

Impact of Digital Frauds on Financial Performance of Deposit Money Banks (DMBs) in Nigeria

**James A. Obadeyi, (Corresponding Author)*

*** Wole Adamolekun*

**** Mayowa E. Ariyibi*

***** Yemi S. Jekanyinoluwa*

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Abstract

As the adoption of digital banking systems continues to grow both in Nigeria and globally, the incidence and complexity of digital fraud have also increased, posing significant threats to financial stability and business operations. These challenges often lead to heightened anxiety and uncertainty among users. In response to this concern, the present study investigates the impact of digital fraud on the profitability of banks in Nigeria. The research relies on secondary data and employs linear regression analysis over an eight-year period (2015–2022). Findings indicate that digital fraud has a significant effect on banks' profitability, with Automated Teller Machines (ATMs) being the most commonly exploited channel. The study recommends that regulatory authorities and relevant stakeholders should intensify efforts to educate and sensitize bank customers on safe practices when using digital banking platforms.

Keywords: Digital fraud, Point of Sale (POS), Automated Teller Machine (ATM), Mobile Phone, Profit after Tax.

JEL Code: G2

** Department of Banking and Finance, Faculty of Administration and Management Sciences, Olabisi Onabanjo University, Ago-Iwoye, Ogun State, Nigeria. e-mail: georgefavour09@gmail.com, ORCID ID: 0009-0009-7525-9061*

*** Department of Mass Communication, Faculty of Humanities, Social and Management Sciences, Elizade University, Ilara-Mokin, Ondo State, Nigeria. e-mail: wole.adamolekun@elizadeuniversity.edu.ng
ORCID ID: 0000-0003-2819-7485, ORCID ID: 0000-0003-2819-7485*

**** Department of Banking and Finance, Faculty of Administration and Management Sciences, Olabisi Onabanjo University, Ago-Iwoye, Ogun State, Nigeria.
e-mail: ariyibimayowa@gmail.com, ORCID ID: 0000-0002-4514-1275*

***** Department of Accounting and Finance, Faculty of Humanities, Social and Management Sciences, Elizade University, Ilara-Mokin, Ondo State, Nigeria. e-mail: jekayinoluwayemi@gmail.com, ORCID ID: 0009-0005-2722-8368*

Introduction

In the 21st century, digital banking has revolutionized the way financial services are delivered, especially through the implementation of Nigeria's cashless policy. This modern banking system allows customers to conduct transactions using electronic platforms such as mobile phones, Point of Sale (POS) terminals, internet banking, and web applications. As digital banking becomes more widespread, it offers speed, convenience, and improved customer experiences through the integration of information and communication technology (ICT).

However, alongside these advancements, digital fraud also known as e-fraud has emerged as a major threat. E-fraud involves the unauthorized and illegal transfer of funds through digital platforms. The proliferation of online transactions, while beneficial, has created vulnerabilities that fraudsters exploit, jeopardizing the safety of customer accounts and the financial stability of banks.

The increasing frequency and sophistication of cyber-related financial crimes pose a serious challenge to banks, as fraudulent activities can lead to substantial financial losses, reduced profitability, and diminished investor confidence. As a result, digital fraud is not just a technological issue but a strategic risk that requires urgent attention from bank management, regulators, and policymakers.

This study is crucial for bank executives and financial managers, as it seeks to identify the underlying causes of digital fraud in Nigeria's banking sector and explore potential solutions. For clarity and consistency, the terms digital banking, cyberspace banking, cashless banking, electronic banking, online banking, and virtual banking are used interchangeably in this paper.

The financial sector, particularly the banking sub-sector, plays a pivotal role in national economic growth and development. Therefore, protecting digital banking systems from fraud is of utmost importance in preserving public trust and sustaining economic stability. A secure and efficient banking system ensures uninterrupted service delivery, investor confidence, and continued growth.

The primary objective of this paper is to investigate the effect of digital banking fraud on bank profitability. This prompts the following research question:

What is the proportional influence of digital banking fraud on bank profits?

In line with this question, the study formulates the null hypothesis as follows:

H₀: There is no proportional effect of digital banking fraud on bank profits.

The remainder of this paper is structured as follows: the second section reviews related literature, the third outlines the methodology, the fourth presents and discusses findings, and the final section offers conclusions and recommendations.

2. Literature Review

Digital banking has remained robust despite persistent threats; however, its inherently open and dynamic nature makes it more susceptible to attacks than traditional banking systems. Thus, there is a pressing need for modern, multilayered strategies aimed at preserving and safeguarding the integrity of digital financial ecosystems, especially as the expansion of the information society introduces new cybersecurity challenges. According to Osakwe and Ezeaku (2022), digital banking enables financial transactions without the use of physical cash, coins, or bills, relying instead on electronic signals or data transmissions.

Deposit Money Banks leverage digital platforms to enhance service delivery and wealth maximization, reinforcing their critical role in developing financial infrastructure (Boateng & Nagaraju, 2020). Nonetheless, the rise in digital fraud encompassing crimes such as phishing, ATM skimming, card fraud, identity theft, and money laundering is closely tied to customer willingness to share sensitive data online (Ololade, Salawu, & Adekanmi, 2020). As a result, emerging markets face intensified competition and operational challenges, exacerbated by infrastructural issues like erratic power supply and underdeveloped network systems (Kim, Zoo, Lee, & Kang, 2018; Ololade et al., 2020).

The proliferation of digital financial services, including ATMs, internet banking, and POS systems, has contributed to the rise in fraud incidents (Aamir, Ercan, & Muhammad, 2023). The POS device, a portable tool for card-based transactions, enables cashless operations but has also become a common target for fraudulent activities (Ololade et al., 2020). Although digital banking is attractive for its low cost, convenience, and accessibility, it has also intensified competitive pressures and reduced bank profit margins (Singh, 2023).

E-commerce, a major driver of electronic payments, facilitates seamless monetary exchanges but is vulnerable to disruptions from infrastructural deficits. Moreover, fraud described as a socio-

economic malaise transcends both public and private sectors. Despite its prevalence, studies have found that while fraud incidents are on the rise, their effect on bank profitability remains statistically insignificant (Udeh & Ugwu, 2018).

Automated Teller Machines (ATMs) play a critical role in the cashless banking landscape, enabling customers to access their accounts via secure chip-embedded cards (Obadeyi et al., 2020). These technologies have significantly decongested banking halls by replicating teller functions (Adeniran & Junaidu, 2014). Furthermore, mobile banking facilitated by the widespread use of smartphones has revolutionized retail banking by providing accessible and affordable services, eliminating the need for physical queues (Priyanka, Sarvesh, Surya, & Ajayi, 2020).

Ahmad and Buttle (2002) noted that telephone banking significantly improves customer retention by reducing transaction costs and offering greater convenience. Obadeyi et al. (2022) similarly observed that mobile banking enhances retail financial services, especially for small-scale users. As banks embrace ICT solutions to improve service delivery, customers are increasingly exposed to internet-based risks (Ezeoha, 2005).

Internet fraud particularly phishing and identity theft poses a substantial risk to unsuspecting customers, facilitating unauthorized account access and fund withdrawals (Ololade et al., 2020). Profitability, a vital performance metric in banking, is mainly derived from service charges and loan interest. O'Connell (2023) observed that loan-related risks had minimal impact on profitability compared to other internal bank-specific factors.

Cressey's Fraud Triangle Theory (1973) identifies three essential elements that contribute to fraud: pressure, opportunity, and rationalization. This model posits that individuals may breach trust under financial strain, especially when they find ways to justify their actions.

Empirical studies across various countries support these insights. Nkiendem, Tenekeu, and Ghah (2023) examined banking satisfaction in Cameroon and found a significant positive impact from ATMs and mobile banking. Similarly, Damaris (2013) investigated digital fraud in Kenya's banking sector and identified customer awareness and weak internal controls as major contributors. Obadeyi et al. (2022), analyzing Nigerian commercial banks between 2006 and 2019, highlighted the detrimental effects of e-fraud on bank performance. Aamir et al. (2023), using ARDL analysis,

noted that in India, digital finance had a negative short-term effect on banking stability and efficiency, while the U.S. experienced stable growth in both the short and long run.

Sinebe and Ikpe (2023), focusing on Nigeria from 2009 to 2020, concluded that ATM, mobile, and internet banking frauds had no significant impact on Return on Assets (ROA) of Deposit Money Banks. Singh (2023) found that e-banking adoption enhanced profitability in India, recommending continued digital innovation. Finally, Osakwe and Ezeaku (2022) found that ATM usage had a positive effect on bank performance, whereas POS and mobile banking had limited influence.

3. Methodology

The study adopts an ex-post facto research design and a purposive sampling approach. Secondary data were obtained from reports generated by the Nigerian Electronic Fund Transfer Forum, the National Bureau of Statistics, and the Central Bank of Nigeria Bulletin, covering an eight-year period from 2015 to 2022. The population comprises twenty-four Deposit Money Banks (DMBs), out of which a sample of fifteen was selected based on their net worth and long-standing presence in the Nigerian banking sector. The data will be analyzed using linear regression analysis. Automated Teller Machine (ATM) usage is proxied by the number of ATMs per 100,000 population, while internet banking is represented by the percentage of the population using the internet (Siddik & Kabiraj, 2020; Aamir et al., 2023)

Model Specification

To investigate the influence of digital fraud on bank profitability, there is need for a model below;

$$Y_{it} = \delta + \beta X_t + \varepsilon_t \text{-----} (i)$$

Where Y= criterion variable

X = regressor variable

it = ith observations on the criterion variable

δ = constant variable (intercept)

β = constant variable (slope)

ϵ = error term

The paper's specification model is to investigate proportional degree of influence of frauds committed from POS, ATM, Mobile phone, internet and Web on bank's profits.

Definition and Measurement of Variables

Table 3.1: Defining and Measuring Variables

S/ N	Variables	Definition	Measurement	Expected Sign	Apriori
	Bank Profit After Tax (P) ^(t) - Dependent variable	It is the profit realised by the bank after deducting tax	Profit before income tax expense minus Income tax expense yearly		
	Independent Variables				
1	Automated Teller Machine-ATM	Electronics device that permits banks' customers to either make cash withdrawals or payments or check account balance(s) at any time.	Number of ATMs that are operational owned by the banks on annual year.	-	$\alpha_1 < 0$
2	World Wide Electronic Banking- WEB	Banking Services enjoyed through websites	Number of banking transactions that are performed on the websites on annual basis	-	$\alpha_2 < 0$
3	Point on Sale – POS	A terminal and electronic portable device that allows customers to transact with credit / debit cards.	Number of POS that are owned by banks and which are operational in and out of the banking system.	-	$\alpha_3 < 0$

4	Internet Banking - IB	Services provided through online banking	Number of internet banking transactions carried out annually.	-	$\alpha_4 < 0$
5	Mobile – M	Banking transaction through telephone (Unstructured Supplementary Service Data- USSD)	Number of banking transactions carried out annually.	-	$\alpha_5 < 0$
6	Ecommerce –E	Trading that occurs through the usage of electronic banking mechanism	Number of banking transactions carried out mainly for business transactions annually.	-	$\alpha_6 < 0$

Source: Researcher's survey (2023)

4. Results and Discussion of Findings

4.1 Descriptive Statistical Analysis of the Data

Table 4.1 shows the summary statistics of the variables under review. It is therefore observed that on average, PAT was 1.30×10^7 with a standard deviation of 1.07×10^7 and minimum of 1.52×10^6 and maximum of 4.26×10^7 . ATM reported mean of 1.62×10^6 , standard deviation value of 1.08×10^6 , minimum value of 1.43×10^6 and maximum value of 2.14×10^6 . Ecommerce described mean as 4.25×10^6 , standard deviation of 3.14×10^6 , minimum value of 1.28×10^7 and maximum of 3.57×10^6 . The internet banking described mean as 3.06×10^7 , standard deviation value of 2.17×10^7 , with minimum and maximum values as 2130000 and 4.18×10^7 respectively. The mobile phone was valued 5.62×10^6 , standard deviation of 3.28×10^6 , while minimum value was detailed 1790000 and maximum value of 2.78×10^6 . POS revealed mean of 2.83×10^6 , standard deviation at 1.33×10^7 , minimum figure reported 1200000 and maximum value of 3.82×10^6 . WEB estimates mean as 3.42×10^7 , standard deviation of 2.14×10^6 , minimum and maximum estimates as 1.23×10^6 and 2.76×10^7 respectively.

The kurtosis estimate is irrelevant and insignificant if the value is less than one (1) and where the values fall between 1 and 10, it depicts moderate non-normality; and distribution is flat with and attain peakness with inverse and positive kurtosis respectively (Blalock, 2012).

Table 4.1: Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
PAT	8	1.30e+07	1.02e+07	1.52e+06	4.26e+07
ATM	8	1.62e+06	1.08e+06	1.43e+06	2.14e+06
ECOMMERCE	8	4.25e+06	3.14e+06	1.28e+07	3.57e+06
INTERNETBA~G	8	3.06e+07	2.17e+07	2130000	4.18e+07
MOBILE	8	5.62e+06	3.28e+06	1430000	2.78e+06
POS	8	2.83e+06	1.33e+07	1200000	3.82e+06
WEB	8	3.42e+07	2.14e+06	1.23e+06	2.76e+07

Source: Stata output, 2023

4.2 Correlation Matrix

Table 4.2 reports the Pairwise Correlation matrix result further depicts the relationship between digital banking fraud platform variables such as ATM, E-Commerce, Internet Banking, Mobile, POS and WEB and profitability of bank that is proxy by profit after tax (PAT). The result shows positive relationship between explanatory variables and PAT; such that e-commerce ($r = 0.730^*$), internet banking ($r = 0.954^*$), ATM ($r = 0.956^*$), Mobile ($r = 0.878^*$), POS ($r = 0.789^*$), WEB ($r = 0.236$). The average correlation coefficient (r) was 0.7572. Similarly, the relationship between explanatory variables and ROA is; e-commerce ($r = 0.594^*$), internet banking ($r = 0.553^*$), ATM ($r = 0.576^*$), Mobile ($r = 0.510$), POS ($r = 0.516$), WEB ($r = 0.245$). The average correlation coefficient (r) was 0.499. It is important to note that values with asterisk correlated at 5% level of significance.

The correlated (average correlation coefficient) results were more directed to PAT. This means that each time digital fraud is committed through any of these digital banking platforms, it

automatically forces the profit after tax of banks to adjust, that is, banks might need to deduct part of ‘provisions’ on e-fraud activities (i.e. in case the lapse / negligence is on the part of the banks, the banks would be required to legally repay the defrauded customers); this might lower the value of profit realised. Therefore, the aggregate result showed a relationship between digital banking frauds platforms and bank profitability.

Table 4.2: Correlation Matrix

Table 4.2: Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) PAT	1.000							
(2) ATM	0.956*	1.000						
(3)	0.730*	0.594*	1.000					
ECOMMERCE								
(4)	0.954*	0.553*	0.981*	1.000				
INTERNETBAN								
KING								
(5) MOBILE	0.878*	0.510	0.942*	0.751*	1.000			
(6) POS	0.789*	0.516	0.771*	0.501	0.830*	1.000		
(7) WEB	0.236	0.245	0.170	0.012	0.271	-0.117	1.000	

* shows significance at the 0.05 level

Source: Stata output, 2023

4.3 Linear regression Result on Profit After Tax (PAT)

The table 4.3 shows the influence of digital fraud on PAT. The linear regression result shows e-fraud / digital fraud significantly influence PAT. By implication, a unit change in digital fraud payment would bring about 0.643 unit change in PAT. This means that there is marginal influence of digital fraud with coefficient value (0.643) on bank’ profit. For every e-fraud perpetrated, 0.643 profits would be hampered in the banks. This is in tandem with Tyona, Aga and Tabulo (2021) who claimed that e-fraud activities impeded profits of banks. The variables were statistically significant ($p < 0.05$). The variables that were combined accounted for 0.741 (74.1%) of the variation in the profit as shown by the R-squared value. While other variables accounted for the remaining 0.259 (25.9%).

Table 4.3: Linear regression (PAT)

LogPAT	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
e-fraudpayment	0.643	0.095	6.77	0.000	0.436	0.850	**
Constant	4.667	0.216	21.61	0.000	20.258	21.201	**
Mean dependent var		20.730	SD dependent var			1.528	
R-squared		0.741	Number of obs			8.000	
F-test		19.051	Prob > F			0.001	
Akaike crit. (AIC)		36.946	Bayesian crit. (BIC)			41.419	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.4 Digital Banking Frauds' influence on Profitability

Findings reveal marginal influence of digital fraud with coefficient value (0.643) on bank' profit. Therefore, this indicates that for every digital fraud perpetrated, 0.643 profits of the banks would be hampered annually.

Findings revealed that the variables that were combined accounted for 0.741 (74.1%) of the variation in the profit as shown by the R-squared value. While other variables accounted for the remaining 0.259 (25.9%). Findings also showed that variables were statistically significant ($p < 0.05$). This implies that there were other factors that were not accounted for in this study that could also affect the bank's profits and performance respectively. Therefore, the conclusion is that digital frauds influence bank's profits in Nigeria.

5. Conclusion and Recommendations

The paper reviews digital frauds influence on banks' profitability in Nigeria. The digital fraud is inimical to customers, operators, regulators and other stakeholders in an economy. Some digital fraud platforms such as ATM, POS, ecommerce, internet banking, Web and mobile were examined. The linear regression analysis was adopted in the study to analyse collected data. The

study concludes that digital banking frauds was more committed through ATM platform during the period under review.

In view of the findings, these were the recommendations:

- i. There is need for bank management to fix biometric and retina scanner to the ATM points as part of security measure, to help identify and retrieve the finger prints and facial identification of the fraudsters.
- ii. The policy makers, regulators and operators should come up with policy on ATM points. The ATM points should not be positioned in isolated areas to discourage swindlers and protect innocent customers.
- iii. The study recommends that regulator and other stakeholders should continuously sensitise banks' customers on how to be extremely careful during banking transactions whenever any of the digital platforms are employed.

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Appendix

Linear regression

PAT	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
logATM	6.111	6.432	0.95	0.374	-9.099	21.320	
logECOMMERCE	-0.888	1.036	-0.86	0.420	-3.338	1.563	
logINTERNETBANKING	-2.923	2.557	-1.14	0.291	-8.970	3.124	
logMOBILE	-1.171	1.255	-0.93	0.382	-4.137	1.796	
logPOS	1.712	2.418	0.71	0.502	-4.004	7.429	
logWEB	-2.050	1.872	-1.09	0.310	-6.476	2.376	
Constant	4.667	39.687	0.12	0.910	-89.179	98.513	
Mean dependent var		20.730	SD dependent var			1.528	
R-squared		0.741	Number of obs			8.000	
F-test		19.051	Prob > F			0.001	
Akaike crit. (AIC)		36.946	Bayesian crit. (BIC)			41.419	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Jacque Berra Normality Test

. jb residual

Jarque-Bera normality test: 2.082 Chi(2) .353

Jarque-Bera test for Ho: normality:

Omitted Variable Bias Test

Ramsey RESET test for omitted variables

Omitted: Powers of fitted values of logPAT

H0: Model has no omitted variables

$F(3, 9) = 3.31$

Prob > F = 0.0712

Heteroschedasticity Test

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	3.65	2	0.1614
Skewness	6.03	1	0.0141
Kurtosis	0.09	1	0.7599
Total	9.77	4	0.0445

Principal Component Analysis

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Unexplained
ATM	0.4829	-0.1090	-0.1189	-0.4443	0.1197	0.7274	0
ECOMMERCE	0.3895	-0.2534	0.8687	-0.0076	0.0425	-0.1662	0
INTERNETBA~G	0.4772	-0.0049	-0.3575	-0.2948	0.4106	-0.6236	0
MOBILE	0.4383	-0.3348	-0.2668	0.7834	-0.0325	0.0991	0
POS	0.4154	0.4379	-0.0471	-0.0765	-0.7804	-0.1362	0
WEB	0.1504	0.7874	0.1736	0.3099	0.4530	0.1612	0