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INFLUENCE OF TECHNOLOGY ENABLED SELF-BANKING SERVICES ON THE PERFORMANCE OF COMMERCIAL BANKS IN NIGERIA

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ABSTRACT

The study looks into how Nigerian commercial banks' performance is affected by technology-enabled self-banking services. Ex-post facto research design was used in this study. All of Nigeria's commercial banks are made up of the population. Secondary data used in this study was taken from each commercial bank's annual report. The data was analyzed using both descriptive and inferential statistics. The coefficients from the study estimation were obtained using the Ordinary Least Squares (OLS) estimation method. E-views 10 to run the data analysis. The results show that while revenue from mobile banking applications (MOBs) does not significantly affect banks' performance, revenue from automated teller machines (ATMs) significantly improves banks' performance. In conclusion, revenue from Automated Teller Machines (ATMs) is crucial for improving Nigerian commercial banks' performance. It is advised that Nigerian commercial banks keep making investments in and expanding their ATM infrastructure because of the statistically significant beneficial influence that ATM income has on both Return on Asset (ROA) and Return on Investment (ROI). To take advantage of the noted positive link with financial performance, strategically place ATMs and make sure they are operating efficiently. Constantly evaluate and improve their mobile banking tactics to meet consumer demands, better user experiences, and perhaps investigate cutting-edge technologies that might improve the usability and appeal of mobile banking apps. Invest in consumer education initiatives that highlight the advantages and usability of ATM and mobile banking services to boost uptake and usage, which will improve financial results.

INTRODUCTION

The advent of self-banking services made possible by technological advancements has dramatically altered how people have access to and handle their own money. Customers can enjoy modern banking conveniences without the hassle of visiting a physical location thanks

to these services, which take advantage of technological improvements. Consequently, consumers have the freedom to conduct a myriad of banking activities and gain access to financial services at their convenience, regardless of their location, utilizing their laptops or mobile devices. The advantages and effects of self-banking services made possible by technology have been the subject of multiple studies. Convenience, ease of use, and time savings were identified as key variables influencing customers' adoption decisions of self-service banking in China, according to Khayrallah *et al.* (2015). In addition, the survey emphasized that customers were more satisfied with self-banking services since they gave them greater control over their financial activities.

The term "technology-enabled self-banking services" describes a set of features and capabilities that allow customers to handle their own banking online, away from the hassle of dealing with physical branches. These services take advantage of technological developments like mobile apps, online banking portals, ATMs, and AI to make banking more convenient and efficient for customers. This includes managing accounts, transferring funds, paying bills, applying for loans, and managing investments. The rise in popularity of technology-enabled self-banking services can be attributed, in part, to the fact that they provide clients with more control and freedom over their financial activities and the ease of accessing banking services whenever and wherever they like (Ratten, 2020).

The increasing accessibility of smartphones and the internet, changes in consumer preferences towards digital interactions, and the relative affordability of digital channels compared to more traditional banking methods are all factors contributing to the growing popularity of these services, according to previous research by Deloitte (2019), the European Central Bank (2021), Al-Ajlouni (2018), Broby (2021), Rao & Budde (2015), Llewellyn (2018), Jaksic and Marinc's (2015), Sardana & Singhania (2018), (Ogungbade *et al.* 2019), Adeusi *et al*. (2020), and other sources. While some of their research found a positive relationship between banks' performance and their use of technology, other studies found no such relationship or even detrimental effects. Since the authors in question were unable to settle their differences, further investigation is required. This study aims to address that knowledge gap by investigating the success or failure of commercial banks in Nigeria that adopted self-banking services made possible by technological advancements. Consequently, we must find solutions to the problems that scholars face, such as examining the effect of mobile banking app income on the return on assets of commercial banks in Nigeria. To what extent does revenue from automated teller machines (ATMs) impact the ROA of commercial banks in Nigeria? Is there a link between the return on investment (ROI) and the amount of money that Nigerian commercial banks make via mobile banking apps? The research stands in for mobile banking applications and ATMs as explanatory variables, and for the performance of commercial banks in Nigeria as ROA and ROI.

LITERATURE REVIEW

Conceptual Clarification

Concept of Self-Banking Services

Self-service technology allows customers to do various banking tasks using their own devices. The connection between banks and clients has been transformed by new delivery channels like ATMs, Internet Banking, and Telephone Banking, as well as improved access to customer information. Financial institutions can now collect, store, and utilize client data for various purposes. They may reach a wider audience online, promote their wares, and tailor their offerings to each consumer's unique needs by offering supplementary financial services like bank assurance to both current and potential clients (Sindwani & Goel, 2015).

In today's business world, the customer is both king and boss. In the banking industry, the customer is king. The "Customer is always right" principle is central to Gandhian thought. Banking, without a question, is a customer-centric industry. Customer behavior has shifted from passive to aggressive, with modern consumers placing increasing demands for speed, accuracy, empowerment, customization, reliability, and cost, time, and convenience efficiency (Sindwani & Goel, 2015). Nowadays, it's not enough simply deliver a product; the way it is presented is what really matters to customers. In addition to being extremely picky, customers can be downright unforgiving at times. They require immediate data. They want banking services that are accessible at all times and in any place. Financial institutions are addressing these issues through the use of cutting-edge technology in the design of their websites. In order to reach their growth objectives, bankers aim to maintain customer satisfaction (Pooya *et al.,* 2020).

Success in today's banking industry is won by companies that value their customers, provide fast delivery, have the necessary technology, effective risk management tools, and, most importantly, a highly empowered human resources workforce that can add value to their products and services (Pooya *et al.,* 2020). It is imperative that public and commercial banks alike implement effective procedures to further reduce customer service wait times and provide immediate assistance. In the future, when competing for market shares becomes increasingly fierce, only these types of banks will likely survive (Kaushik & Rahman, 2015). Quality of service should be the primary emphasis of financial services. Convenience, reflected in an increase in the usage of automated services, is the most powerful consumer trend. One of the most important non-financial assets for banks in the new information technology era is a happy and satisfied customer.

It is more cost-effective to hold on to current consumers rather than constantly trying to attract new ones. Banks and their customers can benefit from rethinking the customer relationship in light of the rise of the new e-world clients, who are both a challenge and an opportunity to make customers more invested in the success of the bank. This is something that banks in India and throughout the world have come to terms with, and as a result, they have refocused their efforts and built their websites using cutting-edge technology. There has been a dramatic increase in ineffective customer service in India's banking business, which is among the worlds biggest. In the end, the episode demonstrates the importance of putting the client first (Kaushik & Rahman, 2015). Customer service and happiness are the ever-present keys that will allow banks to not only keep their current customers but also attract new ones, which is essential for the survival of the industry in the face of fierce domestic and international competition.

Concept of Financial Performance

A company's financial performance indicates how efficiently it generates revenue by utilizing the advantages of its core business strategy. This phrase is also used to describe the overall financial health of an organization over a specific period of time; it can be applied to compare different companies in the same industry or to think about joint ventures or departments (Ongore& Kusa, 2013).Return on Assets (ROA) and Return on Equity (ROE) are two common after-expense rate of return metrics used to evaluate business performance, especially by commercial banks (Nsambu, 2014). Return on assets (ROA) and return on equity (ROE) have been used by financial professionals for a variety of objectives, including but not limited to: assessing industry performance, predicting mergers and failures, and gauging market structure slants. As a case study, the majority of a bank's income comes from interest; hence the

productivity of the bank is determined by the margins in interest rates between deposits and credits. Banks should keep a careful eye on the factors that affect income and expenses since these two factors determine productivity (Jha & Hui, 2012). According to a large body of empirical research, there are two main categories of factors that affect the monetary foundations' financial performance: internal and external. According to Pinto *et al.*,(2017), these studies use ROA, ROE, ROCE, and NIM as dependent factors, whereas the inner and outer elements are considered independent variables.

Measures of the study

Mobile Banking Application

Online banking, sometimes called virtual banking, allows customers of banks and other financial institutions to do various financial transactions through the websites of those institutions (Iberahim *et al.,* 2016). The term "online banking" describes the practice of providing banking services and products to clients through the Internet. What this means is that customers can access banking information and services through various electronic mediums such as computers, telephones, and televisions. It can also refer to the ability to use the banking services through automated teller machines (ATMs) found in public places like airports and train stations, as well as at workplaces.

For the sake of this research, this definition is appropriate for retail electronic banking (Mukerjee, 2020). According to Kumar and Bose (2013), all of a bank's services that are offered through various electronic delivery channels, including the internet, cell phones, and the telephone, are together known as internet banking. Giving customers access to their money "at his or her office/home or any other place or time wherever the person is— be it travelling, shopping, or even in a stadium through the preference of electronic technology" is what it means (Sindwani& Goel, 2015). Now there are a lot of ways in which banks can use the client data. They may reach a wider audience online, promote their wares, and tailor their offerings to each consumer's unique needs by offering supplementary financial services like bank assurance to both current and potential clients (Kumar & Bose, 2013).

The purpose of an Automated Teller Machine (ATM) is to facilitate the withdrawal of cash, the resolution of transactional enquiries, the arrangement of loans and insurance, the buying and selling of stocks, and the provision of investment advice (Manoharan, 2007). In 1987, HSBC pioneered the use of automated teller machines (ATMs) in India. In an effort to better compete with their larger public sector counterparts, private sector banks have begun installing ATMs. Only around two years ago did ICICI, UTI, HDFC, and IDBI collectively control over half of India's ATMs. The first Indian bank to reach 1,000 branches was ICICI Bank (Adewoye& Omoregie, 2013). The situation has altered drastically today. Nationally, automated teller machine (ATM) installations are being pushed by public sector banks such as State Bank of India (SBI), Bank of India (BoI), Union Bank, Allahabad Bank, etc. In the future, automated teller machines will undoubtedly play a larger role. The automated teller machines of the future will offer a wide range of value-added services, not limited to cash dispensing but also encompassing non-banking and non-cash options (Jegade, 2014). Most automated teller machines (ATMs) allow customers to pay for things other than banking services, such as power, phone, cellphone, and credit card bills, as well as insurance premiums. You can do mutual fund business using ATMs at Citibank and ICICI Bank. Orders for demand drafts and fixed deposits can be placed by consumers using Citibank ATMs (Hareliman, 2014). Customers of ICICI Bank, IDBI Bank, and SBI can use their ATMs to donate to designated temples or charity trusts. At some SBI ATMs, clients can pay tuition at certain schools and universities; at some IDBI ATMs, they can pay for petrol and some magazine subscriptions. Besides processing payments, IDBI ATMs also display current events, stock prices,

horoscopes, and movie theatre showings (Ezekiel et al., 2021). The installation of automated teller machines has allowed several banks to move fifty to eighty percent of their cash transactions online. Since the cost of transactions using an ATM is only around 25 to 30 percent of the cost of transactions using a branch, this has resulted in significant cost savings for the banks.

Return on asset (ROA).

One way to look at a company's financial health is to look at its return on assets (ROA). Indicative of how well management turns resources into profit. One measure of a company's efficiency in turning its investments into profits is the return on assets (ROA), which is calculated as net income divided by average total assets. Return on Assets (ROA) can be calculated by dividing net income by average total assets. According to Siddique *et al*. (2020), this statistic shows the return that a business gets for every dollar that is invested in its assets. It is expressed as a percentage. Return on Assets (ROA) is an important metric for analysts and investors to evaluate a business's operational effectiveness. Increases in ROA are indicative of more efficient use of assets and, by extension, better management. A lower return on assets (ROA) indicates that the firm might not be making the most of its assets. You can learn a lot about relative performance by comparing ROA across several industries or organizations (Ally, 2013). Always keep industry standards and company-specific factors in mind while calculating ROA, even if it is a helpful indicator in and of itself. The capital-intensive nature and asset structures of different businesses affect the normal ROA levels. Because of differences in asset and operation types, a software company's return on assets (ROA) may be higher than manufacturing companies.

In addition, return on assets (ROA) is a great metric for investors to use when trying to figure out how healthy a company's finances are. Stability and effective management of resources are shown by a steady and healthy return on investment (ROI) throughout time. But a falling ROA could be an indication of trouble, therefore it's a good idea to look into the business's operations and finances more (Haque, 2014). Return on Assets (ROA) may not be the be-all and end-all of a company's performance metrics. When combined with other financial measures, it provides a more complete picture.

Return on Investment (ROI)

Fundamental to sound financial management is the concept of return on investment (ROI), which measures the extent to which an investment generates a profit. According to Cherotich *et al.,* (2015), it is an essential tool for individuals, businesses, and investors to assess how well their financial decisions were made. Simply said, return on investment (ROI) is a ratio that measures the profit or loss made by an investment relative to its original cost. Simply divide the net profit by the cost of investment, and then multiply the result by 100 to get the return on investment (ROI). By expressing the outcome as a percentage, the return on investment (ROI) may be easily seen. Return on investment (ROI) is a flexible metric that may be used in many different ways; for example, it can be used to evaluate the success of a marketing campaign, the profitability of an investment in real estate, or the feasibility of a new business venture (Ngari & Muiruri, 2014). The metric's adaptability makes it useful for decision-makers in various businesses. If the return on investment (ROI) is positive, then the investment was profitable; if it is negative, then it was a loss. A higher return on investment (ROI) percentage indicates a more profitable investment. A high return on investment (ROI) isn't a guarantee of success, though; ROI calculations don't take time or dangers into consideration. An ever-changing number, return on investment (ROI) helps investors monitor their investments' progress and make smarter choices. Also, it's easy to compare various investment prospects, which helps with prioritization and resource allocation (Maigua & Mouni, 2016). Additionally, return on investment (ROI) is a KPI for companies and a tool for

financial evaluation. For a more effective and lucrative business, it helps with long-term planning by directing choices on where to put money and what investments to prioritize.

THEORETICAL REVIEW

The study is anchored on the following theories:

Technology Acceptance Model

A well-known theoretical framework with roots in information systems and technology is the Technology Acceptance Model (TAM). TAM, which was created by Fred Davis in 1986, was first presented to explain and forecast people's adoption and usage of technology (Marangunic & Granic, 2015). Since then, the model has developed into a fundamental idea in the research of user behavior and technology uptake. The Theory of Reasoned Action (TRA), created by Fishbein and Ajzen in 1975, was expanded upon by Fred Davis, a professor at the University of Arkansas. Davis modified TRA, which was primarily concerned with forecasting and elucidating human behavior, to particularly address the acceptance of technology (Chau, 1996). Perceived utility (PU) and perceived ease of use (PEOU) are the two main components at the centre of TAM. The notion states that if a technology is perceived as user-friendly and is thought to improve performance or productivity, users are more likely to embrace and use it. These two elements have a direct impact on how someone feels about utilizing technology, which in turn determines whether or not they plan to utilize it.

TAM can provide important insights on how technology-enabled self-banking services affect commercial banks' business. Researchers can evaluate how bank staff and clients view the usability and convenience of self-banking technology by utilizing TAM in this study (Masrom, 2007). This can assist in forecasting their adoption of these technologies and, in turn, how they will affect commercial banks' overall performance. Research using Technology Acceptance Models (TAM) in the banking industry has demonstrated that users' attitudes towards technology, including online and mobile banking, have a big impact on how they accept it (Chuttur, 2009). Customers are more inclined to use self-banking services, for instance, if they believe that they are advantageous and easy to use. This could boost customer happiness and efficiency as well as the bank's financial performance. Additionally, researchers might look into other variables that might mediate or modify the connection between bank performance and technology adoption (Lu et al., 2003). A number of factors, including the legal climate, security concerns, and technological infrastructure may be very important in determining how users view self-banking services and, in turn, how they affect commercial banks.

Theory of Service Quality

The origins of Service Quality Theory may be traced back to the early 1980s, when scholars realized that marketing paradigms that were dominated by goods needed to give way to those that were dominated by services (Chowdhary & Prakash, 2005). The theory was first presented by Parasuraman, Zeithaml, and Berry in their groundbreaking work "SERVQUAL" in 1985, and they are among its leading proponents. An important turning point was reached in 1988 when their extended model was published, laying the groundwork for comprehending and assessing service quality. The core idea of the theory is that customer happiness and loyalty are significantly influenced by their opinions on the quality of the services they receive (Houston *et al.,* 1998). Reliability, assurance, responsiveness, empathy, and tangibles are the five main components of service quality that are identified. In many different businesses, these measurements are used as standards for assessing the caliber of services.

The impact of technology-enabled self-banking services on commercial banks' performance is consistent with the Service Quality Theory. The efficiency and effectiveness of digital

platforms have a significant impact on customers' views of certainty, responsiveness, and dependability as technology becomes an essential component of financial services (Johnson *et al.*, 1995). Customers' evaluations of the virtual and physical components of self-banking services also take into account the tangibles dimension. Research has examined the effects of technology-enabled self-banking services on customer happiness, loyalty, and overall service quality in relation to the performance of commercial banks. It is anticipated that the smooth integration of technology into banking processes will improve certainty, responsiveness, and dependability, which will favorably impact consumer impressions. Additionally, the theory aids in comprehending the function of empathy in relation to online banking. Customers feel supported and understood by self-banking services' user-friendly interfaces and intuitive processes, which enhances their empathy even in the absence of direct human connection (John & Tyas, 1996). The dynamic character of service quality has been highlighted by researchers like Parasuraman, Zeithaml, and Berry, who have urged companies to constantly adjust to shifting consumer expectations.

EMPIRICAL REVIEW

Sebastian (2023) builds an impact model based on the interaction between FinTech and sustainability policies in Malaysia's banking industry, with a resource-based view (RBV) as the mediator. According to the resource-based view theory and the sustainable development theory, which form the basis of the connection, FinTech is seen as a resource that contributes to the sustainability of banking. The RBV looks within the organization for the qualities, competencies, and skills that could give it a leg up in the marketplace. This study's methodology involved administering a questionnaire survey to 125 individuals working in the asset, financial, and payment divisions of 39 different banks. These banks encompassed commercial, retail, and investment banks. The study's objectives were achieved by analyzing the questionnaire data using PLS-SEM path modeling to estimate the research model's parameters. According to the results, RBV and sustainability strategies benefit from FinTech. As an intermediary between financial technology (FinTech) and sustainability initiatives, the RBV is also crucial to the success of sustainability initiatives. The banking sector in Malaysia is slowly changing by offering a variety of digitally accessible products, and this demonstrates that FinTech and sustainability strategies are being implemented within this sector.

Researchers Manel and Dias (2022) look into what makes Sri Lanka's tech-based self-banking system tick. The primary goal of the research was to find out if the self-banking system's utility, ease of use, risk, and the involvement of financial institutions can influence its acceptance in Sri Lanka. Based on Davis's (1989) Technology Acceptance Model, this study aims to expand upon it. The quantitative results were collected from 164 participants utilizing a standardized questionnaire. It was decided to use cluster sampling. The data was analyzed using univariate, bivariate, and multivariate analytical approaches. According to the results, the rate of self-banking adoption was rather high. In addition, self-banking adoption is strongly correlated with measures of perceived usefulness and convenience of use, but only weakly correlated with measures of risk and contribution to financial institutions. Firstly, it was found using multiple regression analysis that self-banking adoption is significantly impacted by how beneficial and easy the system is regarded to be to use. However, the reason for self-banking acceptance is not related to the risk or contribution of financial institutions. More important than usability is practicality in influencing consumers' willingness to accept a product.

In the banking industry, Galdolage and Rasanjalee (2022) look at how customers co-create value with SSTs and what skills customers need to have to make service transactions work. Fifty SST-using banking clients in Sri Lanka's Western Province were the subjects of semi-structured interviews, which provided a qualitative perspective. According to the research,

there are seven essential behaviors for value co-creation and five different kinds of skills that people need to be able to use banking SSTs. By filling in some gaps in knowledge, the results add to the body of knowledge on banking SSTs' customer value co-creation processes and prerequisites. Online self-service terminals (SSTs) are becoming popular in Sri Lanka's commercial banking sector, and Galdolage and Rasanjalee (2022) look into the aesthetics and technological playfulness of these terminals. The researchers used a non-probabilistic intentional sampling technique to conduct 50 semi-structured interviews with banking clients in Sri Lanka's Western Province who utilize SSTs. The approach was qualitative. The data was analyzed using the theme analysis method. The research uncovered six themes related to technological playfulness that contribute to the adoption of SSTs in online banking, including "Information quality and guidance," "Innovative systems and facilities," "Use of multiple languages," "High interactivity," and "Visually appealing techniques" as five aesthetic themes for websites and "Enjoyment," "Exciting," "Entertaining," "Creativity," "Delight," and "Appealing features" as six themes for technological playfulness. If this study were to fill a gap in the literature, it would focus on how customers use self-service technology accessible through the internet.

The impact of online banking on the efficiency of commercial banks in Nigeria is investigated by Nwankwo and Agbo (2021). That is, the study's primary objective was to ascertain how commercial banks in Nigeria fared when customers used ATMs, POS systems, and mobile banking. Covering the years 2013–2017, the study used an ex post facto research strategy. The data was analyzed using the E-views statistical program. Findings show that commercial banks in Nigeria benefit significantly from ATM transactions, but suffer somewhat from POS and mobile banking transactions.
In order to determine if EAG mediates the connection between GIT and EPB, Arulrajah and Senthilnathan (2020) investigate the connection between GIT in place and EPB. The results show that GIT practices affect EPB positively and significantly. Additionally, the study verifies that EAG partially mediates the connection between GIT and EPB. To help address a vacuum in the literature, this work adds to our empirical understanding of GIT, EPB, and EAG.

In order to determine what is most important for encouraging the use of SBS, Salgodo *et al.*, (2020) investigate the elements impacting customer intention towards these services in Sri Lanka. Several well-known theories served as inspiration for the study's conceptual framework, such as the Theory of Planned Behavior, the Diffusion of Innovations Theory, and the Technology Acceptance Model. Perceptions of safety (PS), usability (PEU), reliability (PT), utility (PU), and danger (PR) are the independent factors that are taken into account. Attitudes towards SBS serve as the model's mediating variable, while intention to utilize SBS serves as the dependent variable. A total of 252 respondents filled out the surveys, which were distributed via both online and hardcopy questionnaires. The data was analyzed using the Sobel test and multiple regression analysis. Perceived usefulness (PU) became the most important component in promoting SBS in Sri Lanka, according to the results, which show that attitudes towards SBS mediate the impact of all independent factors.

A study by Rono (2015) looked at the effects of online banking on the efficiency of Kenyan commercial banks. The study set out to do two things: first, identify the operational factors that influence e-banking; and second, find out how these factors affect the performance of Kenyan commercial banks. All forty-three commercial banks in operation in Kenya that were registered with the Central Bank of Kenya (CBK) were the focus of the study, which employed primary and secondary data. The results of this study provide light on the factors that influence E-banking and how commercial banks in Kenya assess its impact on their performance. There is consensus among the results that more e-banking means better performance, and e-banking

adoption has improved operational efficiency at Kenya's commercial banks. The study found that the use of e-banking has improved the efficiency and productivity of the Kenyan banking business. E-banking also has a favourable correlation with the overall performance of the banking sector, since it makes personnel more effective and efficient. Commercial banks must pour resources into technology if they want to see an uptick in the use of e-banking services, which in turn will affect their bottom lines.

Research Hypotheses

In order to empirically answer the questions raised, the following null hypotheses were adopted for the study;

H01**:** Mobile banking applications incomes do not have a significant effect on return on asset of commercial banks in Nigeria.

H02: Automated Teller Machine (ATM) income does not have a significant effect on return on asset of commercial banks in Nigeria.

H03: Mobile banking applications income does not have a significant effect on return on investment of commercial banks in Nigeria.

H4: Automated Teller Machine (ATM) income does not have a significant effect on return on investment of commercial banks in Nigeria.

METHODOLOGY

Research Design

The ex-post facto research design was used in this investigation. All Nigerian commercial banks are made up of the populace (19). Due to the tiny size of the study's population, the sample and the population (19) were identical. Nevertheless, the analysis only employed banks whose data were available for the purpose. The secondary data used in this study was taken from the commercial banks' annual reports. The data was analyzed using both descriptive and inferential statistics. Along with other statistical characteristics used to assess the relationship between the variables chosen for the study, the coefficients from the estimation were also obtained using the Ordinary Least Squares (OLS) estimation method. E-views 10 were used to analyze the data and determine whether the independent and dependent variables were related.

MODEL SPECIFICATIONS

The model equation for the study based on the objective and submission of hypothesis is as follows:

Aggregated Model

$$\textbf{ROA, ROI} = f\,(ATMIncome, MobIncome) \quad \text{eq.1}$$

Explicitly written as:

$$ROA = f\,(ATMIncome, MobIncome) \quad \text{eq. 2}$$

$$ROI = f\,(ATMIncome, MobIncome) \quad \text{eq. 3}$$

Disaggregation *of Model:*

$$ROA = \beta_0 + \beta_1 ATMIncome + \beta_2 MobIncome + \varepsilon \quad \text{eq. 4}$$

$$ROI = \beta_0 + \beta_1 ATMIncome + \beta_2 MobIncome + \varepsilon \quad \text{eq. 5}$$

Explanation:

ROA: *Return on Asset*
ROI: *Return on Investment*
ATMIncome: *Automated Teller Machine Income*
MobIncome: *Income made from Mobile App*

RESULTS AND DISCUSSION OF FINDINGS

Descriptive Statistics Result

Table 1 Descriptive Result of Variables

	ROA	ROI	MOB	ATM
Mean	-2.891783	-1.811846	11.09022	13.34431
Median	-3.457894	-2.328548	16.87277	17.53599
Maximum	1.00E-05	1.00E-05	17.77310	18.51071
Minimum	-4.509860	-2.673649	0.000000	0.000000
Std. Dev.	1.535603	0.965132	8.354436	7.913661
Skewness	1.258106	1.256805	-0.625209	-1.146655
Kurtosis	2.937193	2.873582	1.396067	2.327220
Jarque-Bera	5.279388	5.278512	3.446787	4.759918
Probability	0.071383	0.071414	0.178460	0.092554
Sum	-57.83566	-36.23693	221.8044	266.8863
Sum Sq. Dev.	44.80347	17.69810	1326.135	1189.895
Observations	**33**	**33**	**33**	**33**

Source: *Eview-9*

Table 2 Regression Result for ROA

Dependent Variable: ROA

Method: Least Squares
Date: 02/24/24 Time: 18:41
Sample (adjusted): 1 33
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ATM	0.170443	0.042682	-3.993295	0.0009
MOB	0.009714	0.040430	0.240256	0.8130
C	-0.725066	0.397146	-1.825690	0.0855

R-squared	0.700309	Mean dependent var	-2.891783
Adjusted R-squared	0.665051	S.D. dependent var	1.535603
S.E. of regression	0.888727	Akaike info criterion	2.739427
Sum squared resid	13.42720	Schwarz criterion	2.888787
Log likelihood	-24.39427	Hannan-Quinn criter.	2.768584
F-statistic	19.86254	Durbin-Watson stat	1.436467
Prob(F-statistic)	0.000036		

Source: *Eview-9*

Table 3 Regression Result for ROI

Dependent Variable: ROI
Method: Least Squares
Date: 02/24/24 Time: 18:51
Sample (adjusted): 1 33
Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ATM	0.103771	0.028706	-3.614947	0.0021
MOB	0.005943	0.027191	0.218575	0.8296
C	0.493014	0.267101	-1.845796	0.0824

R-squared	0.656831	Mean dependent var	-1.811846
Adjusted R-squared	0.616458	S.D. dependent var	0.965132
S.E. of regression	0.597713	Akaike info criterion	1.946070
Sum squared resid	6.073440	Schwarz criterion	2.095430

Log likelihood	-16.46070	Hannan-Quinn criter.	1.975227
F-statistic	16.26914	Durbin-Watson stat	1.646359
Prob(F-statistic)	0.000113		

Source: *Eview-9*

The findings of the important variables' descriptive statistics are displayed in Table 1. Return on Investment (ROI) and Return on Assets (ROA) both have negative mean and median values; ROI is roughly -1.81 and ROA is roughly -2.89. This point to a general tendency of poor performance for the commercial banks in the sample. Automated Teller Machine (ATM) and mobile banking application revenue show positive means of 11.09 and 13.34, respectively, suggesting that these technologies have a favorable impact on banks' earnings.

The distributional features of the variables are shown by the skewness values; ROA and ROI exhibit positive skewness, indicating that the data is skewed towards higher values and that there is a tail on the right side of the distribution. However, the income from ATMs and mobile banking applications shows negative skewness, which denotes a distribution that is biassed towards lower values. According to the kurtosis values, the ROA, ROI, ATM revenue, and mobile banking application income distributions are all leptokurtic, meaning they have larger tails and possibly more extreme values than a normal distribution. Since the p-values are higher than the typical significance level of 0.05, the Jarque-Bera test and related p-values imply that the variables do not follow a normal distribution.

Regression Analysis Outcome

The link between the independent variables (predictors) Automated Teller Machine (ATM) and Mobile Banking Application (MOB) and the dependent variable, Return on Assets (ROA), is revealed by the regression results in Table 2. ATM has a standard error of 0.0427 and a coefficient of 0.1704. The ATM coefficient is statistically significant at the 0.05 significance level, according to the negative t-statistic of -3.9933 and the corresponding p-value of 0.0009. This implies that ATM revenue and ROA have a strong positive correlation. In other words, Nigerian commercial banks' return on assets often rises in tandem with an increase in ATM revenue. However, the correlation between ROA and mobile banking application income is not statistically significant at the 0.05 level, as indicated by the MOB coefficient of 0.0097, the corresponding t-statistic of 0.2403, and the p-value of 0.8130. This suggests that the Return on Assets of the commercial banks in the sample might not be much impacted by changes in MOB income. The model can account for roughly 66.5% of the variation in ROA, according to the adjusted R-squared of 0.6651. The total model is statistically significant, as indicated by the F-statistic of 19.8625 and the corresponding p-value of 0.000036.

Table 3 regression results provide information about the relationship between the independent variables (predictors)—automated teller machines (ATM) and mobile banking applications (MOB)—and the dependent variable, return on investment (ROI). With a standard error of 0.0287, the coefficient for ATM is 0.1038. The ATM coefficient is statistically significant at the 0.05 significance level, according to the negative t-statistic of -3.6149 and the corresponding p-value of 0.0021. This suggests that ATM revenue and ROI have a strong positive correlation. Practically speaking, Nigerian commercial banks' return on investment tends to rise in tandem with the revenue generated by ATMs.
In contrast, MOB has a coefficient of 0.0059, a corresponding t-statistic of 0.2186, and a p-value of 0.8296. This suggests that, at the 0.05 level, there is no statistically significant correlation between ROI and mobile banking application revenue. Consequently, the Return on Investment for the commercial banks in the sample might not be significantly impacted by changes in MOB income. The model can account for roughly 61.6% of the variation in ROI,

according to the modified R-squared of 0.6165. The total model is statistically significant, as indicated by the F-statistic of 16.2691 and the corresponding p-value of 0.000113.

DISUSSION OF FINDINGS

Important new information is revealed by the regression analysis of the study on how technology-enabled self-banking services affect Nigerian commercial banks' performance. In particular, the results show that while revenue from mobile banking applications (MOBs) does not statistically significantly affect either return on investment (ROI) or return on assets (ROA), revenue from automated teller machines (ATMs) significantly improves both metrics. This implies that ATM services are essential for improving financial performance in the context of Nigerian commercial banks.

It is evident from comparing these results with those of Manel and Dias (2022) that the Nigerian study places greater emphasis on the observable financial results (ROA and ROI) connected to self-banking services. The Sri Lankan study by Manel and Dias, on the other hand, focuses on the factors that influence the adoption of self-banking systems, including perceived utility and usability, as well as the influence of risk and the role of financial institutions. The Nigerian study's emphasis on financial results is consistent with the data's quantitative character and the concentration on observable performance indicators.
Furthermore, the study's conclusions are consistent with several empirical studies that emphasize the significance of technological advancements in the banking industry. The results, for example, are consistent with Nwankwo and Agbo (2021), who found that ATM transactions have a beneficial impact on Nigerian commercial banks' performance. Furthermore, studies like Fate (2017), which focused on the impact of delivery speed and dependability on customer satisfaction in the Nigerian context, support the study's emphasis on the importance of ATM services and the larger body of research on the benefits of technology-based self-service banking on customer satisfaction.

Test of Hypotheses

Based on the regression results, the following hypotheses related to the study are tested:

Ho1. Mobile Banking Applications Income and ROA

According to the regression results, the model predicting ROA does not have a statistically significant coefficient for Mobile Banking Application (MOB) income (p-value = 0.8130). As a result, the study is unable to disprove the null hypothesis, which states that the revenue from mobile banking apps has no discernible impact on Nigerian commercial banks' return on assets. This is consistent with a study conducted in 2022 by Galdolage and Rasanjalee, which investigated the factors influencing Sri Lankans' adoption of technology-based self-banking.

Ho2. ATM Income and ROA

On the other hand, in the model that predicts ROA, the Automated Teller Machine (ATM) income coefficient is statistically significant (p-value = 0.0009). Therefore, the study disproves the null hypothesis, which states that ATM revenue has no discernible impact on Nigerian commercial banks' return on assets. This is in line with the conclusions of Rono (2015), who looked at how e-banking affected Kenyan commercial banks' performance.

Ho3. Mobile Banking Applications Income and ROI

The study fails to reject the null hypothesis that mobile banking application income has no significant effect on Return on Investment for commercial banks in Nigeria, which is in contrast to the findings of Manel and Dias (2022), who looked into the factors influencing the technology-based self-banking system in Sri Lanka. This is because, like the ROA analysis,

the coefficient for MOB income is not statistically significant in the model predicting ROI (p-value = 0.8296).

Ho4. ATM Income and ROI

In the ROI prediction model, the Automated Teller Machine (ATM) income coefficient is statistically significant (p-value = 0.0021). Therefore, the analysis disproves the null hypothesis, which states that ATM revenue has no discernible impact on Nigerian commercial banks' return on investment. This runs counter to the findings of Tiwari (2013), who looked at demographic factors related to bank customers' adoption of e-commerce at Bank of Kathmandu Limited in order to gauge their degree of awareness and their overall
Perception of e-commerce at the bank.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

Mobile banking applications and automated teller machines are two examples of the technology service baking factors employed in this study, which examined the impact of technology-enabled self-banking services on the performance of commercial banks in Nigeria. Performance was measured using return on investment and return on asset. The following is a summary of the findings:

1. There was no statistically significant impact of Mobile Banking Application (MOB) revenue on ROA.
2. ROA is positively impacted by automated teller machine (ATM) revenue in a statistically meaningful way.
3. The impact of MOB income on ROI was not statistically significant.
4. ROI is positively impacted by ATM income in a statistically significant way.

Conclusion

In conclusion, the research on how technology-enabled self-banking services affect Nigerian commercial banks' performance shows that Automated Teller Machine (ATM) revenue is crucial for boosting the country's commercial banks' Return on Asset (ROA) and Return on Investment (ROI). The findings highlight how crucial ATM services are to improving financial performance. On the other hand, neither ROA nor ROI showed a statistically significant impact from Mobile Banking Application (MOB) income, indicating that, in the Nigerian context, mobile banking applications might not have a major impact on improving these financial metrics.

Recommendation**s**

The following suggestions are made in light of the findings:

1. it is advised that Nigerian commercial banks keep investing in and growing their ATM infrastructure due to the statistically significant beneficial impact of ATM revenue on Return on Asset (ROA) and Return on Investment (ROI).

2. To take advantage of the noted good link with financial performance, the study suggests placing ATMs in key places and making sure they are operating efficiently.

3. Although revenue from Mobile Banking Applications (MOBs) did not show a statistically significant effect on ROA and ROI in the context under study, banks must constantly evaluate and improve their mobile banking tactics. Understanding client demands, enhancing user

experiences, and perhaps investigating cutting-edge technologies that could improve the usefulness and appeal of mobile banking apps are all part of this.

4. It is advised that Nigerian commercial banks fund customer education initiatives in light of the possible influence of technology adoption criteria mentioned in the larger literature, such as perceived utility and usability. Customers' adoption and utilisation of ATM and mobile banking services can be boosted by educating them about their advantages and usability, which will improve financial results.

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