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## Financial Innovation and Return on Assets of Listed Deposit Money Banks in Nigeria

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### **Abstract:**

*The return on assets as a measure of financial performance in the listed deposit money banks (DMBs) in Nigeria is not only of interest to the management team of the DMBs but also to the general stakeholders. However, the DMBs in Nigeria had experienced poor return on assets culminating into corporate failures which has led to the liquidation, merger and outright revocation of licenses of many DMBs by the Central Bank of Nigeria. Previous studies have reported inconsistencies of the influence of financial innovation on return on assets of DMBs and there have been fewer studies in this regard, especially in developing economies like Nigeria. This study thus reviewed the effect of financial innovation on return on assets of listed DMBs in Nigeria.*

*The ex-post facto research design was adopted for the study with the study population of thirteen (13) listed deposit money banks (DMBs) in Nigeria as of 31<sup>st</sup> December 2020. The purposive sampling technique was used to sample 12 listed DMBs. The period of study covered eleven (11) years (2010-2022). Validated data which were sourced from the audited published annual reports of the DMBs were used. The study employed descriptive and inferential (multiple regression) statistics to analyze the data at 5% level of significance.*

*The study found that financial innovation (FI) had significant effect on return on assets ( $Adj.R^2 = 0.05$ ;  $F(5,11) = 254.96$ ;  $p < 0.05$ ).*

*The study concluded that financial innovation (FI) was a strong determinant of return on assets. The study recommended that the management of the DMBs should invest more in financial innovation products with appropriate police and processes put in place to ensure adequate return on assets.*

**Keywords:** Corporate performance, Financial Innovation, return on assets

### **1. Introduction**

The financial performance of the banking sector is of importance not only to the management of the banks, but also to the shareholders and the general stakeholders at large. Investment in innovation without good return on the investment makes the survival of the banks both in the short and in the long run to become difficult. This view was echoed by Amos, Umar, Busari, Ekpe Mary-Jane (2020) when they opined that the financial performance of an organization is essential for its survival both in the short and in the long run. Adigun and Okedigba (2017) submitted that without stable return on assets from the banking sector investments, satisfying the interests of the various stakeholders may become impossible and this is because financial performance is at the core of meeting the needs of these stakeholders.

Adigun and Okedigba (2017) went further by positing that without good return on assets by the banking sector, the wealth of the shareholders cannot be maximized and the equity holders will not be able to get any returns on their investments. Hence, the going concern of the banks may become threatened. The banking sector in Nigeria had experienced poor financial performance problems proxy by return on assets (ROA) as far back as the year 1930 during which major banking failures were recorded. The problem of poor return on assets in the Nigeria banking sector resulting in bank failures was brought to a head in 2009 when the joint investigation of the Nigerian Deposit Insurance Corporation and the Central Bank Nigeria into the books of the 25 mega banks revealed that some of the banks were technically insolvent on account of capital inadequacy, poor credit risk management, liquidity and lack of corporate governance occasioned by insiders' dealings by the management of the banks (Sanusi, 2009). This investigation led to the taking over of 9 (Nine) banks by the CBN and the suspension of the management of these nine banks (Adeyemi, 2011). According to Ugoani (2015), all the failed 9 (Nine) banks had exceeded their credit ceilings through unauthorised lending, over exposure to non performing loans, micro-financial credit risk abuses that were estimated to be in excess of N700billion.

It has been argued (Sanusi, 2009, Augusto and Co., 2020, and Nwanji, *et al*, 2020) that over-exposure to non-performing loans by the banking sector is one of the factors responsible for poor return on assets by the banking sector and by extension leading to poor performance. According to Nwanji, *et al* (2020), in the year 2020 alone, about 22 commercial banks in Nigeria restructured N7.8trillion worth of loans out of a total N19.9trillion for some 35,640 customers. This posed a serious problem to the DMBs in their quest to provide adequate returns upon which their performance ratings were based. Hence, impaired loans written off eroded the profitability of the DMBs and as such, the management of the banks would not be able to have good returns of assets, (Marshall, 2017). The banks have lost income to bad loans written off because of the inability of the borrowers to pay the loans (CBN, 2020).

Interestingly, the banking sector in the advanced countries, have become technological driving in their quest to improve their financial performances viz ensuring that they earn good returns on the assets. Hence, to overcome the challenges arising from loss of income due to unpaid or restructured loans, financial innovation has become a verifiable tool through which fees, commission and income can be earned to improve the profitability of the banks in Nigeria (Latorre, 2020).

In Great Britain, it was reported that the banks have faced a sizeable slump in bank branch visits by around 30% in the last three years, while the USA has recorded a drop of cashier transactions by as much as 45% in the period 1992-2013 (FDIC, 2014). It is estimated that in the North American market only, universal banks would lose about 35% of their market share by 2021 to technology competitors, fin-tech, new market players who use the Internet and mobile technologies to create new, more superior banking products and services, in case they fail to modernize their existing business model (Accenture, 2013). A survey carried out by Price Water Coopers (2020), showed that most (88%) global financial institutions were concerned they would lose revenue without incorporating emerging innovations and without partnerships with fintechs (Galvin, 2018).

Bhutani and Wadhvani (2018) stated that the estimated size of the digital banking market was over US\$7 trillion in 2017 and the anticipated growth will be over US\$9 trillion by 2024. Schmith, Vincent and Perera (2018) added that the financial technology companies (fintechs) are set to disrupt revenue worth \$4.7 trillion of global financial services. They stated further that, in an increasingly globalized world, financial innovations have been gaining ground. According to Accenture (2015), investments into newly established innovative fin-tech companies have been growing significantly, from 4 billion USD in 2013, to 12.2 billion USD in 2014. In 2019, the global fin-tech investment increased to \$137.5 billion (Frankel, 2020). This could pose a threat to the financial performance proxy by return on assets of the traditional banking sector if the traditional banks do not embrace innovation fully to support financial performance.

Wewege, Lee and Thomselt (2020) submitted that the Asia Pacific banks led the market with over 60% revenue share owing to rapid adoption of digital payment services in China and India. This is so in the Asia Pacific banks because of the growing population of younger generation, existence of telecommunication infrastructure, growth of e-commerce industry and the governments support towards digital transactions.

This is because, technology has virtually taken over business activities in the 21st century, and banking sector that plays a major role in the economic development of a nation is not an exemption of the innovation orchestrated by this phenomenon (Adeku, 2020). It is estimated that by 2021, more than half of the banks' new revenues in Scandinavia, Great Britain and Western Europe will be generated from online/digital channels while banks who are late and slow to adopt financial innovation will have their profits be under threat by up to 36% in the next three years (Rajagiri, 2020).

In Africa, according to Tam and Oliveira (2016), the technology-based applications such as mobile banking, internet banking, and Automated Teller Machine (ATM), Point of Sale Purchase (POS), block chain, and App store provide clients of financial institutions an edge in the conveyance of subsisting products. The induction of technology-based applications has greatly improved the Africa financial sectors financial performance positively (Jinquin, Yink, Kaodui & Osei-Assibey, 2019). Since the emergence of the stated technology-based applications in Africa, it has caused the dependence of branches to dwindle.

Today, the advent of COVID-19 pandemic has further brought about a paradigm shift in the ways things are done in all facets of life (Philip, 2020). More importantly, the pandemic has placed limitations on the traditional ways of transacting businesses across the globe. According to a study by Global Fintech Regulatory Rapid Assessment (GFRRRA) (2020), the COVID-19 pandemic has increased the prioritization of financial innovation technology among financial institutions worldwide. The pandemic has therefore accelerated the digitization of everything from education to the workplace. The banking sector is no exception to this (GFRRRA, 2020). Hence, in principle, financial innovation, and particularly credit risk- shifting instruments has the potential to shift risk optimally to those who are able and willing to absorb it (Llewellyn, 2009). Financial innovation is used by banks as a strong strategic tool to outstrip the competition and has become an essential means for the bank to improve its performance and to maintain its effectiveness on the market (Batiz-Lazo & Woldesenbet, 2006).

Looking at studies on financial innovation across the globe, it is evident that enhancing financial performance and reducing operational cost form the main purpose of innovation. In Ghana, according to Joshua (2010), the deployment of financial innovation products has enhanced the financial performance of the banking sector and customer as well, customers are efficiently served and profit motive of banks enhanced. In Kenya, Muiruri and Ngari (2014) opined that the stiff competition and the compression of the interest rates, had forced banks to set up and put into effect all necessary decisions that supported financial innovation. This enabled them to dynamically plan new locations, evaluated their financial performance, forecast customers' attitude to new offered products and services, estimate clients' switching behavior, and finally provided marketing support to their geographically separate branches.

Financial innovation largely remains an area that is yet to be fully embraced by the banking sector in Nigeria. This is despite the fact that the future of bank financial performance may lie on fees and commission received from the

products of financial innovation as the world is gradually moving toward virtual banking. This is because of the percentage of younger population in Nigeria.

The Nigeria population estimated to be around 200million populace according to the National Bureau of Statistics (NBS) (2019) with 41.4% (82.26million people) of it accessed the internet through the mobile phone device in the year 2020 alone. According to Statista Research Department (RSD) (2020), financial innovation remains largely an untapped source of fees and commission to the Nigerian banks with the provision of efficient financial innovation services. This figure is projected to grow to 64.9% by the year 2025 (Statista Research Department, 2020).

However, despite of the importance of sustaining the performance of the banking sub-sector in Nigeria, studies solely focusing on financial innovation and return on assets of listed DMBs in developing economies particularly Nigeria using the three metrics of financial innovation seem to be very limited and scarce. More importantly, majority of the few studies carried out in this respect were foreign.

For instance, Simiyu and Tobias (2018), study was on the effect of financial innovation on financial performance: "a case study of deposit-taking savings and credit cooperative societies in Kajiado County". Muiri and Ngari (2016) examine the effects of financial Innovations on the financial performance of commercial banks in Kenya using limited questionnaire. Jingqin, Yink, Kaodui and Osei-Assibey (2019) study was on the impact of financial innovation on financial performance: Evidence of electronic banking in Africa. Mugane and Ondigo (2016) study was on the effect of financial innovation on the financial performance of commercial banks in Kenya.

These studies have gaps ranging from methodological, theoretical and time gaps. The very few studies carried out in Nigeria such as Nkem and Akujinma (2017) that examined financial Innovation and efficiency of the Banking Sub-sector: The case of Deposit Money Banks and selected instruments of electronic banking (2006-2014) also suffered from methodological gap. The study, Nkem and Akujinma (2017), made use of questionnaire that was opinion based to measure the research variables measuring past activities. In addition, the study made use of only a metric of financial innovation (product innovation) as the explanatory variable in the study, thus, suffered variable gap.

Base on the above-identified gaps, conflicting findings from the previous studies that the study therefore, focuses on the effect of financial innovation on return on assets (ROA) of listed Deposit Money Banks in Nigeria.

### 1.1. Statement of the Problem

The healthiness of a nation's economy depends largely on the stability of its financial sector (Kanu & Nwali, 2019). The financial crisis of 2008 had put the global economy in disarray. The globalization of the economy thus made every country suffered the impact of the global financial crisis and some have not survived it (The United Nations Conference on Trade and Development, 2009).

The problem of poor return on assets vis the financial performance in the Nigerian banking sector from inception has become the concern of everybody. This is because, when the banking sector is not performing effectively, the wealth of the shareholders cannot be maximized, the equity holders will not be able to get any returns on their investments and the return on assets would be poor. (Adigun & Okedigba, 2017).

According to Marshal (2017), the first bank failure due to poor return on assets vis financial performance was recorded in Nigeria in the year 1930 when Industria and Comercial Bank Limited was closed. Between the year 1936-1968, according to the Central Bank of Nigeria (CBN) Economic and Financial Review report ( 1968), a total of 20 (twenty) banks failed and were closed due to poor financial performance occasion by assets value erosion. Marshall ( 2017) stated that the failure of these banks led to the loss of millions of investments by the investors, customers deposits were lost and shareolders' value was completely eroded.

The problem of return on assets in the Nigeria banking sector resulting in bank failures was brought to a head in 2009 when the joint investigation of the NDIC and CBN into the books of the 25 mega banks revealed that some of the banks were technically insolvent on account of capital inadequacy, poor credit risk management, liquidity and lack of corporate governance occasioned by insiders' dealings by the management of the banks ( Sanusi, 2009). This investigation led to the taking over of 9 (Nine) banks by the CBN and the suspension of the management of these nine banks ( Adeyemi, 2011). According to Ugoani (2015), all the failed 9 (Nine) banks had exceeded their credit ceilings through unauthorised lending, over exposure to non performing loans, micro-financial credit risk abuses that were estimated to be in excess of N700billion.

Additionally, over exposure to non-performing loans has been seen as one of the reasons for poor performance of the DMBs in Nigeria leading to failures and revocation of licenses of some banks by the CBN (Sanusi, 2009). According to a report by Augusto and Co. (2020), Nigeria DMBs have recorded high loan portfolio with increase in non-performing credits in which case the principal amount borrowed cannot be recovered as well as the interest elements. Between 2016- 2020, the DMBs in Nigeria have collectively written off about N1.9trillion worth of impaired loans (Augusto & Co., 2020).

Furthermore, rigid government policy and regulation has also been seen as one of the factors leading to poor return on assets of the DMBs in Nigeria (Martins, 2016). According to Nweze (2016), the introduction of the Treasury Single Account (TSA) by the Nigerian government in 2012 but which became operational in 2015 where all financial inflows from government agencies which had hitherto been passing through the DMBs are now consolidated into a single account at the Central Bank of Nigeria has been perceived to drain the liquidity of the bank, reduces the interest accruable to the banks from the deposits emanating from the public sector (CBN, 2016). According to Martins (2016), an estimated N374bn interest income would have been earned had the N2.67trillion public funds transferred to the CBN by the DMBs been invested in treasury bills by the DMBs. The mopping of public funds from the DMBs had reduced the liquidity of the DMBs and funds available for investment purposes (Martins, 2016). This has created performance issue to the DMBs.

In addition, another problem leading to the erosion assets of the banks in Nigeria is the activity of fraudsters. Rafidah, Nafsiah, and Ayub (2017), opine those frauds have become an issue and source of discouragement in the adoption of financial innovation platforms by a section of the populace leading to loss of income by the banks. The Nigeria Deposit Insurance Corporation (NDIC) report for the year 2018 revealed that Card-related frauds (ATM/POS) constituted the major fraud cases reported in the year. Losses arising from frauds are being written off against the profit of the DMBs, thereby depriving the shareholders from getting returns on their investments, the DMBs would not be able to have adequate return on asset as well as on equity with the attendant negative effect on the market valuation of the DMBs. Malik, Teal and Baptist (2006) and Onodje (2020) stated that the other major constraints to performance of banks in Nigeria are corruption, loose importation of product, insufficiency assessment of credit, poor infrastructure, rising costs of doing business and lack of investment in human capital.

### 1.2. Objective of the Study

The main objective of this study is to examine the effect financial innovation on the financial performance of listed Deposit Money Banks (DMBs) in Nigeria. And specifically, to evaluate the effect of financial innovation on return on assets of listed deposit money banks (DMBS) in Nigeria.

### 1.3. Hypothesis

The hypothesis tested in the study was:

- H<sub>0</sub>1: There is no significant effect of financial innovation on return on assets (ROA) of listed Deposit Money Banks (DMBs) in Nigeria.

## 2. Literature Review

### 2.1. Conceptual Review - Return on Assets (ROA)

Return on Assets (ROA) is a measure of firm's performance that provides relevant information to the stakeholders of the DMBs through the annual published audited financial statement of how well a company uses its assets to generate income. The ROA shows the ability of the bank's management to generate revenue by utilizing bank assets at their disposal. It also shows the efficient use of the resources of the company in creating income. A higher ROA means a higher level of firm performance. The use of ROA in measuring financial performance of a firm has been adopted by a variety of researchers. Some of the researchers that adopted this measure in their empirical studies is Orumo (2018).

In this way, it can be said that ROA is the most commonly used industry investigator as a proportion of the firm's performance. ROA is a measure based on accounting. It expresses 'the capacity of the company to produce accounting profits based on actual costs for a given arrangement of capital calculated as amortized authentic costs' and offers experience on the Board's ability to do well with the assets (Carter & Easton, 2016; Dharmadasa, Gamage & Herath, 2014).

ROA is important to the decision of the executives on the criteria for the valuation of resources (Rose, 2007). Warrad and Omari (2015), submitted that most professional analysts and investors tend to focus on return on asset as their primary measure of firm performance. They opined further that ROA is a better metric of financial performance than income statement profitability measures like return on sales. The ROA clearly takes into account the assets used to support business activities. It determines whether the company is able to generate an adequate profit on its assets rather than simply showing ROS.

The ROA was calculated in this study as:

ROA = Profit before Interest and Tax Divided by Total Asset (Mugane & Ondigo, 2016; Jingin, Kaodui & Osei-Assibey, 2019; Ogutu & Fatoki, 2019; Ibekwe & Ojukwu, 2021).

### 2.2. Automated Teller Machine

Historically, Nigeria joined the countries using ATM following the installation of the first ATM by National Cash Register (NCR) for the defunct Society Generale Bank in 1987 (Jegade, 2014). According to Adeoti (2013), the defunct Society Generale Bank (SGBN) was the first Nigerian bank to introduce ATM for their customers. SGBN had "Cash Point 24" as the trade name for the new introduced ATM that was the only ATM in operation at that time in Nigeria. First Bank of Nigeria was the next bank in Nigeria to introduce the use of ATM to its customers in December 1991.

This study conceptually defined Automated teller machine (ATM) as an electronic banking machine that accepts and dispenses cash, allows bank customers to perform other banking services with use of a credit card or debit card, registered mobile phone or through the use of thumb printing without the aid of the bank's teller or representative.

### 2.3. Internet Banking Innovation

Siyanbola (2013) defines internet banking to involve conducting banking transactions on the internet using electronic tools such as the computer without visiting the banking hall. E-commerce is greatly facilitated by internet banking and is mostly used to effect payment. Commonly used internet banking transactions in Nigeria are settlement of commercial bills and purchase of air tickets through the websites of the merchants.

The full acceptance of internet banking in Nigeria has been plagued by frauds. Kolapo and Olaniyan (2018) opined that the banking sector is plagued with an increasing complaint of fraud, which is a contributor to the operational risk of a business and discourages the banking populace from adopting internet banking fully. Hence, the management of the banks have a lot to do in diffusing the financial innovation to the society in order to enhance full adoption by the Nigerian banking populace.

Internet banking innovation is therefore defined as the use of internet facilities to facilitate business relationships between the organization, its customers and other stakeholders. In this wise, internet banking innovation accords the customers of the banks to carry out banking transactions in the conveniences of their homes at a fee-based commission to the banks.

#### *2.4. Agency/Point of Sale (POS) Banking Innovation*

Agency banking is an alternative distribution strategy in which traditional retail banking use authorized agents to expand the reach of the branch network. It is generally seen as a better way to reach more people, more locations and to enhance financial inclusion. Kithaka (2017) and Kasekende (2018) believe that agency banking represents essential opportunities that reduce transaction costs.

In a study conducted in 2018 by Enhancing Financial Innovation and Access (EFInA), 65% of Nigerians responded that affordability barriers, such as irregular income and the cost of maintaining a banking account have discouraged them from formal banking institutions. Furthermore, the report states that a quarter of the respondents responded, "banks are too far".

According to EFInA (2018), there were only 8000 bank branches in the country of over 200million people, and most branches are concentrated in the cities. Also, According Abubakar (2021), the total number of agents under the agency banking in Nigeria increased by 517% between 2017 and 2019. This view was also supported by the study of Watiri (2013), where he found that low transaction cost through agency banking had a positive impact on financial performance of Kenya commercial banks.

#### *2.5. Mobile Banking Innovation*

This involves the use of mobile phone for settlement of financial transactions. This is more or less fund transfer process between customers with immediate availability of funds for the beneficiary. It uses card infrastructure for movement of payment instructions as well as secure SMS messaging for confirmation of receipts to the beneficiary.

The mobile banking innovation is one area the Nigerian banking sector can continue to improve in order to improve income generated from fee-based commission from the use of mobile phones to transact banking businesses. According to a report from Data Reporter survey carried out in the year 2020, It was stated that there were 169.2million mobile connections in Nigerian in January, 2020. This figure was an increase by 7.7% from the previous figure in January, 2019. Hence, it grew by an additional 12million new mobile connections. Data Reporter (2020), hence, concluded that the number of mobile connections in Nigeria in the year 2020 was equivalent to 83% of the total population. The high level of mobile connections in Nigeria presents a very great opportunity for the Nigeria banking sector to improve performance through generating more revenue by ensuring more inclusion of the banking platform via the mobile banking innovation.

#### *2.6. Real Time Gross Settlement Innovation*

The term real-time gross settlement (RTGS) refers to a funds transfer system that allows for the instantaneous transfer of money and/or securities. This institutional innovation was developed to cover the inadequacy of the cheque clearing system. The RTGS is used for real time online fund transfer, used for high value transactions, it is safe and secure, it is reliable and backed by the RBL, it is for immediate clearing, funds are credited on a one-on-one basis and transactions are executed on an individual, gross basis. Upon completion, RTGS bank transfers are final and irrevocable, and in most of the world, RTGS systems are run by central banks.

In this study, real-time gross settlement (RTGS) innovation system is conceptually defined as a fund transfer system that allows one to transfer money or securities immediately.

#### *2.7. Theoretical Framework*

##### 2.7.1. Schumpeter Theory of Innovation

Joseph Schumpeter developed the theory, Schumpeter theory of financial innovation in 1928. The Schumpeter theory assumes that technological progress emanates from innovations initiated by firms in pursuit of profits. The model was premised on three propositions. The theory asserts that technology creates opportunities for new profits and super profits because of increased investment by companies on innovation.

Critics of Schumpeter theory of financial innovation however believe that for all the propositions of Schumpeter on the role of innovation, he failed to really explain the genesis of innovation. Thus, it gave room for Keynesian economics to argue that levels of investment were the cause of innovation. It was not until the 1960s that economists would begin again to search for the source of innovation. Critic of also argued that Schumpeter regard of innovation as the main cause of economic development is untrue. They believe that this view is far from reality because economic development of a country does not depend on innovations only but also on many economic and social factors.

Researchers such as Mugane and Ondigo (2016), Nkem and Akujinma (2017), Ibekwe (20210), and Effiom and Edet (2020) did not only support the assumptions of the theory but also adopted the Schumpeter theory of financial innovation as the basis for their studies.

This theory is vital to this study because for DMBs in Nigeria to remain competitive in the ever-changing financial institution dynamics and to manage the risk of extinct from the industry, then continuous innovation is vital for them to continue to perform financially.

### 2.7.2. Diffusion Innovation Theory

The members of the society tend to adopt innovation with a view of making informed decisions. Innovations are very instrumental in the attainment of development and sustainability and therefore should be adopted by firms to enhance financial performance of organizations. In addition, Tidd (2006) was of the opinion that through technological development and network effect, new financial innovation diffuses to other competing organizations. The theory further opines that not all individuals and firms adopt a technological development or a new product at the same time, but it spreads over time and upon introduction, the product is marketed to gain larger market share.

The theory was developed by E. M Rodgers in 1962. He sought to explain the manner in which financial innovations and ideas were passed across the populations in a society through market or non-market channels or just through an organization.

This theory is relevant to the study because the general adoption and acceptability of innovation by the society is paramount to the financial performance of the organization. Hence, the DMBs in Nigeria must strive to create strong awareness on the acceptability of their financial innovation products so as to achieve profit-maximization and good return on assets.

### 2.8. Theoretical Framework

The study was underpinned by the Diffusion Innovation Theory and Schumpeter Theory of Innovation. This is because these theories advocated for firms' adoption of innovation as a means to reduce cost, increases acceptance by the stakeholders and maximize profits.

### 2.9. Empirical Review

#### 2.9.1. Financial Innovation and Return on Assets

In a bid to improve bank performance given the income that can be generated from the provision of virtual banking services all over the world, various studies have been carried out by many researchers in this respect.

In a study carried out by Oyewole, Mohammed, El-maude, & Arikpo (2013) on electronic banking and bank performance, they employed the use of judgmental sampling in selecting only four Nigerian banks for the study. The study considered pre-adoption of e-banking between the years 1997-2002 and the year 2003 to 2010 for post-full adoption years of electronic banking in Nigeria with the use of quantitative methodology. The study found that there is no significant difference between pre and post returns on assets (ROA) of Nigeria banks on adoption of e-banking. This implies that the adoption of electronic banking by Nigerian banks has not significantly improved the returns on assets of Nigerian banks.

The study also found that the adoption of e-banking led to increase in the operation costs of banks when compared to turnover. The study recommended that; (i) the banking industry should adjust to full and effective deployment of information technology due to its complexity, (ii) that the Nigerian banks should be able to accept the level of risk that they can cope with in electronic banking system, measurable to the bank's overall strategic and business plans, (iii) that the banks should be able to provide adequate security both physically and electronically to check the incidence of hacking by fraudsters, and lastly that shareholders of banks should exercise patience with the banks management in the payment of dividend as perceived future dividends will be fatter after some lag period of cost recovery. Michael, Ahmad, Hakeem, Mary-Jane and Babajide (2020) study on the "effect of electronic banking on bank performance in Nigeria" analyzed the effect of e-banking proxy by automated teller machine, internet banking and point of sales on the return on assets of the sampled banks. The study is in agreement with the findings of Oyewole, Mohammed, El-maude, & Arikpo (2013). The correlational survey design was used with the population of 21 DMBs as at December 2017.

A total enumeration sampling was employed in the study with analysis carried out using multiple regressions. The study findings showed that e-banking has no significant impact on the performance of banks in Nigeria measured by return on asset (ROA). The study thus, concluded that investment in electronic banking has not improved the return on assets of deposit money banks in Nigeria with the recommendation that for effectiveness in electronic banking, there should be rigorous campaign and awareness for clients to patronize the facilities.

The study of Michael, Ahmad, Hakeem, Mary-Jane and Babajide (2020) therefore confirmed the findings of Oyewole, Mohammed, El-maude and Arikpo (2013) study that e-banking has no significant impact on bank performance using return on asset (ROA) as the proxy for performance.

The work of Ogutu and Fatoki (2019) on the effect of e-banking on financial performance of listed commercial banks in Kenya however was in contrast to the findings of Oyewole, Mohammed, El-maude and Arikpo (2013) and Michael, Ahmad, Hakeem, Mary-Jane and Babajide (2020). Ogutu and Fatoki (2019) employed the use of quantitative design with the aid of panel data analysis, with a target population of 11 listed commercial banks in Kenya. The study however found that there was strong positive and significant relationship between e-banking and financial performance, proxy by return on assets of listed commercial banks in Kenya. The study recommends among others that the commercial banks should enlarge their e-banking products using well-articulated strategy for the long run-in order to increase clients' satisfaction and increase the institutions profits. Banks' managements were also advised to adopt new innovations in their banking operations, as this will boost their profitability.

Ibekwe (2021) conducted a study on financial innovation and performance of DMBs in Nigeria using the *ex-post facto* research design. The study of Ibekwe (2021) was in agreement with the findings of Ogutu and Fatoki (2019) study. Ibekwe (2021) found that financial innovation (using ATM, POS and Mobile banking as proxies) has a positive and significant effect on ROA while e-banking has negative and insignificant effect on ROA of the sampled banks. The study

concluded that financial innovation has positive effect on the profitability of commercial banks in Nigeria and has enhanced the return on asset of the commercial banks.

The study's recommendations were based on the need for government to provide adequate infrastructure in the area of power supply, telecommunications and internet, efficient working relationship between the DMBs, the switching companies and the card companies in improving equipment quality, standardization as well as maintenance. To further enhance the general acceptance of the financial innovation, the study recommends that public education and awareness on the benefits of financial innovation should be done.

Kahindi and Nzoka (2020), in their study on the effects of financial product innovations on the financial performance of Savings and Credit Co-operative Societies, employed conceptual review of relevant literature and found that money banking, internet banking, agency banking and bank assurance contributed to the increase in SACCOs revenue and other financial indicators. Thus, they recommend that for SACCOs to remain competitive in financial intermediation, they should continuously adopt innovation.

In a study conducted on the effect of financial innovation on the financial performance of commercial banks in Kenya using an explanatory research design with a population of all the 43 commercial banks operating in KenyabyMugane and Ondigo (2016), they found that there was a negative and significant relationship between product innovation and ROA. The relationship between service innovation and ROA, organizational innovation and ROA was however found to be positive and significant. The study concluded that commercial banks in Kenya in the study had unstable trends in ROA despite the fact that more financial innovations were taking place in the sector.

Gündoğdu and Taşkin (2017) analyzed the relationship between financial innovation and the performance of Turkish banking system using credit card, online and telephone banking as the proxy for the independent variable. The results of the study showed that only credit card usage has a significant positive impact on ROA. They opined further that the positive impact on ROA implied that credit card usage increased the profitability and thus the performance of banking system.

Examining financial innovation as an alternative delivery channel and commercial banks financial performance in Kenya, Ndwiga and Maina (2018) using online questionnaire found that financial innovation and financial performance are indeed correlated. However, it was found that only process innovation has a significant relationship with financial performance while product innovation showed no significant relationship. The study recommends that commercial banks should invest more on process innovation strategies and less on product innovation.

Catherine (2015) investigated the effect of financial innovations on financial performance of commercial banks in Kenya. The study adopted an explanatory research design. The population of the study was all the 43 commercial banks operating in Kenya in the study period. The study conducted a census on all the 43 commercial banks with the use of primary data. An ordinary linear regression model was used. The regressions were conducted using statistical package for social sciences (SPSS) version 20.

The study findings revealed that there is a negative and significant relationship between product innovation and ROA. The relationship between service innovation and ROA and also organizational innovation and ROA was found to be positive and significant

Having examined various empirical studies with conflicting findings, the present study aimed to confirm or refute the findings of these empirical studies. The present took the study further by expanding the sample size to 12 DMBs out of the 13 listed DMBs in Nigeria as at December 2020 covering 11years period. In addition, the independent variable was further expanded to cover product, process and organizational innovation in the DMBs in Nigeria.

### 2.9.2. Researcher's Conceptual Model

The conceptual framework was developed to establish the effect of financial innovation on return on assets of listed deposit money banks in Nigeria.

2.10. Conceptual Model of Financial Innovation and Return on Assets

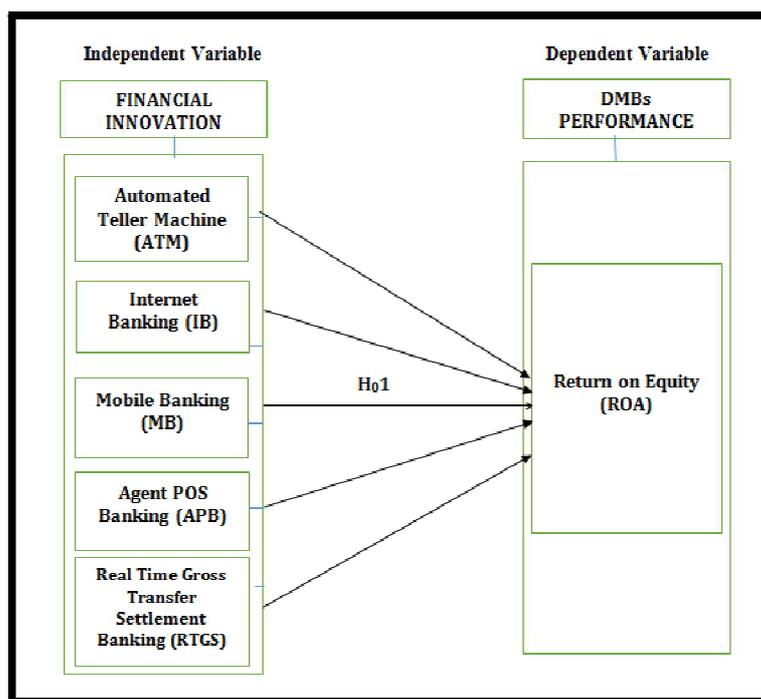


Figure 1: Researcher's Conceptual Model  
Source: Research Work (2022)

3. Methodology

The *ex-post facto* design was adopted as the research design for this study.

3.1. Population

The population of this study consisted of 13 listed DMBS licensed, regulated and supervised by the Central Bank of Nigeria as of 31<sup>st</sup> December, 2020.

3.2. Sample Size and Sampling Technique

The sample size for the study comprised of 12 (twelve) listed DMBS in Nigeria as of 31<sup>st</sup> December 2020. The sampling technique that was adopted in the study is the purposive sampling.

3.3. Model Specification

The model that was used in ascertaining the effects of the independent variables on the dependent variables of the study is specified as:

Model Specification

$$Y=f(X)$$

$$CP = f(FI)$$

Y = Dependent Variable = Return on Assets (ROA)

X = Independent Variable = Financial Innovation (FI)

3.3. Functional Relationship

$$ROA = f(ATM, IB, APB, MB, RTGS) \dots\dots\dots(\text{eqn. 1})$$

Regression Model

$$ROA_{it} = \beta_0 + \beta_1ATM_{it} + \beta_2IB_{it} + \beta_3APB_{it} + \beta_4MB_{it} + \beta_5RTGS_{it} + e_{it}$$

Where:

$\beta_0$  = Intercept

ATM = Automated Teller Machine (independent Variable)

IB= Internet Banking (independent Variable)

APB = Agent POS Banking (independent Variable)

MB = Mobile Banking (independent Variable)

RTGS = Real Time Gross Transfer Settlement (independent Variable)

ROA= Return on Asset (dependent variable)

$e_i$  = Error Term

$\beta_1$ -  $\beta_5$  are coefficients of the independent variables

## 4. Data Analysis and Discussion of Finding

### 4.1. Regression Tables for the Hypothesis

The hypothesis was tested using the multiple regression analysis. The data for financial innovation (ATM, IB, APB, MB, and RTGS) and return on assets (ROA) were analyzed through multiple regression. The results of the regression are presented in Table 1 below.

Dependent Variable: Corporate Performance (CP)				
Fixed-effects Regression with robust option				
Variable	Coefficient	Std. Err	T-Stat	Prob.
Constant	14.689	10.9709	1.34	0.208
ATM	-1.0569	1.2188	-0.87	0.404
APB	0.5843	0.7893	0.74	0.475
IB	-0.1533	0.1882	-0.18	0.433
MB	0.4951	0.6178	0.74	0.477
RTGS	-0.8006	0.2919	-2.74	0.019
Adj. R <sup>2</sup>	0.0502			
F-Stat/Wald Stat	F <sub>(5, 11)</sub> = 254.96 (0.00)			
Probability of F-Stat	0.0418			
Hausman Test	chi <sup>2</sup> <sub>(5)</sub> = 23.17 (0.0003)			
Testparm Test/LM Test	F <sub>(10, 105)</sub> = 4.71 (0.000)			
Heteroskedasticity Test	chi <sup>2</sup> <sub>(12)</sub> = 1051 (0.000)			
Serial Correlation Test	F <sub>(1, 11)</sub> = 2.138 (0.1716)			
Cross-sectional Independence	1.587 (0.1125)			

Table 1: Financial Innovation and Return on Assets of Listed Deposit Money Banks in Nigeria  
Source: Researcher's Computation (2022)

Notes: The dependent variable is Return on Assets (ROA), the independent variables are Automated TellerMachine Innovation (ATM), Agency/POS Banking (APB), Internet Banking/Web Payment (IB), Mobile Banking (MB) and Real Time Gross Transfer Settlement Scheme (RTGS). \*\* and \*\*\* indicates statistical significance at 5 and 1 per cent respectively.

### 4.2. Interpretation of Diagnostic Tests

From Table 1, the result of the Hausman test with the *p-value* of 0.000, being less than the 5 percent level of significance chosen for the study reveals that fixed effect is the appropriate estimator according to its null hypothesis which states that there is presence of unsystematic difference in the model coefficients; thus, the study does reject the null hypothesis. This was supported with the result of the Test parameters carried out, having *p-value* of 0.000 showed that fixed effect is the best appropriate estimator for the study.

The model was tested for heteroscedasticity, autocorrelation, and cross-sectional dependence to examine the robustness of the model. The result of the heteroscedasticity with *p-value* of 0.000 (that is, 0 percent) which is less than the significance level of 5 percent is an indication of the presence of heteroscedasticity; that is, the residuals of the model are not constant over time, thus the study do reject the null hypothesis. Also, serial correlation test carried out using Wooldridge test with *p-value* of 0.1716 (that is, 17.16%) which is more than the significance level of 5 percent is an indication that there is no serial correlation problem in the model. In addition, the cross-sectional dependence test result with *p-value* of 0.115 (11.5%) which is more than the significance level of 5 percent evidenced that the model has no cross-sectional dependence problem.

However, due to the presence of only heteroscedasticity in the Model, Fixed-effects Regression with robust option was used in model one.

### 4.3. Interpretation

$$ROA_{it} = \beta_0 + \beta_1 ATM_{it} + \beta_2 IB_{it} + \beta_3 APB_{it} + \beta_4 MB_{it} + \beta_5 RTGS_{it} + e_{it} \dots \dots \dots \text{Model 1}$$

$$ROA_{it} = 14.689 - 1.0569 ATM_{it} - 0.1533 IB_{it} + 0.5843 APB_{it} + 0.4951 MB_{it} - 0.8006 RTGS_{it} + e_{it}$$

From the results in Table 1, the regression estimates of the model show that Automated Teller Machine Innovation (ATM), Internet Banking (IB) and Real Time Gross Transfer Settlement Scheme (RTGRS) had a negative effect on return on assets (ROA) while Agency/POS Banking (APB) and Mobile Banking exerted a positive effect on return on assets (ROA) of listed deposit money banks in Nigeria. This is indicated by the signs of the coefficients, which are -1.0569, -0.1533 and -0.8006 (ATM, IB and RTGS) and 0.5843 and 0.4951 for (APB, MB). While the coefficient with positive effect is consistent, the result with negative influences are not consistent with a-priori expectations.

Concerning the magnitudes of the estimated parameters, 1000 Naira increase in the use of Agency/POS Banking (APB) would yield 0.5843 percent increase in Return on Asset. Likewise, also, a N1000 increase in the use of Mobile Banking (IB) will also bring about an increase of 0.4951 percent in the return on asset of deposit money banks in Nigeria. This is interesting because both transactions bring about commission charge by the bank provided from the use of technology. Although, it is difficult to ascertain this result significantly because all the probability of the t-statistic is insignificant (greater than 0.05% level of degree of freedom). This is because, there is evidence that the Agent/POS

Banking and Mobile banking have no significant positive relationship with corporate performance of the listed deposit money banks in Nigeria (APB = 0.5843, t-test = 0.74,  $p > 0.05$  and MB = 0.4957, t-test = 0.74,  $p > 0.05$ ). This implies that APB and MB have positive effect on corporate performance proxy by Return on Assets (ROA) but do not have significant influences on corporate performance proxy by Return on Assets (ROA) in the deposit money banks in Nigeria.

In contrast, Automated Teller Machine Innovation (ATM) and Internet Banking (IB) both had insignificant negative effect on return on asset (ROA) of deposit money banks in Nigeria. This indicates that N1000 increase in availability of Automated Teller Machine Innovation will bring about 1.0569 percent decrease in the return on assets while N1000 increase in the use of internet banking will bring about 0.1533 percent decrease in the return of asset of deposit money banks (ATM = -1.0569, t-test = -0.87,  $p > 0.05$  and IB = -0.1533, t-test = -0.18,  $p > 0.05$ ). Although, N1000 increase in Real Time Gross Transfer Settlement Scheme (RTGS) related transactions will bring about 0.8006 percent decrease on return of assets (ROA) of deposit money banks in Nigeria but this effect is however significant (RTGS = 0.8006, t-test = -2.74,  $p < 0.05$ ).

Furthermore, the Adjusted R-square of the model is 0.0502, this suggests that only 5% variation in performance measure by return on asset of the sampled population can be attributed to all independent variables used in the study, while the remaining 95% variations in return on assets are caused by other factors not included in this model.

The result of the F-test ( $F_{5,11} = 254.96$ ) showed a probability value of 0.0418 which indicates that the effect of all explanatory variables on return on asset (ROA) is statistically significant because the probability value (0.0418) is less than 5%, the level of significance adopted for this study. Therefore, the model jointly and statistically significantly impacted on return on asset (ROA).

#### 4.4. Decision

Based on the F-statistics ( $F_{5,11} = 254.96$ ), adjusted R square of 5% and the probability of F-statistics of 0.0418 being less than the 5% chosen significant level of the study, the null hypothesis for the model which states that "Financial Innovation does not have any significant effect on the return on assets of listed deposit money banks in Nigeria" was rejected while the alternate hypothesis was accepted and it was concluded that "Financial Innovation significantly affected the return on assets of listed deposit money banks in Nigeria".

## 5. Discussion of Findings

The finding of the study was consistent and confirmed the findings of other studies. The finding of the study aligned with the findings of the work of Ogutu and Fatoki (2019) who carried out study on the effect of e-banking on financial performance of listed commercial banks in Kenya. The study found that there was strong positive and significant relationship between e-banking and financial performance, proxy by return on assets of listed commercial banks in Kenya. Also, the findings of the current studies confirmed that of Ibekwe (2021) who conducted a study on financial innovation and performance of DMBs in Nigeria using the *ex-post facto* research design. Ibekwe (2021) found that financial innovation (using ATM, POS and Mobile banking as proxies) has a positive and significant effect on ROA while e-banking has negative and insignificant effect on ROA of the sampled banks.

Furthermore, the findings of the current study were consistent and in alignment with the findings of the study carried out by Mugane and Ondigo (2016), where they found that there was a negative and significant relationship between product innovation and ROA. The relationship between service innovation and ROA, organizational innovation and ROA was however found to be positive and significant.

However, the findings of the current study were in contrast with the findings of the studies carried out by Oyewole, Mohammed, El-maude, & Arikpo (2013) on electronic banking and bank performance. The study found that there is no significant difference between pre and post returns on assets (ROA) of Nigeria banks on adoption of e-banking. This implies that the adoption of electronic banking by Nigerian banks has not significantly improved the returns on assets of Nigerian banks. The study also found that the adoption of e-banking led to increase in the operation costs of banks when compared to turnover.

Also, the findings of the current study negated the result of the study carried out by Michael, Ahmad, Hakeem, Mary-Jane and Babajide (2020) on the "effect of electronic banking on bank performance in Nigeria" analyzed the effect of e-banking proxy by automated teller machine, internet banking and point of sales on the return on assets of the sampled banks.

## 6. Conclusion

From the analysis conducted, it was evident that there was a significant effect of financial innovation on return on assets (ROA) of listed DMBs in Nigeria. The study thus concluded that financial innovation has a significant effect on return of assets of listed deposit money banks in Nigeria.

## 7. Recommendations

For the banks to have adequate return on assets on investment in financial innovation, full acceptance by the banking populace is very paramount. Hence, rigorous efforts should be made to ensure total diffusion of the innovation to the bank customers and the society at large. Therefore, it is recommended that in order to achieve full diffusion, the management of the deposit money banks should develop a training and enlightenment programmes in major Nigerian languages for the customers with regard to financial innovation, its benefits and risk exposure. Constant training and

retraining should be held for bank staff to keep them abreast of new developments as they evolve in this current technology era to improve the performance of deposit money banks in Nigeria

Secondly, the company's board of directors and management should take conscious effort in ensuring efficient utilization of assets in a bid to ensure good return on the assets arising from the full adoption of the financial innovation by the banking population. This will reduce cost of operation and ultimately improves profit optimization goal of the banks.

Thirdly, in order to encourage full adoption by the banking population, stem introduction of fraud deterrent policies and controls to be put in place by the management of the DMBs to discourage the activities of fraudsters. And also, speedy attention should be given in the resolution of complaints from the bank customers on challenges faced in adopting the financial innovation products such as the ATM, MB, APB, IB and the RTGS. This will eliminate the fears in the mind of bank customers who are yet to adopt the usage of financial innovation products to carry out their banking transactions.

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