



FINANCIAL INNOVATIONS AND FRAUD CASES IN THE NIGERIAN BANKING INDUSTRY

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Abstract

This study analysed the effect of financial innovations on fraud cases in the Nigerian banking industry. The study covered a period of twelve years spanning from 2009 and 2020. The study applied descriptive statistics to analyse the four major financial innovations: Point of Sale terminals, Automated Teller Machine, Mobile banking services, and Internet banking services. The independent variable is financial innovations measured by the volumes of automated teller machines, Point of Sale Terminals, Mobile banking services, and Internet banking services while the dependent variable is fraud cases measured by annual amount of funds involved in fraud cases. The model was subjected to robustness checks through the instrumentality of Econometric Views version 9.0. The ordinary least square estimation techniques were used to test the research hypotheses. The study found that Point of Sale terminals (POS), Mobile banking services, and Internet services exerted positive significant effect on fraud cases in the Nigerian banking industry. However, Automated Teller Machine exerted negative significant effect on fraud cases in the Nigerian banking industry. Hence, the study concluded that Point of Sale terminals (POS), Mobile banking services, and Internet services are associated with rising incidence of fraud cases in the Nigerian banking industry. As such, the study recommends that effective regulations, guidelines, citizens' education and adequate monitoring are important in ensuring security of funds.

Key words: Financial Innovation, Fraud Incidences, Automated Teller Machine, Point of Sales, Mobile Banking Services, Electronic Banking Services

Introduction

Innovations in Financial technology have brought increased use of internet as well as the rise of cutting edge technological innovations in the financial services sector and are shaping the digital banking services in Nigeria. Financial technology innovations as the bedrocks of technological innovation, has re-defined the modes of operations of the banking industry on the overall. Abel (2018) believes that financial innovation is the act of creating and popularizing new financial instruments. Financial innovation refers to the act of creating new financial technologies, institutions and markets. More so, it involves the creation of new technological advances in the market of financial products.

The outline that allows the operator to simultaneously transfer money to multiple accounts qualifies as a financial innovation.

Prior to the advent of financial innovation, the Nigerian banking industry was characterized by primordial products and services. The primordial products included coins and notes, bank draft, and bank cheques and the primordial services were not customer-centric at all. Shabbir, Rehman, and Shabbir (2019) posit that, payment options involving the use of coins had limitation with regards to amount. Depending on the denomination, Naira notes could also be cumbersome, as the highest denomination at a time was Twenty Naira, followed by Fifty, and

later One Hundred and Two Hundred Naira notes before the country got to the present higher denominations Five Hundred and One Thousand Naira respectively. More so, payments with cheques ameliorated the inconveniences encountered by payments with notes especially where large sums were involved. More so, drafts quickened payments by banks located outside the same Central Bank Clearing Area (CBCA) while bank cheques quickened payments by banks within the same CBCA. With all these mode of settlements, valuable days, weeks, and months were spent in the banking industry except where cheques were drawn on the same banks with the payees (Shabbir, Rehman and Shabbir, 2019).

Similar to the global banking system changes over time, the Nigerian banking ecosystem and landscape have changed and is still changing. Consequently, the need to meet up with the changing banking environment coupled with the need to satisfy the endless demands of customers have given rise to the emergence of financial innovation. It was in realization of the inherent challenges associated with financial innovation that Udeh and Ugwu (2018) reported that Central Bank of Nigeria set up Nigerian Electronic Fraud Forum (NeFF) to safeguard the integrity of the e-payment platforms and ensure seamless business transactions devoid of loss of financial resources to electronic fraud.

The CBN e-fraud measure mitigation strategy notwithstanding, the threat of fraud in Nigerian banks has still not abated. The Nigerian Deposit Insurance Corporation (2018) reported that, 1,532 cases of fraud were reported involving 21.29 Billion Naira with expected actual loss of 11.69 Billion Naira in 2010. Meanwhile, in 2009, CBN employing Forensic Accountants in five commercial banks, uncovered a number of fraud. Consequently, the CEO of Oceanic Bank was prosecuted by Economic and Financial Crimes Commission (EFCC) and was sentenced by the court and was given 18 months jail term (Inaya and Isito, 2016). In 2011, 2,352 cases of fraud were reported involving 28.4 Billion Naira with expected actual loss of 4.071 Billion Naira. In 2014, there were 10,612 reported cases of fraud as against 3,786 in 2013 with involvement of 25.61 Billion Naira and 21.80 Billion Naira respectively. The expected actual loss for 2014 was 6.19 Billion Naira as against 5.76 Billion Naira in 2013, representing an increase of about 7.5%.

Ogbeide (2018) declared that it is no exaggeration to state that fraud is the great killer of business invention and exists in every part of

human endeavours and fraud is a deliberate act of defrauding others by suppressing the truth, by trickery, misinformation, false suggestions, cunning, deceit, and other methods of gaining undue financial advantage.

The current study is therefore directed at investigating the effect of financial innovations on fraud cases in the Nigerian banking industry, from 2009 to 2020, and to establish the effect of financial innovation on fraud cases in the Nigerian banking industry.

1.2. Statement of the Problem

The upwardly surging incidences of financial fraud within the Nigerian banking environment is pathetically a key cause of worry to service providers, regulators, and users of electronic banking and payment platforms in recent times (NDIC, 2018). This is apparently due to the continuous re-occurrence of cases of cyber-attacks and countless occurrences of electronic fraud in the Nigerian banking industry in the face of policy measures established by services providers. The incessant attacks by fraudsters popularly called '*Yahoo Boys*' has quite very worrisome.

Careful analysis of extant literature indicates the existence of prior empirical studies concerning the effect of innovations in financial technology, and financial fraud on bank performance (Fakunmoju, Fasola, and Fashagba, 2021; Mawutor, Enofe, Embele, Ndu and Awodola, 2019; Ogbeide (2018); Udeh and Ugwu, 2018; Ogbeide, 2018; Amanze and Onukwughu, 2017; and Olay and Dada, 2017). However, there appears to be only a handful of the studies are concerned with the effects of financial innovation on fraud cases in and outside the Nigerian banking industry. Therefore, this study seals the perceived gap by looking at the effect of financial innovations on fraud cases in the Nigerian banking industry.

Pursuant to the objectives of this study, the key issues are what effects automated teller machines (ATM) have on the amount of funds involved annually in fraud incidences in the Nigerian banking industry; the extent Point of Sale (POS) has affected the amount of funds involved annually in fraud cases in the Nigerian banking industry; what influence internet banking services have on amount of funds involved annually in fraud cases in the Nigerian banking industry; the degree to which mobile banking services has affected the amount of funds involved annually in fraud cases in the Nigerian banking industry.

This study focused mainly on all the twenty one (21) quoted deposit money banks in Nigeria authorized by the CBN as at 31st December 2020. The independent variables is innovation in financial technology measured by the volume of automated teller machines, volume of Point of Sale terminals, volume of internet banking services, and volume of Mobile banking services. The dependent variable is fraudcases measured by amount of funds involved in fraud cases. This study covered a study period of twelve years spanning 2009 – 2020. This is due to the fact that Nigerian banks began full operations of alternative banking options otherwise referred to product innovations since 2009 (Ali and Emenike, 2016).

2. Review of Related Literature

In this study, literature review considers the concepts of financial and fraud; the theoretical framework and the prior empirical studies.

2.1.1. The Concept of Financial Innovation

Ordinarily, the term ‘financial innovation’ means the inclusion of new financial instruments in financial institutions and markets through new technologies. Financial innovation involves exploiting the benefits presented by advanced technology in developing new products and means of delivering the products (Safdar, Said, Fatima, Gulzar, and Qaria, 2018). Nkem and Akujinma (2017) believe that the banking sector in the emerging countries, especially Nigeria can be more efficient, resilient and highly competitive due to adoption of financial innovations. Muotolu (2019) further buttressed this assertion when he stated that financial product innovation does not only enhance competitive advantage of the banking industry but also improves her administrative efficiency and reduces transaction cost.

Ali and Emenike (2016) observed that the increasing adoption of technological innovations have redefined and reshaped banking services in Nigeria. Innovations in financial technology are however faced with numerous challenges ranging from Epileptic Power Supply (Shabbir, Rehma, and Shabbir, 2019), Inadequate security (Nkem, and Akujinma, 2017), Out-dated ATM Machine (Muotolu, 2019; Morufu, 2016; Muia, 2017).

Despite the challenges, there are numerous benefits associated with the provision of financial product innovations in Nigeria. The first is that financial product innovations vis-à-vis ATM Booths and POS terminals allow for speedy completion of transaction, especially withdrawal even outside the country where the

banker does not have a branch. This reduces the number of customers’ visit to their banks. Again, financial product innovations make it possible for a customer to withdraw from any bank close to him at any given time (Shabbir, Rehma, and Shabbir, 2019). Another benefit of financial product innovations is that it reduces the amount of cash a customer carries around since he has free access to money anywhere. This, extension also reduces the rate of theft and stealing since people can actually do all forms of transactions without holding large sum of money (Shabbir, Rehma, and Shabbir, 2019).

2.1.2 The Concept of Fraud

Fraud is a term that presents some intricacies in its conceptualisation. Fraud typically relates to the taking of undue advantage of others or generating fictitious profit usually at the expense of others. In legal terms, fraud is seen as the act of deceitfully depriving a person of something, which the person would or might be entitled to, but for the perpetration of fraud. Generally, fraud is an act of trickery which is intentionally practiced in order to gain illegitimate financial advantage. Thus, for any action to constitute a fraud there must be devious intent to benefit (on the part of the perpetrator) at the disadvantage of another person or group. Fraud typically requires stealing and manipulation of accounts, frequently accompanied by cover up of the theft. Fraud also involves conversion or the translation of the stolen resources or property into own resources or property.

Udeh and Ugwu (2018) stated that fraud is a deliberate act to defraud others by suppressing the truth using trickery, misinformation, false suggestions, cunning, deceit, and other methods. Udo, Udoh, Abner, Ike, and Ibekwe (2018) viewed accounting fraud as a premeditated exploit calculated towards unjustifiable gain at the detriment of naïve individuals. Empirical researches identify fraud as a function of theft, asset treachery, and proceedings alternation for direct and indirect gains. Mawutor, Enofe, Embele, Ndu and Awodola (2019) perceive fraud as misrepresentation by a person of a material fact, known by that person to be untrue or made with reckless indifference as to whether the fact is true, with the intention of deceiving the other party and with the result that the other party is injured.

Generally, fraud incidence is an illegal act characterized by deceit, concealment or violation of trust committed by individuals and organisations to obtain money or service, avoid payment or loss of services or to secure personal

or business advantage usually measured by the number of manner at which it occurs. It is an intentional deception perpetrated by individuals or organisations, either internal or external to an organisation, which could benefit themselves, others or the organisation or which could inflict harm to others or the organisation, including falsifying financial or other records to cover up the theft of money or other assets.

2.2. Conceptual Exposition of Relationship in Hypotheses Variables

This section deals with link between the dependent (fraud incidences) and the independent variables that were used as predictor variables to explain changes in occurrence of financial fraud due to innovations in financial technology and e-products of banks in Nigeria.

2.2.1 Automated Teller Machine and Financial Fraud

The Automated Teller Machine popularly called the cash dispensing machine allows customers to withdraw cash from account anywhere, at any time, and the withdrawal amount is spontaneously debited from the account (Kamau and Oluoch, 2016). The cash dispensing machines are usually placed within the banks' premises or designated locations created by banks (Nkem and Akujinma, 2017). With the emergence of Automated Teller Machine, individuals are able to perform various transactions at anytime and anywhere without necessarily wasting valuable time in the banking hall. The apex bank recorded that out of the four major payment channels in Nigeria, ATM recorded the highest incidence of fraud cases in Nigeria as at 31st December, 2021 (CBN, 2020). Therefore, the first hypothesis of the study is stated as follows:

H0₁: Automated teller machines (ATM) have no significant effect on the amount of funds involved in fraud cases annually in the Nigerian banking industry.

2.2.2 Point of Sales (POS) Terminals and Financial Fraud

Point of Sales (POS) terminal is an electronic device used in payment for goods and services. Usually, Merchant Service Charge (MSC) is charged on all transactions done on POS terminals. The charge is borne by the merchant. The maximum total fee a merchant can be charged for any POS terminal transaction is 0.75% of the transaction value or ₦1,200.00. The parties are free to purchase POS terminals from any manufacturer so far they meet the POS

specifications in the Point-of-Sale guidelines. Currently, there are mixed reactions concerning the use of POS because some customers have complained of been defrauded at some POS centres while some others complained that they were defrauded of valuable sums of money through using pay codes sent to them by POS agents (NDIC, 2018). In this regard, the second hypothesis is presented as follows:

H0₂: Point of Sale (POS) has no significant effect on the amount of funds involved in fraud cases annually in the Nigerian banking industry.

2.2.3 Mobile banking (MOB) and Financial Fraud

Mobile banking refers to the provision of banking services through mobile devices. Mobile devices such as smart phones play a key role in the initiation, approval and conclusion of transactions in place of traditional methods of banking. Individuals can use the mobile devices to make deposits, pay bills from their bank accounts, etc via the use of MOB methods. There have been general mixed reactions in this area because some fraudsters appear to join forces with bank employees to perpetrate financial fraud. This has been effected through SIM Swap, and Mobile Mule (NDIC, 2018). The third hypothesis is presented as follows:

H0₃: Internet banking Services have no significant effect on the amount of funds involved in fraud cases annually in the Nigerian banking industry; and

2.2.4 Electronic (Web Pay) Banking Services and Fraud Cases:

Electronic based banking products are significantly increasing daily. This is because it acts as a substitute like branches and thus reduces the operational and other associated costs (Nkem and Akujinma, 2017). There are, however, cases of e-fraud inherent in the Nigerian banking industry since the emergence of financial innovation in 2009. The fraud stars appear to have various means and ways of committing e-fraud through business e-mail compromise, data breach, and denial of service, e-mail account compromise, Malware, Phishing Smashing, and Ransom ware (NDIC, 2018). The fourth hypothesis is developed along the line of this understanding as follows:

H0₄: Mobile banking services have no significant effect on the amount of funds involved in fraud cases annually in the Nigerian banking industry.

2.3. Theoretical Background

The fraud diamond theory is used to underpin the study along with the theory of deception. Taking into account the observable pitfalls inherent in the fraud triangle theory, Wolfe and Hermanson (2004) developed the fraud diamond theory. Wolfe and Hermanson (2004) believe that for fraud to really occur, four basic elements must be present and they include incentive, opportunity, rationalization and individual's capability. This reveals that for someone to be engaged in fraudulent activities, the person's intellectual capacity is instrumental, holding other factors like incentive, opportunity, and rationalization in check. By extension, for a bank employee to be engaged in financial fraud, he must have technological pedagogical content knowledge on how the various financial product channels work. This therefore suggests that a direct relationship exist between financial product channels and financial fraud. However, if there are stiff penalties, sensitization, and costs associated with the offense and above all proper character checks prior to employment ratification in place, such relationship will turn negative (Wolfe and Hermanson, 2004).

The Theory of Deception is based on seven tactics usually employed by fraud perpetrators to defraud unsuspecting victims (Grazioli and Jarvenpaa, 2003). The tactics includes:

- a) Masking – Hiding or destroying critical information,
- b) Dazzling – Disguising critical information,
- c) Decoying – Distracting the victim's attention away from critical information,
- d) Mimicking – Assuming someone's identity, or impersonating someone else,
- e) Inventing – Making up information,
- f) Re-labeling – Misleadingly presenting information, and
- g) Double play – Suggesting to the victim that the victim is taking advantage of the deceiver.

The fraud deception theory is deemed relevant to the study in the sense that internal electronic fraud perpetrators will use any of the seven tactics to either individually commit electronic fraud or in collaboration with other employees, particularly those with expert and legitimate power relying on expert knowledge or position of authority.

2.3. Empirical Studies

Fakunmoju, Fasola, and Fashagba (2021) examined the effect of fraud management practices on non-financial performance of

selected deposit money banks in Lagos State, Nigeria. The study adopted the primary source of data collection. The study found that fraud management practices have positive and significant effect on bank efficiency and operational performance of the selected deposit money banks at $P < 5\%$.

Ololade, Salawu, and Adekanmi (2020) examined why and how e-frauds are perpetrated in the Deposits Money Banks in Nigeria by employees. The survey research design was adopted and primary data were sourced from 120 fraud investigation officers in the Banks through the administration of structured questionnaires. Data were analysed using simple percentages. Results revealed that e-frauds were perpetrated by the employees whose employment was threatened as a result of not achieving deposit targets and using either expert or legitimate power to connive with other employees to commit e-fraud against the Banks. Findings revealed also that job losses were occasioned by disruptive technologies and economic challenges which often lead to employees' disengagement with little or without compensation. This created fear in the mind of employees to commit e-fraud through Phishing, Pharming, and breach of internal checks. The study recommended that unachievable deposits and sales targets should be discouraged in the Banks through our labour laws. Also, the human resources department of the Banks should institute whistleblowing policy that can assist employees to get a reprieve from a supervisor that may want to influence them using any form of power to commit e-fraud. Etale and Pouzigha (2020) explored the effect of electronic payment system on payroll fraud prevention in selected ministries in Bayelsa state. Using the primary data approach, 325 questionnaires were retrieved out of the 365 distributed in the study area. The study was built on 5-point Likert scale. The study found that electronic payment channels have positive insignificant effect on fraud prevention. It was suggested that there is need for government agencies to ensure full compliance with government directive on ensuring that all accounts are linked together using bank verification numbers.

Mawutor, Enofe, Embele, Ndu and Awodola (2019) studied the impact of fraud on DMBs in Nigeria. The study was driven by the positivist research philosophy. Data were sourced from the Nigeria Deposit Insurance Corporation (NDIC) annual reports covering the period of 2006 to 2016. The Ordinary Least Square (OLS) was used to predict the impact of fraud on DMBs after fulfilling major regression assumptions.

The study concluded that the impact of fraud in the banking sector affects the performance of DMBs in Nigeria. The regulation and supervision of DMBs should be stricter, that is, the CBN and NDIC should tighten their grip in regulating and supervising in order to reduce the increasing fraud incidence.

Okafor (2019) analysed the effect of financial innovation development on fraud cases in the Nigerian banking industry. The time scope spanned from 2009 to 2018. The study used trend analyses and descriptive statistics to examine the four major financial innovation channels including Point of Sale terminals (POS), Automated Teller Machine (ATM), Mobile Pay (MBP), and Web/Internet payment (WEBP) channels. The study found that the four major financial innovation channels stated are associated with rising incidence of fraud compared to the pre-innovation era and, therefore, called for drastic measures towards protecting the unsuspecting users of these channels. Effective regulations, guidelines, citizens' education and adequate monitoring were recommended as important in ensuring security.

Elumaro and Obamuyi (2018) studied the relationship between card frauds and customers' confidence in alternative banking channels (e-channels) in Nigeria and found a negative relationship between the two. This is because e-fraud breeds uncertainty in the financial ecosystem and subsequently leads to lack of trust in the alternative banking channels. This results in the avoidance of e-channels by the public. The study recommended collaborations among the banks and their regulatory agencies to nip card frauds occurrences at the bud.

On the contrary, Ogbeide (2018) found fraud amount to be statistically insignificant and negatively related to performance of DMBs. The study concluded intuitively that fraud may affect the capital base of banks in the long run. Perusing through the NDIC Report (2006 – 2014), it can clearly be seen that fraud amount increased until recently in 2015 and 2016, where it reduced drastically as a result of the regulations put on ground to check fraud by the NDIC and CBN.

Kolapo and Olaniyan (2018) examined the impact of fraud on the performance of deposit money banks in Nigeria between the periods 1994 to 2015. The Generalized Method of Moments (GMM) estimator was employed to analyze the data. The study showed that the amounts involved in fraud cases, amount lost to

fraud and number of staff involved in fraud have a negative and significant influence on the deposit of banks in Nigeria. Meanwhile, the past value of bank deposit has a positive and significant relationship with deposit of banks in Nigeria. It was recommended that bank management should not only strengthen their internal control systems, but also utilize whistleblowing policy and other "speak-up" mechanisms, which have remained underused and underrated in the Nigerian financial sector, since greater dependence on the process-type fraud detection methods simply encourage complacency.

Kalapo and Olaniyan (2018) found a negative relationship between the total number of staff involved in fraud cases and performance of banks. Implying that as more staff commit fraud, the asset of the banks will be depleted, and banks will find it difficult generating a reasonable return on asset. The author added that the emergence of electronic banking options exposed the banking industry to more fraud cases.

Tade and Adeniyi (2017) examined ATM fraud in south-west Nigeria to determine the factors that are responsible for the susceptibility of victims to ATM frauds and suggested strategies to prevent the continuous occurrence of ATM fraud. The research design was exploratory with a sample of 20 respondents in Lagos and Oyo States, who were mainly victims of ATM fraud. The qualitative data gathered through in-depth interview were analysed using content analysis. The study found that illiteracy, ill-health and trust of relatives including children, friends, and lovers were factors that accounted for victims falling into the victimisation strategies of the fraudsters that used swapping of ATM card, card cloning, use of physical attacks during odd hours withdrawal (gun threats) and demobilizing the victims through the seizure of their mobile phones to commit frauds. The study recommended fraud prevention strategies which are: stringent penalty for culpable staff, continuous education and enlightenment of banks' customers and improvement in staff welfare. The study concentrated on ATM fraud without taking into consideration other e-frauds that are perpetrated in the Nigeria banks. The possible involvements of employees of the banks were not taking into consideration as the study restricted fraudsters to relatives, friends and lovers of the victims.

Ibor (2016) investigated the involvement of employees of banks in fraud in Nigeria and the role of human resources in curtailing fraud in the

banking sector. The relationship between the amount of fraud losses and the levels of employees that perpetuated fraud was determined using Ordinary Least Square (OLS) in estimating the secondary data obtained from Nigeria Deposit Insurance Corporation. The study found that 77% of the fraud cases were attributable to insiders while 23% were attributable to outsiders and that the contribution of officers to fraud losses was more than other categories of staff. Meanwhile, the study only determined the extent of involvement of employees in fraud generally without a focus on why employees of Deposit Money Banks commit e-fraud and how they perpetuate e-fraud.

2.4. Gap in Literature

Studies of Fakunmoju, Fasola, and Fashagba (2021); Ololade, Salawu, and Adekanmi (2020); Etale and Pouzigha (2020) used primary data sources. Studies of this nature are usually prone to window dressing. Hence, the use of secondary data would have made this research more robust. Meanwhile, some of the existing studies like the studies of Mawutor, Enofe, Embele, Ndu and Awodola (2019); Ogbeide (2018); Kolapo and Olaniyan (2018); Tade and Adeniyi (2017) focused on the effect of fraud on the performance of the Nigerian banking industry. Even Okafor (2019); Elumaro and Obamuyi (2018) whose studies dealt with the effect of technological innovations on fraud incidence using Point of Sales, Automated Teller Machine, Mobile pay, and Web/Internet payment channels. The model for the study was adopted from the empirical findings of Okafor (2019). Our model is stated thus:

$$FRI = f(TEIV)-----$$

Equation 3.1

FRI = Fraud Incidence measured by Amount of Funds involved in Fraud cases annually
TEIV = Technological Innovations measured by automated teller machines (in volumes), Point of Sale (in volumes), Web Pay/internet banking services (in volumes), and Mobile pay/banking services (in volumes).

The model is econometrically restated as:

$$AFIF = \beta_0 + \beta_1ATM + \beta_2POS + \beta_3INB + \beta_4MOB + U_{it}-----$$

Equation 3.2

Where:

AFIF = Amount of Funds involved in Fraud annually
ATM = Automated teller machines (in volumes)
POS = Point of Sales (in volumes)
INB = Internet banking services (in volumes),
MOB = Mobile Banking Services (in volumes).
U_{it} = Stochastic Disturbance Term

as surrogates for technological innovations, focused more on number of frauds. The present study widens its time scope to cover 2009 – 2020 and applied the annual amounts of funds involved in fraud cases as a measure of fraud incidence as against previous studies.

3. Materials and Method

This study adopts the *ex-post Facto* research design because, although this gives the liberty to explain the observed phenomena, it does not have control over the possible cause. The study population is all the quoted 21 deposit money banks in Nigeria as at 31st December, 2020. Since the study involves aggregate data, the population equals our sample size.

In order to ensure that the model follows standard specification, attains the classical assumptions of the Ordinary Least Square, and ensures that the model did not produce spurious outcomes all the study variables were first subjected to various diagnostic tests, some of which include multi-collinearity test, Heteroskedasticity test, and CUSUM Test. The econometric package used for these analyses is the Econometric Views version 9.0.

Data for the study was sourced from Central Bank of Nigeria Statistical Bulletin (2020) and the annual reports of the Nigerian Deposit Insurance Corporation (2020) with respect to both the study variables and the time scope.

β_0 = Constant
 $\beta_1-\beta_4$ = Coefficient of independent variables

To avoid spurious regression result, all variables of interest were logged. The *a-priori* expectation is that a positive relationship should exist among technological innovation proxies and fraud incidence proxy. Hence, it is mathematically stated as: $\beta_1, \beta_2, \beta_3, \beta_4 > 0$

4. Results and Discussions

Data for the study was analyzed using both descriptive and correlation analysis. Each of them are presented and discussed in the foregoing sub-section.

4.1 Descriptive Statistics

This section describes the dependent and independent variables under consideration. The descriptive statistics result is presented below:

Table 4.1: Summary of Descriptive Statistics

	AFIF	ATM	POS	INB	MOB
Mean	23796.26	3410.955	784.5714	892.8538	165.9979
Median	21540.71	3254.408	380.2921	394.4105	87.86565
Maximum	46676.00	6512.608	3204.753	5080.965	675.9167
Minimum	4832.170	399.7100	11.03000	1.270000	25.05000
Std. Dev.	13092.79	2288.897	1038.198	1443.754	201.4414
Observations	12	12	12	12	12

Source: Econometric Views Version 9.0 (2021)

Table 4.1 above shows that amount of money involved in fraud incidences annually denoted by AFIF reported an average value of 23,796.26 and a low standard deviation value of 13,092.79. This suggests that the amount of financial fraud did not deviate far away from the mean value; with a reported minimum and maximum value of 4,832.170 and 46,676.00, respectively.

The result also proved that the volume of automated teller machine denoted by ATM has an average (mean) value of 3,410.955 and a low standard deviation value of 2,288.897. This suggests that current ratio did not deviate far away from the mean value. The volume of ATMs reported a minimum and maximum value of 399.7100 and 6,512.608 respectively.

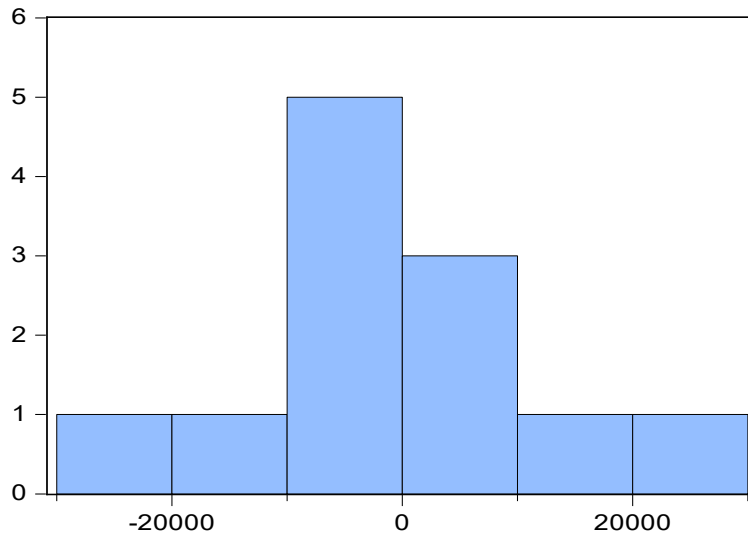
The result indicates that the volume of point of sales denoted by POS has an average (mean) value of 784.5714 and a low standard deviation value of 1,038.198. This suggests that volumes of point of sales did not deviate far away from its mean value. The volume of point of sales reported a maximum and minimum value of 11.03000 and 3,204.753 respectively.

The descriptive statistics confirmed that the volume of internet banking services denoted by INB has an average (mean) value of 892.8538 and a high standard deviation value of 1,443.754. This suggests that the volume of internet banking services reported high volatility. The volume of internet banking services reported a maximum and minimum value of 1.270000 and 5,080.965 respectively.

Lastly, the descriptive statistics evidenced that the volumes of mobile banking services denoted by MOB have average (mean) values of 165.9979 and a low standard deviation value of 201.4414. Meanwhile, it reported maximum and minimum values of 675.9167 and 25.05000 respectively.

4.2. Robustness Check

To ensure that the model for the study meet the ordinary least classical assumptions of Normality, Homoskedasticity, stability, and absence of serial autocorrelation, we subjected our model to the following robustness checks:



Series: Residuals	
Sample 2009 2020	
Observations 12	
Mean	-5.96e-11
Median	-2261.812
Maximum	22578.99
Minimum	-20463.98
Std. Dev.	10957.55
Skewness	0.254794
Kurtosis	3.202399
Jarque-Bera	0.150322
Probability	0.927594

Figure 4.1: Normality Test;
Source: Econometric Views version 9.0 (2021)

The normality test in figure 4.1 above reported a Jarque-Bera value of 0.150322 alongside an associated p-value of 0.927594. This suggests that the model is normally distributed and thus is reliable for prediction.

Table 4.2: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.408351	Prob. F(4,7)	0.1574
Obs*R-squared	8.009257	Prob. Chi-Square(4)	0.1557
Scaled explained SS	2.204948	Prob. Chi-Square(4)	0.8201

Source: Econometric Views version 9.0 (2021)

The Heteroskedasticity Test: Breusch-Pagan-Godfrey test reported in table 4.2 above clearly revealed that the model is Homoskedastic. This is because the p-values of the Heteroskedasticity Test: Breusch-Pagan-Godfrey test are all less than 5% suggesting that the mean of their variance are equally distributed. Hence, the model can be relied upon for prediction.

Table 4.3: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.681206	Prob. F(1,6)	0.4467
Obs*R-squared	1.438861	Prob. Chi-Square(1)	0.2303

Source: Econometric Views version 9.0 (2021)

The Breusch-Godfrey Serial Correlation LM Test reported in table 4.3 above clearly revealed that the model is free from serial auto-correlation. This is because the p-values of the Breusch-Godfrey Serial Correlation LM Test are all less than 5%. Hence, the model can be relied upon for prediction.

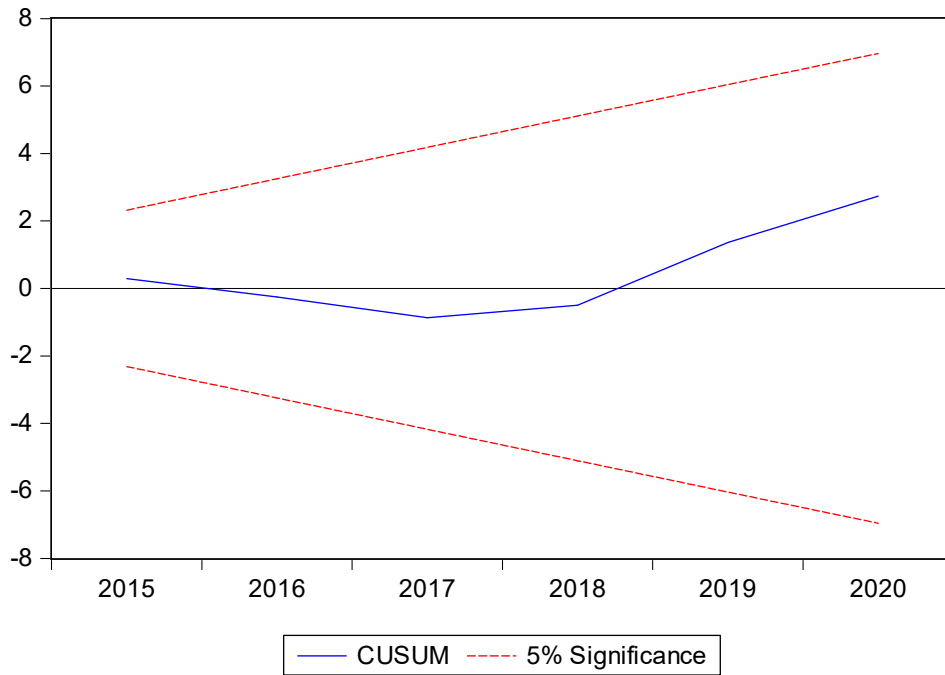


Figure 4.2: CUSUM Test
 Source: *Econometric Views version 9.0 (2021)*

The CUSUM Test in figure 4.2 above reveals that the model is relatively stable since the blue line did not traverse over the danger line. Thus, the model can be relied upon for prediction.

4.3. Regression Results: Test of Hypotheses

The regression result is presented in table 4.4 below:

Table 4.4: Regression Result

Dependent Variable: LOG(AFIF)

Method: Least Squares

Date: 10/20/21 Time: 16:06

Sample: 2009 2020

Included observations: 12

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.631602	0.915903	5.056870	0.0370
LOG(ATM)	-0.579221	0.166052	-3.488196	0.0005
LOG(POS)	0.603402	0.299655	2.013653	0.0440
LOG(INB)	0.626515	0.131369	4.769126	0.0000
LOG(MOB)	0.512949	0.153683	3.337710	0.0008

R-squared	0.940800	Mean dependent var	10.03375
Adjusted R-squared	0.851999	S.D. dependent var	0.516958
S.E. of regression	0.198878	Akaike info criterion	-0.131120
Sum squared resid	0.158210	Schwarz criterion	0.122086
Log likelihood	7.721163	Hannan-Quinn criter.	-0.290731
F-statistic	10.59453	Durbin-Watson stat	2.081422
Prob(F-statistic)	0.019405		

Source: *Econometric Views version 9.0 (2021)*

The regression result in table 4.4 above reveal a reported R-squared (coefficient of determination) value of 0.940800. This means that the independent variables jointly accounted for 94.08% total variation in the dependent variable, financial fraud, while the remaining 5.02 is explained by the error term. The adjusted R-squared with a value of 0.851999 suggests that the model has a high explanatory power. Meanwhile, the Durbin Watson statistics with a p-value of 2.081422 suggests that the model is free from serial auto-correlation. The F-statistic has a value of 10.59453 and a probability value of 0.019405 signifying that the model on the overall is statistically significant. The individual results are tested below:

Table 4.5: Summary of Test of Hypotheses

Study Variables	Coefficients	P-Values	Decision Rule	Conclusion
LOG (ATM)	-0.579221	0.0005	Reject H ₀₁ if its P-value is <0.05, instead accept H ₀₁ if its p-value is > 0.05.	Reject H ₀₁
LOG (POS)	0.603402	0.0440	Reject H ₀₂ if its P-value is <0.05, instead accept H ₀₂ if its p-value is > 0.05	Reject H ₀₂
LOG (INB)	0.626515	0.0000	Reject H ₀₃ if its P-value is <0.05, instead accept H ₀₃ if its p-value is > 0.05	Reject H ₀₄
LOG (MOB)	0.512949	0.0008	Reject H ₀₄ if its P-value is <0.05, instead accept H ₀₄ if its p-value is > 0.05	Reject H ₀₃

Source: Researcher's Compilation Based on Econometric Views 9.0 Output (2021)

4.4. Discussion of Results

The individual results are discussed below:

4.4.1. Automated Teller Machines (ATM) and Fraud Cases

The regression analysis in table 4.4 above revealed that Automated Teller Machines (ATMS) have a negative and significant effect on accounting frauds. This indicates that a 1% increase in the volumes of ATMS leads to 57.92% decrease in accounting frauds in Nigeria. Overall, an increase in ATM leads to a proportional decrease accounting frauds. To further substantiate this claim, this finding meets the *a-priori* expectation and the innovation diffusion theory. The result is in conformity with Okafor (2019); Elumaro and Obamuyi (2018) but deviates sharply from the findings of Etale and Pouzigha (2020).

4.4.2. Point of Sales (POS) and Fraud Cases

The regression result showed that volume of Point of Sales Terminals has a positive beta coefficient value of 0.603402 and a p-value of 0.0440. This means that volume of Point of Sales has a positive significant effect on accounting fraud. The implication of this result is that 1% increase in Mobile Phone Usage *vis-à-vis* volume of Point of Sales result to a corresponding increase in fraud incidence by a significant value of 60.34%. The justification for this is that individuals are sometimes anxious that POS agents are not trustworthy and they may hack into the account of individual after transaction. This account may lead to increased use of raw cash which negate the concept of cashless society which in turn has the potential to increase fraud occurrences in Nigeria. The

result agrees with the *a-priori* expectation of the study. This result aligns with Okafor (2019); Elumaro and Obamuyi (2018) but again deviated sharply from the findings of Etale and Pouzigha (2020).

4.4.3. Internet Banking Services and Fraud Cases

The analysis result reported that volume of internet banking services has a positive beta coefficient value of 0.626515 and a p-value of 0.0000. This implies that volume of internet banking services has a positive significant effect on fraud incidence. The implication of this result is that 1% increase in internet penetration *vis-à-vis* volume of internet banking services results to a corresponding increase in accounting fraud by a significant value of 62.65%. The result is in consonant with reality that the introduction of electronic platforms has increased crime rate in Nigeria. This result confirms the *a-priori* expectation of the study and agrees with Okafor (2019); Elumaro and Obamuyi (2018) but deviated sharply from the findings of Etale and Pouzigha (2020).

4.4.4. Mobile Banking Services and Fraud Cases

The regression analysis in table 4.4 above reveals that Mobile banking (MOB) channels have a positive and significant effect on fraud cases in the Nigerian banking industry. This indicates that 1% increase in MOB value leads to a corresponding increase of 51.29%. The positive result is in consonance with the fact the problem of perceived risk associated with internet fraud, financial risk, social risk, poor network system, unnecessary bank charges,

illiteracy and ignorance is common among Nigerians. This study is in line with the findings of Okafor (2019); Elumaro and Obamuyi (2018) but still deviated sharply from the findings of Etale and Pouzigha (2020).

5.1. Conclusion

This study analysed the effect of financial innovation on fraud cases in the Nigerian Deposit Money banks. The time scope was 2009 to 2020. The study used descriptive statistics to analyse four major financial innovation channels – Point of Sales Terminals, Automated Teller Machine, Mobile banking services, and Internet services. The model was subjected to robustness checks through the instrumentality of Econometric Views version 9.0. The ordinary least square estimation technique was used to test the hypotheses. The result showed that Point of Sale terminals (POS), Mobile banking services, and Internet services exerted positive significant effects on fraud cases in the Nigerian banking industry. However, Automated Teller Machine exerted negative significant effect on fraud cases in the Nigerian banking industry. The study concluded that Point of Sale terminals, Mobile banking services, and Internet services are associated with rising incidences of fraud cases in the Nigerian banking industry.

5.2. Recommendations

- a) Drastic measure towards protecting the unsuspecting users of ATM booths is needed. Management of Banks in Nigeria should ensure that ATM machines are serviced regularly and their tracking system is efficient. Nigerian banks should implement strong authentication controls at all their ATM Booths, and comprehensive infrastructure risk assessments should be conducted before installing ATM in any proposed ATM location;
- b) Management of banks in Nigeria and POS issuing bodies should advise their agents to utilize point-to-point encryption (P2PE) to safeguard POS data, and prior to recruiting agents and bank employees, adequate character checks should be conducted on prospective agents and employees;
- c) The Nigerian Government should educate the masses on the possible impact that money transfer can provide in a country's payment system;
- d) Banks should introduce training of staff in order to achieve competent management of financial innovation and this minimizes fraud cases

occasioned by innovative banking technology;

- e) Strong control policies and regular public enlightenment concerning the use of innovative banking products and how to guide against fraud should be instituted by CBN and the various Deposit Money Banks in Nigeria.

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