is facing. This is because, the usefulness of POS in rendering financial services, especially now that the CBN has recommended an agent banking system cannot be overemphasized. Therefore, any country that wants to adopt this system must have it in mind to install multiple numbers of POS machines, otherwise, will not harness the full benefits of the banking system.

The banking sector has become an important contributor in the Nigeria economy. This sector contributes to the target on creating employment opportunities. However there are some problems that may encounter while accessing the banking services like, long distance to access banking halls, high transaction and operational costs and congestion in the banking halls. Agent banking is a new concept that has been added a new dimension to banking transactions by making it more convenient, which has eliminated long distance to access banking halls to transact. The transactions cost of agent banking is far less to process than transactions at an automated teller machine (ATM) or branch, banks can make a profit handling even small money transfers and payments (Booz, 2013). The adoption of agent banking is mainly geared to improve on market share by attracting and retaining their customers, improving their financial performance, and create a variety of services.

However, the extent to which agent banking are often used as a tool to deepen the financial sector remains largely unknown. Also, the true benefits of the agent banking model to customers, the banks, and the bank agents also remain largely unstudied. Although customers have benefited a lot through agency banking, it is not clear whether the financial performance of commercial banks has improved or not as a result of adopting agency banking.

Failed transaction is one of the major problems associated with agent banking in Nigeria. People travel from villages for complaint of failed transactions. The specific objectives are to Investigate the effect of automated teller machine (ATM), web/internet banking (WEB), point on sale terminal (POS) and mobile banking (MOB) on banking sector efficiency in Nigeria.

**LITERATURE REVIEW**

**Banking Sector Efficiency:**

Efficiency, particularly in the banking sector, is the best utilization of limited resources with minimum cost and maximum output. The evaluation of efficiency helps to find how much a bank is efficient. The banks that deliver more yields from a given amount of input are characterized as efficient bank.

Efficiency in financial institutions implies improved profitability, more funds channeled in, better prices, and service quality for consumers in this competitive business environment. A bank's Efficiency could play a vital role in shaping the real economy and help in inadequate economic progress. The whole economy of a country may be threatened due to a weak and incompetent banking system (Shaari, Khalique & Isa 2011).

The study of bank efficiency is central to the growth and long-term sustainability of the banking sector (Chen, You and Chang 2021; Ramly, Chan, Mustapha and Sapiei 2017),

**Determinants of Bank Efficiency:**

**Corporate governance of bank and efficiency**

According to Claessens and Fan (2002), minimizing capital and transaction costs through better corporate governance leads to Efficiency. Aguilera and Cuervo-Cazurra (2004), emphasized that good corporate governance improves the firm's technical Efficiency. Nanka-Bruce and Douglas, (2009), proposed that corporate governance principles should be adopted in the firm's institutional environment to improve Efficiency.

**Enterprise risk management and efficiency.** Financial institutions have faced enormous changes, including privatization and digital banking, around the globe during the last 15 years. The possibility of unexpected incidents unfavorably disturbs the attainment of the aims or goals of an organization. Such incidents are termed "risks." Risk Management practices play a vital role in determining the behavior, Efficiency, profitability, and competitive strength of the insolvency of a banking system. McShane, Nair and Rustambekov (2011), argued that Enterprise Risk Management (ERM) practices in a firm or financial institution are a critical concept after the financial crisis of 2007–2008. Enterprise Risk Management becomes the hot and far-front interest of the top management, government regulators, and other stakeholders. The reasons include the increase in the default rate and awareness of risk, which results in better operational and strategic decisions.

Enterprise Risk Management helps firms and other institutions minimize the risk and cost of capital, improve the Efficiency of capital, and create synergies between various risk management techniques. David Walker has strongly recommended better governance and risk management practices for an efficient banking system.

**Ownership structure and efficiency.** The corporate governance code and other financial

sector reforms have changed the banking sector's ownership structure during the last two decades. State-owned banks used to be dominated previously in the banking sector but currently, the ownership structure is more concerned with the shareholder percentage of control in the banking sector Arun and Turner (2004).

**Bank size and efficiency:** The size of a bank is an essential element that can be measured through the total assets of -the bank. Chhibber and Majumdar (1999), have shown a positive correlation between the size and Efficiency of banks. Moutsianas and Kosmidou (2016), in their study, have concluded that economies of scale are attained easily because large size reduces cost and ability to gather information for the running of the business.

**Return on Equity (ROE) and efficiency:** Return on equity refers to the return on the volume invested by the shareholder and their income and profit. It is also assuming the response to the shareholder's equity. If the ratio is higher, it means higher income generation and better profit for the company Khrawish (2011). Return on equity (ROE) reveals how effectively a corporation is generating profit from the money that investors have put into the business, and is calculated by dividing net income by total shareholders' equity.

**Financial leverage (total assets to total equity) and efficiency:** Banks' assets are used as collateral because of lower agency costs, which may be linked to using debt. Therefore, the financial leverage proxy is measured from the ratio of total assets to total equity (TATE).

The ratio indicates the relationship of the total assets with the shareholders-owned proportion with the financial leverage/debt extensive to bank finance. In the short term, assets are preferred over debt if a firm is in the growth

stage. However, in the long run, it is beneficial to increase the funds of a bank because of the relationship between financial leverage (TATE) and the bank's performance in terms of Efficiency, which is positive.

**Macroeconomic conditions and efficiency:** External factors are not under the management's control; consequently, macroeconomic conditions are mainly in refining efficiency. The external factors that can cause devastating effects, no matter how healthy the controls of the banks are, refer to the macroeconomic conditions. These are alleged to be fatal for the financial crises that have occurred previously due to overpowering. Swamy (2013), has claimed that the impact of macroeconomic conditions exists at the short and long-term levels in developing countries. The macroeconomic factors, i.e., inflation, interest rate, etc., significantly affect the ownership and financial recital Laila (2017).

**Banking structure of the financial system and efficiency.** Generally, in most industries, competition is considered a positive force for the Efficiency and development of an organization. Competition in banks leads to Efficiency in operations and financial system soundness . Casu and Girardone (2009). Schoenmaker and Wagner (2011), have observed that the entry of foreign banks into the domestic market can increase the competition. Domestic banks may start competing with foreign banks if the government-owned banks are ineffective in their operations. Consequently, increasing the number of banks in a market increases the sense of competition and concentration and improves Efficiency because it can encourage banks to become more efficient.

**Agent Banking:**

Agency banking refers to contracting of a retail outlet whether corporate or a small market enterprise by a financial institution or

mobile network operator to process bank client's transaction (Calleo, 2014). Sahut (2011) defines agency banking as systems that enable bank customers to access accounts and general information on bank products and services through a personal computer or an intelligent device or any other banking activity held on internet.

Agency banking has aided banks in increasing earnings and expanding the scope of financial services in Nigeria, one thing it has failed to do is decongest banking rooms. It was assumed that the majority of people would use agents to deposit cash, withdraw money, and open accounts, all of which are services that most people desire from banks. A quick check of various banks revealed that they are still jam-packed with people looking to deposit and withdraw money (Tanko & Bako, 2022).

Agent banking is different from a bank cashier or tellers in that the owner conducts the transactions such as cash deposit, cash withdrawal, electronic fund transfers and payment of bills, account balance enquiry and loan referrals. Agent banking has been seen as the delivery of financial services outside conventional bank branches after using non-bank retail outlays that rely on technologies such as point-of-sale (POS) devices or mobile phones for real-time transaction processing (Modupe, 2010). From the definitions given, it can be said that Agent banking is a tool used in other emerging economies to: expand demand for banking services, decongest bank branches, reduce the cost to serve, and achieve financial inclusion. It also holds a promise of a low-cost means of market penetration by banks and other financial institutions, especially into the rural areas.

Agent Banks can play a critical role in providing many low-income people with their first access to a range of financial services in such contexts by leveraging existing retail

infrastructure and lowering set-up and operating costs (Kinyanjui, 2011).

**Instrument of Agent Banking:** The different kinds of agent banking instruments that are being used in the areas (that is, countries) where the operations are in operative include the followings;

**Automated Teller Machine:** Automated teller machines (ATMs) are electronic terminals that allow bank customers to withdraw cash, make deposits, check account balances, and move funds between accounts at almost any time. You typically insert an ATM card and enter your pin. Some finical institution and ATM owner charge a fee, particularly if you don't have an account with them or if your transactions take place in remote locations. Generally, before you complete the transaction, ATMs must display the charge a fee and the amount on or near the terminal screen. Check with your institution and at ATMs you used for more information about these fees.

**Credit Cards:** According to Lindsay (1994), credit cards evolved over many decades from an oil company, restaurant, and department store billing, acting as a payment method similar to a debit card. When they buy products or services from a store, hotel, or gas station, or when paying for something from someone who accepts credit cards as a form of payment.

**Advantage of Credit Card:**

Payment may be spread over a period.

Credit cards can be used to obtain cash at ATMs

Credit cards are widely accepted both in Nigeria and abroad.

It reduces crime rate there will be no physical cash to be robbed.

**Personal Computer Banking:** Personal computer, banking (PC banking) is also a fast growing instrument in electronic banking which is also found in agent banking as one of the instruments. The customer can now make them, transaction with telephone banking, and

also in some cases download information and manipulate it in their own financial management software.

The benefits that customers can derive here are that, it allows them to reconcile their statement of accounts, it also helps in checking deposits already made and cheque that have been cleared etc.

However, there are a number of problems that can militate against this banking system with the use of a PC. The first is that, the person must be a customer of a particular bank otherwise; the instrument will be of no use. The second is that the purchase of a software package is usually expensive.

**Point-of-Sale (POS) Machine:** A point of sale system is a payment device that enables customers to pay with their credit or debit cards at a sale or purchase location. Retail payment, cashless payments, cash back balance investigation, air time vending, loyalty, redemption, and other services are all possible with it. The POS involves a computer terminal in retail stores that will transfer funds instantly from the bank deposit of the store in which customer is making a purchase in the process the computer will verify that customer has sufficient funds to cover the purchase and will inform the customer of the new bank balance. The customer can also arrange for overdraft of the bank, so that instant loans (up to a present limit) can be made.

**Operators of Agent Banking:** Operators of agent banking include the following:

1. Post Office, 2). Small lottery outlets, 3). Pharmacies, 4). Supermarkets, 5). Convenience Stories

**Theoretical Framework:**

This study is based on theories of branchless banking which are categorized into three: Bank-led theory; Non-bank led theory and bank – focused theory. These theories mainly

seek to explain how branchless is conducted. **The Bank- Led theory** was brought forward by Lyman, Ivatury & Staschen (2006) and is based on the argument that, a licensed financial institution delivers financial services through a retail agent. The theory supports agency banking model by stating that the work of a bank is developing financial products and services, but distributes them through retail agents who handle all or most customer interaction (Lyman, et al, 2006). Retail agents have face- to- face interaction with customers and perform cash in/ cash-out functions, much as a branch based teller would take deposits and process withdrawals (Owens, 2006). Under this theory, the bank develops financial products and services but distributes them through retail agents who handle all or most customer interactions (Lyman, et al, 2006). With respect to **the non-bank led theory;** customers do not deal with a bank or maintain bank accounts rather, they deal with a non-bank firm either a mobile network operator or prepaid card issuer and retail agents serve as the point of customer interaction. Cash exchange by customers is done for e-money stored in a virtual e-money account on the non-bank's server, which os not linked to a bank account in the individual's name (Kumar, et al, 2006). The model is riskier as the regulatory environment in which these non-banks operate might not give much importance to issues related to customer identification, which may lead to significant Anti- Money Laundering risk. Under **the bank-focused theory**, a conventional bank uses non-traditional inexperience delivery channels to provide banking services to its existing customers. This theory emerges when a traditional bank uses non-traditional low cost delivery channels to provide banking services to its existing customers with the use of agent banking; a bank achieves economies of scale by serving money customers at low cost (Kapoor, 2010).

**Empirical Review**

Alam et al (2020), examined the impact of agent banking on financial performance of commercial banks in Bangladesh between 2016-201, used Return on Equity (ROE) as a measure of financial performance of commercial bank as the dependent variable while number of agents, volume of deposits, volume of withdrawals, and volume of loan distribution are the explanatory variables. The study employed multiple regression model are used to analyze data on financial performance. The study finds that the number of agents and volume of deposits have a positive and significant impact on the financial performance whereas the volume of withdrawals and volume of loan disbursement negatively impact on the financial performance of commercial banks in Bangladesh although the volume of loan disbursement is statistically insignificant.

Dotun and Adesugba (2022), investigated the impact of agency banking on financial performance of listed Deposit Money Banks in Nigeria from 2011-2020 using Economic value added (EVA) to quantify financial performance. Log of volume of accounts opened by agents to total accounts, log of volume of electronic transfer income by agents to total electronic transfer income, and log of volume of withdrawals through agents divided by total withdrawals were used as variables of Agency Banking Activities. The study employed Descriptive statistics and econometric analysis utilizing the linear panel regression method with periodic and cross-sectional data Random (Effect as the regression model) and found that volume of accounts opened by agent has significant positive impact on the financial performance of DMBs in Nigeria and concluded that volume of electronic transfers positively increases banks financial performance.

Munoru (2013) investigates how agency banking affects Kenya's level of financial inclusion. The study's foundation was

secondary CBK data. As of December 2014, 13 banks out of Kenya's 44 commercial banks made up the sample size for the banking industry. We used inferential statistics, normality tests, correlation analysis, regression analysis, unit root tests, and error correction models to investigate the connection between financial inclusion and agency banking. The findings indicate that agent banking had a somewhat beneficial impact on financial inclusion.

The variables were not related causally.

Mwando (2013) investigated how agency banking affected Kenyan commercial banks' financial results. In this investigation, a descriptive survey was used. The study was founded on first-hand information. The researchers employed multiple regressions to evaluate the data. The analysis found that Kenya's commercial banks fared better financially as a result of the central bank's move to regulate agency banking. The study found that Kenyan commercial banks' financial performance benefited from agency banking low transaction costs as well.

Chude and Chude (2014) looked at how agent banking affected Nigerian deposit banks' performance. In order to conduct the research and analyze the work, the study used a descriptive survey. It was discovered that agent banking was crucial to raising bank profitability and customer happiness.

Additionally, Kingori and Gekara (2015) evaluate the effect of agency banking on bank agents' performance in the Thika community of Kenya. The mean and standard deviation, as well as graphs, frequency percentage plots, and other descriptive statistical techniques, were used to examine the data. To examine the association between the independent and dependent variables, a linear regression model was utilized in the study. According to the study, a licensing advantage has led to a

consolidated monopoly among rival banks, costing them business with other agents.

The effect of agency banking on the financial performance of banking institutions listed on the Nairobi Securities Exchange is also examined by Kanyore et al. (2017). Out of the 43 commercial banks in Kenya, the study's findings were based on a survey of the 11 listed on the Nairobi Securities Exchange. The research used secondary data. The study employed inferential statistics, correlation analysis, and a descriptive research methodology. Multiple linear regression models were employed to measure each variable in the model, and the findings were utilized to build a relationship between the dependent and independent variables.

On the financial performance of listed banks, agency banking might have a favorable effect. The effect of agency banking on the operating results of commercial banks in Embu County, Kenya, is also evaluated by Mbugua and Omagwa (2017). The survey covered all Banks branches in Embu County, Kenya. The study involved 69 senior, middle and junior managerial bank employees from Embu County, Kenya. The study relied on primary data collected through the use of questionnaires distributed via a drop-off/pick-up technique. For a descriptive analysis of the gathered data, descriptive statistics including mean, frequencies, standard deviation, and percentages were used. Multiple regressions and correlation analysis were also utilized to show how the study's dependent and independent variables related to one another. The research claims that agency banking has reduced the cost of banking and financial transactions. The study also discovered that the cost of agency banking had a considerable impact on the commercial banks' bottom lines in Embu County.

Nyota and Muturi (2019) use the equity bank, Kisii, Nyamira, and Keroka branches as examples to examine the effects of agency

banking features on commercial banks' financial performance in Kenya. The study discovered a significant relationship between agency banking variables like market share, accessibility, and financial service costs and financial success. The inconsistent financial performance of Equity Bank is mostly explained by agency banking. Agency banking improves financial performance through increasing market share, cutting service costs, and increasing access to financial services.

The introduction of agency banking and its effects on Kenya's commercial bank withdrawals are evaluated by Kanyugie et al. (2019). An exploratory, non-experimental research design was used for the study. The study used secondary data, and the data was quantitative in nature. The information was aimed at 15 business banks. Using a data collecting worksheet and descriptive and inferential statistics, information was gathered from the annual reports of the CBK Banking Supervision and the financial reports of the 14 commercial banks. The event research served as the foundation for the study's empirical model. According to the study, Kenyan commercial banks' financial performance is being impacted by the use of agency banking.

Alam et al. (2020) investigated how agent banking affected the financial success of Bangladeshi commercial banks. 19 commercial banks in Bangladesh were chosen as the study sample for this quantitative investigation. Secondary data for the years 2016 to 2019 was gathered from the balance sheets and income statements of the example banks and the Central Bank of Bangladesh. A multiple regression model is used to examine financial performance data. In spite of the volume of credit disbursements being statistically insignificant, the study reveals that the number of agents and the volume of deposits have a favorable and significant

impact on financial performance, whereas the volume of withdrawals and loan disbursements has a negative impact.

## METHODOLOGY

The research employed an ex-post facto research design to explore the impact of capital market behavior on manufacturing sector output in the Nigerian economy. In this design, the researcher does not manipulate the independent variable but instead retrospectively analyzes its influence on the dependent variable(s).

Data was sourced from the Central Bank of Nigeria Statistical Bulletin aand Nigerian Deposit Insurance Corporation (NDIC), spanning 14 year period, specifically from 2009 to 2022, comprising annual time series data.

**Model Specification:**

Banking sector efficiency (ROE) is the dependent variable while Value of transaction on Automated Teller Machine (ATM), Value of transaction on Web/internet banking (WEB), Value of transaction on Point of Sales (POS) and Value of transaction on mobile banking (MOB) are proxies for agent banking as independent variables

To evaluate the effectiveness of agent banking on banking sector efficiency in Nigeria. Thus, the functional relationship between agent banking and banking sector efficiency in Nigeria are expressed as follows:

$ROE = f(ATM, WEB, POS, MOB,)$……Model 1

$ROE_t = \beta_0 + \beta_1 ATM_t + \beta_2 WEB_t + \beta_3 POS_t + \beta_4 MOB_t + U$.....Equation 1

Where:

ROE = Return on Equity

ATM = Value of transaction on Automated Teller Machine

WEB = Value of transaction on Web/internet banking

POS = Value of transaction on Point of Sales

MOB = Value of transaction on mobile banking

U = Stochastic disturbance or error term

$\beta_0$ denotes the constant term, $\beta_1$ $\beta_2$ $\beta_3$ and $\beta_4$ are slope coefficients representing

Parameters to be estimated and $\mu$ is the disturbance term assumed to be purely random.

On apriori expectation $\beta_1, \beta_2 \beta_3 \beta_4 > 0$.

**Techniques for Data Analysis**

Descriptive statistics, the ADF unit root test, OLS regression analysis, the Johansen co-integration test, the Granger causality test, and an error correcting mechanism were used to analyze the data.

**Unit Root Test**

The data's time series properties are analyzed to avoid incorrect model definition and improve the correctness of the results. Despite the fact that there are various approaches to verify for stationarity and the presence of unit roots, the Augmented Dickey-Fuller (ADF) test was used in this situation. A series is considered to be stationary if its mean and variance are both constant and finite. A non-stationary series, on the other hand, has a variable variance and a clear temporal trend. If a series is non-stationary, it will have a high degree of persistence.

If the ADF values are greater than (>) the 5% critical value for all the variables (dependent or independent) at absolute value and the P-values are less than 5% while the order of integration are at stationarity the study can proceed to estimate the values using OLS or the study will use other estimation tools such as Vector Autoregressive model (VAR), Autoregressive distributed lag (ARDL) and so on if the variables are not stationary.

**Ordinary Least Square**

The Ordinary Least Squares (OLS) approach was used to investigate the association between stock market development indicators and economic growth in Sub-Saharan Africa. A regression model was used to analyze the association between stock market development indicators and economic development in Sub-Saharan Africa for the time period under consideration. To analyze the significance of the estimated regression model parameters, the Durbin-Watson test, F statistic, and coefficient of determination ($R^2$) were utilized.

**Granger Causality Test**

A time series of data is essential or not for assessing another according to the statistical theory known as Granger causality. According to him, doing a test can reveal economic causation. This was done to examine the theories demonstrating the link between Sub-Saharan African economic development and stock market development indices.

## RESULTS AND DISCUSSION

**Data Presentation**

The study empirically investigates the relationship between agent banking and banking sector efficiency Nigeria. The variables used in the model include: Return on Equity (ROE) as dependent variable, Automated Teller Machine (ATM), Mobile Banking (MOB), Point-of-Sale terminal (POS) and Web/internet banking (WEB) as independent variables proxy for agent banking.

**TABLE 1: EXTRACTED EFFICIENCY PARAMETERS FOR AGENT BANKING AND BANKING SECTOR EFFICIENCY IN NIGERIA.**

| PERIOD | RETURN ON EQUITY (ROE) (%) RATE | AUTOMATED TELLER MACHINE (ATM) (%) | MOBILE BANKING (MOB) (%) | POINT-OF-SALE (POS) (%) | WEB/INTERNET BANING (WEB) (%) |
|---|---|---|---|---|---|
| 2009 | 13.13 | 85.1 | 0.2 | 1.7 | 13.0 |
| 2010 | 13.13 | 88.9 | 0.6 | 1.2 | 9.3 |
| 2011 | 13.13 | 93.4 | 1.2 | 1.9 | 3.5 |

| | | | | | |
|---|---|---|---|---|---|
| 2012 | 22.63 | 94.7 | 1.5 | 2.3 | 1.5 |
| 2013 | 14.59 | 88.9 | 4.5 | 5.1 | 1.5 |
| 2014 | 15.03 | 83.5 | 7.7 | 7.1 | 1.7 |
| 2015 | 6.77 | 80.2 | 8.9 | 9.1 | 1.8 |
| 2016 | -2.54 | 75.2 | 11.4 | 11.4 | 2.0 |
| 2017 | 15.12 | 70.0 | 12.1 | 15.4 | 2.0 |
| 2018 | 8.15 | 61.7 | 11.8 | 22.7 | 3.8 |
| 2019 | 9.86 | 42.6 | 33.3 | 21.0 | 3.1 |
| 2020 | 8.62 | -10.1 | 10.9 | 25.5 | 19.2 |
| 2021 | 12.63 | 2.0 | 5.0 | 2.0 | 50.0 |
| 2022 | 8.95 | 2.2 | 7.5 | 2.8 | 53.1 |

Source: Central Bank of Nigeria Statistical Bulletin, Central Bank of Nigeria Economic and Annual Federal Resrve Bank of St. Louis for the Period Under Review from 2009– 2022.

**Interpretation of Result:**

Table 2 shows the descriptive statistics for the dependent and independent variables for the time series data. The purpose of this is to show the degree of difference between the variables.

**Table 2: Descriptive Statistics Result**

| | ROE | ATM | MOB | POS | WEB |
|---|---|---|---|---|---|
| Mean | 11.37143 | 61.30714 | 8.328571 | 9.228571 | 11.82143 |
| Median | 12.88000 | 77.70000 | 7.600000 | 6.100000 | 3.300000 |
| Maximum | 22.63000 | 94.70000 | 33.30000 | 25.50000 | 53.10000 |
| Minimum | -2.540000 | -10.10000 | 0.200000 | 1.200000 | 1.500000 |
| Std. Dev. | 5.658282 | 37.01558 | 8.395459 | 8.618534 | 17.63350 |
| Skewness | -0.564565 | -1.005710 | 1.880513 | 0.777521 | 1.724944 |
| Kurtosis | 4.419724 | 2.422404 | 6.709168 | 2.117202 | 4.376244 |
| Jarque-Bera | 1.919487 | 2.554666 | 16.27689 | 1.865202 | 8.047532 |
| Probability | 0.382991 | 0.278780 | 0.000292 | 0.393529 | 0.017885 |
| Sum | 159.2000 | 858.3000 | 116.6000 | 129.2000 | 165.5000 |
| Sum Sq. Dev. | 416.2100 | 17811.99 | 916.2886 | 965.6286 | 4042.224 |
| Observations | 14 | 14 | 14 | 14 | 14 |

The descriptive statistics for the variables included in our study are shown in the table above. Between 2009 and 2022, the average return on equity (ROE), automated teller machine (ATM), mobile banking (MOB), point of sale terminal (POS), and Web/internet banking (WEB) are 11.37143, 61.30714, 8.328571, 9.228571 and 11.82143, respectively.

ROE and ATM are negatively skewed, with skewnesses of -0.564565 and -1.005710 which are less than zero, indicating a larger tail to the left. Furthermore, POS is typically skewed since it has a skewness of 0.777521 which is zero. MOB and WEB are positively skewed because they have skewnesses of 1.880513 and 1.724944 that are more than zero, indicating a longer tail to the right.

ATM and POS are platykurtic because their distributions are flat peaked and their kurtosis values of 2.422404 and 2.117202 are less than 3; whereas ROE, MOB and WEB are leptokurtic because their distributions are highly peaked relative to normal and their kurtosis values of 4.419724, 6.709168, and 4.376244, respectively are greater than 3.

The Jarque-Bera statistic (JB) for ROE, ATM and POS provides sufficient evidence to support the null hypothesis of normality since the p-values of the JB statistic of 0.382991, 0.278780 and 0.393529 are larger than 0.05. While the Jarque-Bera statistic (JB) for MOB, and WEB give sufficient evidence to reject the null hypothesis of normalcy since the p-values of the JB statistic of 0.000292 and 0.017885 are less than 0.05.

**Table 3: SUMMARY OF ADF UNIT ROOT TEST**

| Variables | ADF Test Statistic | Mackinnon Critical Value @ 5% | P-Value | Order of integration | Remark |
|---|---|---|---|---|---|
| ROE | -5.240455 | -3.144920 | 0.0017 | 1(1) | STATIONARY |
| ATM | -3.791991 | -3.212696 | 0.0210 | 1(2) | STATIONARY |
| MOB | -4.716877 | -3.212696 | 0.0055 | 1(2) | STATIONARY |
| POS | -4.956788 | -3.175352 | 0.0032 | 1(0) | STATIONARY |
| WEB | -5.275398 | -3.212696 | 0.0026 | 1(2) | STATIONARY |

According to the table, the variable is stationary at order level 1(0) for POS, first difference 1(1) for ROE, whereas they are stationary at second difference 1(2) for ATM, MOB and WEB.

**TABLE 4: GRANGER CAUSALITY TEST**

Pairwise Granger Causality Tests
Date: 04/06/24 Time: 23:28
Sample: 2009 2022
Lags: 2

| Null Hypothesis: | Obs | F-Statistic | Prob. |
|---|---|---|---|
| ATM does not Granger Cause ROE | 12 | 0.06689 | 0.9359 |
| ROE does not Granger Cause ATM | | 0.09633 | 0.9093 |
| MOB does not Granger Cause ROE | 12 | 0.36319 | 0.7078 |
| ROE does not Granger Cause MOB | | 0.34386 | 0.7204 |
| POS does not Granger Cause ROE | 12 | 0.28761 | 0.7585 |
| ROE does not Granger Cause POS | | 0.54013 | 0.6051 |
| WEB does not Granger Cause ROE | 12 | 0.56667 | 0.5914 |
| ROE does not Granger Cause WEB | | 0.11744 | 0.8909 |

There is no causation since ATM does not granger cause ROE (0.9359 > 0.05) and ROE does not Granger Cause ATM (0.9093 > 0.05); MOB does not Granger Cause ROE (0.7078 > 0.05) and ROE does not Granger Cause MOB (0.7204 > 0.05); There is no causation since POS does not granger cause ROE (0.7585 > 0.05) and ROE does not granger cause POS (0.6051 > 0.05); WEB does not granger cause ROE (0.5914 > 0.05) and ROE does not granger cause WEB (0.0037 < 0.05).

**TABLE 5: OLS**

Dependent Variable: ROE
Method: Least Squares
Date: 04/06/24 Time: 23:31
Sample: 2009 2022
Included observations: 14

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 26.67262 | 23.57876 | 1.131214 | 0.2872 |
| ATM | -0.108901 | 0.215057 | -0.506383 | 0.6248 |
| MOB | -0.118063 | 0.291952 | -0.404391 | 0.6954 |
| POS | -0.482507 | 0.606718 | -0.795274 | 0.4469 |
| WEB | -0.269733 | 0.433801 | -0.621791 | 0.5495 |

| | | | |
|---|---|---|---|
| R-squared | 0.213075 | Mean dependent var | 11.37143 |
| Adjusted R-squared | -0.136669 | S.D. dependent var | 5.658282 |
| S.E. of regression | 6.032560 | Akaike info criterion | 6.704673 |
| Sum squared resid | 327.5260 | Schwarz criterion | 6.932908 |
| Log likelihood | -41.93271 | Hannan-Quinn criter. | 6.683546 |

| | | | |
|---|---|---|---|
| F-statistic | 0.609231 | Durbin-Watson stat | 2.024735 |
| Prob(F-statistic) | 0.666344 | | |

$ROE_t = \beta_0 + \beta_1 ATM_t + \beta_2 WEB_t + \beta_3 POS_t + \beta_4 MOB_t + U$

Using the absolute values of all variables, the calculated regression model parameters are:

ROE = 26.67262 -0.108901ATM - 0.118063MOB - 0.482507POS - 0.269733WEB+ U

According to the estimated model's coefficient of regression, there is a negative relationship between ROE, ATM, MOB, POS and WEB; thus, a unit changes in ATM, MOB, POS and WEB results in 0.108901%, 0.118063%, 0.482507% 0.269733% loss in return on equity (ROE).

The coefficient of determination ($R^2$) is $R^2$ = 0.213075 (21.3075%). This means that the independent variables accounted for about 21.31% of the overall variance, while the remaining 78.69% was unexplained and was handled by the stochastic disturbance term or error term U during the study period.

There is absence of autocorrelation or serial correlation in the residual is indicated by the Durbin-Watson statistic, which has a value of 2.024735, about 2.02, which is equal to the Durbin-Watson value of 2 (2.02 = 2).

The regression output's F-statistic was 0.609231. The regression plane is thus statistically not significant.

When Sign P-values are compared to the selected level of significance (0.05), P-values 0.6248, 0.6954, 0.4469, and 0.5495 for ATM, MOB, POS, and WEB, respectively, are greater than the intended level of significance. Furthermore, the overall level of significance, Prob.(F-Statistic) 0.666344, is greater than the 0.05 level of significance, indicating that all of the independent variables cannot jointly

influence the dependent variable for the time period under consideration; thus, our null hypotheses are accepted as the variables are statistically not significant.

**Decision Rule**

**Sign P-value:** If the Sign P-value is greater than the chosen level of significance (> 0.05), we accept the null hypothesis but if not (< 0.05), we accept the alternative.

**Test of Hypotheses**

**Test of hypotheses**

**Objective 1:** Investigate the effect of automated teller machine (ATM) on banking sector efficiency in Nigeria.

$H_{01}$: Automated teller machines (ATM) do not have effect on banking sector efficiency in Nigeria.

Automated teller machines do not show a substantial association with ROE. Because the P-value of 0.6248 is greater than the 0.05 threshold of significance, ATM does not impact the dependent variable over the time period under consideration. As a result, the null hypothesis is accepted leading to the conclusion that Automated teller machines has no considerable influence on ROE of banks in Nigeria.

**Objective 2:** To investigate the effect of mobile banking (MOB) on banking sector efficiency in Nigeria.

$H_{02}$: Mobile banking (MOB) does not have effect on banking sector efficiency in Nigeria.

Mobile banking showed no substantial association with ROE. Because the P-value of 0.6954 is greater than the 0.05 threshold of significance, MOB does not impact the dependent variable over the time period under consideration. As a result, the null hypothesis is accepted leading to the conclusion that Mobile banking has no considerable influence on ROE of banks in Nigeria.

**Objective 3:** To examine the effect of point on sale terminal (POS) on banking sector efficiency in Nigeria.

$H_{03}$: Point of sale (POS) does not have effect on banking sector efficiency in Nigeria.

Point of sale showed no substantial association with ROE. Because the P-value of 0.4469 is greater than the 0.05 threshold of significance, POS does not impact the dependent variable over the time period under consideration. As a result, the null hypothesis is accepted leading to the conclusion that Point of sale has no considerable influence on ROE of banks in Nigeria.

**Objective 4:** To Evaluate the effect of web/internet banking (WEB) on banking sector efficiency in Nigeria.

$H_{04}$: Web/internet banking (WEB) has no effect on banking sector efficiency in Nigeria.

Web/internet banking showed no substantial association with ROE. Because the P-value of 0.5495 is greater than the 0.05 threshold of significance, WEB does not impact the dependent variable over the time period under consideration. As a result, the null hypothesis is accepted leading to the conclusion that Web/internet banking has no considerable influence on ROE of banks in Nigeria.

**Discussion of findings**

This study on "agent banking and banking sector efficiency in Nigeria" showed several non significant conclusions based on the analysis of the factors listed below:

**i.** AT**M:** The P-value of 0.6248 indicated that Automated teller machines have no significant relationship with return on equity a proxy for banking sector efficiency in Nigeria, for the period under review, implying that it does not significantly contribute to banking sector in Nigeria.

**ii. MOB:** The P-value of 0.6954 indicated that mobile banking have no significant relationship with return on equity a proxy for banking sector efficiency in Nigeria, for the period under consideration; thus implying that it does not significantly contribute to banking sector in Nigeria.

**iii. POS:** The P-value of 0.4469 indicated that point of sale terminal have no significant relationship with return on equity a proxy for banking sector efficiency in Nigeria, for the period under consideration; thus implying that it does not significantly contribute to banking sector in Nigeria.

**iv. WEB:** The P-value of 0.5495 indicated that web/internet banking have no significant relationship with return on equity a proxy for banking sector efficiency in Nigeria, for the period under consideration; thus implying that it does not significantly contribute to banking sector in Nigeria.

## CONCLUSION

This work's summary is as follows:

i. ATM transactions had no significant effect on banking sector efficiency in Nigeria.

ii. MOB transactions had no significant effect on banking sector efficiency in Nigeria.

iii. POS transactions had no significant effect on banking sector efficiency in Nigeria.

iv. WEB transactions had no significant effect on banking sector efficiency in Nigeria.

Based on our findings, agent banking had various levels of interaction with ROE as a measure of banking sector efficiency in this study with greater outcome indicating negative and insignificant effect. The study therefore, concluded that though the variables were stationary at their respective levels, but has not contributed positively and significantly to banking sector efficiency in Nigeria.

However, based on the findings, the study recommends as follows

i. The migration of our normal banking system to agent banking system would require some reform and a lot of effort and sensitization especially for low income customers, who are currently deeply rooted in using cash and see it as a convenient and easy way of receiving and making payments any point in time.

ii. Regulators should require that services offered use technical standards that

will allow for interoperability at low cost in the future. This will maximize flexibility to allow for market entry while also ensuring that future interoperability will be feasible, both from a technical and financial perspective.

iii. Agents should not just be used by customers to access their bank accounts and transfer money: they should also offer a range of other services including payment of salaries and payment of benefits.

**iv.** There should be increase in the number of point-of-sale terminals (POS) machines in the country particularly in the remote or rural areas where there is no physical structure of banking halls in order to harness the full benefits of the banking system.

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