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Effects of Forensic Accounting Tools on Fraud Prevention in Nigeria Listed Deposit Money Banks

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Abstract
The main objective of the study is to examine the effect of forensic accounting tools on fraud prevention in Nigeria-listed deposit money banks. Survey research design was adopted and the population of the study was 460 out of which 136 sampled size was determined using purposive sampling techniques, descriptive statistics was used to analyze the data with the aid of Stata 23 software. The findings show among others that big data analytics tools, data visualization tools, and data mining have significant effect on fraud prevention in Nigerian listed deposit money banks. Fraud detection software has no significant effect on fraud prevention in Nigerian-listed deposit money banks. The study recommends among others that Nigerian listed deposit money banks should continue to invest financially and human capital in adopting advanced technological tools such as big data analytics, data visualization tools, data mining techniques, and fraud detection software in fraud prevention. These tools have demonstrated significant effect in enhancing fraud prevention capabilities by enabling real-time monitoring, anomaly detection, and predictive analytics.

Keywords: *Forensic Accounting Tools, Fraud Prevention, Deposit, Money, Banks*

1. Introduction

The 2008 economic and financial crisis, triggered by the collapse of Lehman Brothers, rapidly spread internationally, causing widespread recession and financial turbulence. This crisis led to a global credit shortage, falling property prices, and disrupted exports, especially affecting emerging economies and major EU trading partners. The effects on modern economies, including the banking sector, are expected to persist for years (Ibrahim, 2020).

Simultaneously, the rise of e-commerce and digital transactions has led to a significant increase in computer crimes, such as financial fraud and cyberattacks. Internet banking and financial services have become vulnerable to fraudsters exploiting online platforms (Moses, 2020). Forensic accounting tools, used to collect and analyze digital evidence, have become crucial in combating these threats (Shehu, 2017). These tools help investigators detect fraud by analyzing transaction data, identifying anomalies, and predicting fraudulent activities. Big data analytics and data mining techniques play a pivotal role in real-time fraud detection, enabling banks to safeguard customer assets and prevent financial losses (Ololo, 2018).

Fraud detection software is also vital, continuously monitoring transactions to flag suspicious activities, assign risk scores, and enable swift intervention (Barau, 2020). Despite extensive research on fraud in Nigeria's banking sector, there has been limited focus on the use of forensic accounting tools as a preventive measure. This study aims to explore the impact of such tools on fraud prevention in Nigeria's listed deposit money banks, offering a solution to the rising issue of financial fraud in the sector (Ibrahim, & Musa, 2022). Fraud remains a significant concern for organizations, particularly in the banking sector, where new methods of fraud, such as card payment frauds and compromised customer details, are on the rise. In response, banks are enhancing security mechanisms and adopting computer-assisted forensic accounting tools to combat these threats, (Ibrahim, & Musa, 2022).

However, fraud remains a major issue in Nigeria, with internal and external fraud cases rising sharply. In 2023, banks reported 318 cases of staff-related fraud, resulting in significant financial losses. Externally, digital payment frauds have surged, with fraudsters increasingly exploiting mobile and PoS channels, causing billions in losses (Ibrahim, & Musa, 2022).

The Nigerian banking system faces several challenges in effectively implementing forensic accounting tools, including outdated IT infrastructure, data quality issues, a shortage of skilled forensic professionals, and regulatory hurdles. Additionally, the high cost of investing in forensic tools, compatibility issues, and the potential for false positives complicate fraud prevention efforts. Despite these challenges, forensic accounting tools offer crucial capabilities for detecting and preventing fraud, but they require continuous innovation, regulatory alignment, and workforce development. The current study aims to examine the impact of forensic accounting tools on fraud prevention in Nigeria's listed deposit money banks, addressing gaps in previous research.

The following research questions were raised for this study:

i. How does big data analytics tools affect fraud prevention in Nigeria-listed deposit money Banks?
ii. what impact does data visualization tools have on fraud prevention in Nigeria's listed deposit money Banks?
iii. How does data mining affect fraud prevention in Nigeria's listed deposit money Banks?
iv. To What extent does Fraud detection software have on fraud prevention in Nigeria-listed deposit money Banks?

2. Literature Review

Concept of Fraud Prevention

Fraud prevention involves strategies, policies, and measures implemented by organizations to proactively identify, deter, and mitigate fraudulent activities before they occur. Its primary goal is to protect assets, maintain stakeholder trust, and uphold the organization's integrity. Fraud, defined as criminal deception for unjust gain, is not new but has evolved with advancements in technology. Traditional fraud, like money laundering, has become easier to execute, while new forms, such as mobile telecommunications fraud and computer intrusion, have emerged. (Ibrahim, et al., 2022).

A key aspect of fraud prevention is understanding and assessing risks and vulnerabilities within an organization. This allows for targeted control measures in high-risk areas. Robust internal controls, such as policies and governance structures, help prevent unauthorized activities and ensure compliance. Implementing a segregation of duties (SoD) policy further reduces fraud risks by distributing responsibilities across individuals to prevent conflicts of interest and collusion. Employee education is another crucial factor. Training programs and awareness campaigns promote a culture of integrity, empowering employees to recognize and report fraud. By building awareness of fraud risks and ethical conduct, organizations can significantly enhance their fraud prevention efforts (Moses, et al 2022).

Concept of Forensic Accounting Tools

Forensic accounting tools are specialized software and technologies used in investigations, legal proceedings, and dispute resolution. These tools assist forensic accountants in collecting, analyzing, and presenting digital evidence in court, adhering to legal standards. Forensic accounting, recognized as a form of professional expertise, often requires formal certification, which enhances its symbolic value (Williams, 2019).

These tools facilitate the extraction of digital evidence from various devices, including computers and mobile platforms, while ensuring the data's integrity and admissibility in legal contexts (Aftabi, 2023). They can recover deleted or encrypted data, analyze large volumes of information, and detect patterns or anomalies related to fraud and cybercrimes. Additionally, visualization tools make complex data more accessible (Akal, 2019).

Forensic accounting tools play a significant role in cybersecurity by identifying vulnerabilities, detecting unauthorized access, and supporting incident response. They preserve evidence by creating forensic images of devices and maintain a secure chain of custody for the data (Alyoubi, 2019). Legal compliance is ensured through encryption, data protection, and privacy controls. These tools require practitioners with specialized knowledge in digital forensics, cybersecurity, and legal procedures, emphasizing the importance of training and professional development (Asllani, 2014).

Forensic Accounting Tools and Fraud Prevention

Fraud is difficult to define and detect due to its complex nature. It involves intentional deception or manipulation to gain an unfair advantage, often by diminishing the value of assets in secret. Fraud can take many forms, including deceit, trickery, and dishonest practices, making it challenging to establish a clear definition (David, 2005). It is typically associated with financial distress, such as when companies face insolvency, where senior management may be involved in fraudulent activities. (Moses, et al., 2018).

David (2005) emphasizes that fraud is not merely a possibility but a likelihood, and decision-making by a group rather than an individual could reduce the risk of fraud. However, if the group shares similar interests or is influenced by a dominant leader, fraud prevention becomes more challenging. Courts often refrain from rigid definitions of fraud to avoid allowing individuals to exploit legal loopholes (Ejura, et al. 2023).

According to Anyanwu (1993), fraud is a deliberate act of deception for unlawful gain, and accounting fraud specifically refers to the intentional manipulation of financial records to inflate income or sales figures. This illegal practice subjects organizations and their executives to civil lawsuits, often driven by the desire to meet investor expectations or reverse financial losses (Arokiasamy & Cristal, 2019).

Theoretical Review

This paper began with evidence of forensic accounting services as essential for effective the performance of Deposit Money Banks. Forensic accounting services were also discussed as particularly important in the present technologically advanced yet fragile economic conditions. Intentions are the best predictor of any planned behavior and understanding the antecedents of intentions provides practical insights into the behavior (Ajzen and Fishbein 1980). Therefore, Fraud preventative theory was proposed to curb the behavioral intention of any individual to fraud.

According to Goosen, et al (1999), a bank owes a duty to its customers to keep accurate records of all the transactions effected against the account in question. Thus, a bank statement serves a vital role in meeting the bank's accountability to its clients and is a fundamental aspect of modern banking. Goosen et al. (1999:221) state that the role of a bank account statement, which is of the utmost importance to a bank, is that it serves as an audit trail showing in detail the various transactions effected against the account. A bank statement is a form of accounting record. This view is reflected in the total sample, which views a bank account statement as a detailed record of all transactions in a bank account. These transactions reflect money going into an account (credit transaction) or out of an account (debit transaction). In effect, a bank statement serves as evidence of the transactions against a bank account, a fact that is addressed by Section 236 of the Criminal Procedure Act 51 of 1977, which deals with the proof of entries in bankers' books. Section 236 of Act 51 of 1977 allows the production of a bank statement to be prima facie proof of the transactions reflected therein. Section 28 of the Civil Proceedings Evidence Act 25 of 1965 contains similar provisions relating to civil legal proceedings.

Empirical Review

Wisdom (2021) examines the effects of big data analytics on the fraud management of deposit money banks in Nigeria. The target populations comprised all 609 forensic managers, their staff and internal control managers and their staff. For this study, a sampling frame of 21 deposit money banks was taken. A sample of 61 respondents was used which was spread proportionately across 6stratum. The study used primary data that was collected through self-administered questionnaires. The findings indicated that forensic investigation and forensic litigation were statistically significant in explaining changes in the financial performance of deposit money banks. The findings of this study were crucial in formulating study conclusions. However, the study also took into account the expectations of the study. It was possible to conclude from the study findings that forensic investigation and forensic litigation were statistically significant in explaining changes in the financial performance of deposit money banks in Nigeria. It was also possible to conclude that the use of forensic financial information influenced and improved the performance of deposit money banks in Nigeria. The unique

contribution of the paper is that it addresses the effects of forensic accounting on the performance of deposit money banks in Nigeria, upon which the majority of deposit money banks in a developing economy ought to adapt to mitigate financial irregularities though, primary data was used while this current study will use secondary data which is a gap that the study will cover.

Omiya, (2021) examines the effect of big data analytics on prevention and detection of fraud in Nigerian banking sector. Data were gathered from a sample of United Bank of Africa (UBA) Plc's annual reports and accounts for (12) twelve years (2000-2007). The research work made use of multiple regression methods. Forensic audit (FAUD) was used as a proxy for forensic accounting and as the dependent variable, while net profit margin (NPM), profit after tax (PAT) and dividend per share (DPS) were used as independent variables using multiple regression techniques, STATA software package as a tool for data analysis. The result of the analysis shows that forensic audit has a significant effect on the net profit margin of selected Nigerian banks. It was also observed that forensic audit influences the profit after tax of Nigerian banks. The study also revealed that forensic audit has a significant effect on retained earnings and dividends per share of Nigerian banks. Based on the findings of this study, the researchers recommended that the management of commercial banks should emphasize and enhance the use of forensic financial information as this will help in increasing their profitability. Their use of a multiple-model approach was very appropriate for comparative findings but using the 2007 dataset as the most recent in their 2023 work engenders currency problems.

Muhammed, (2021) examines the effect of data visualization tools on Bank Fraud in Nigeria. The unprecedented increase in cases of bank fraud in Nigeria. The study used a survey research design and Primary sources of data were used through a well-structured questionnaire which was distributed randomly to 110 respondents out of which 106 were collected back. The data collected were analyzed using Spearman's rank correlation method and we found out that there is a very strong and static relationship that exists between forensic audit and fraud detection, prevention, and investigation. The findings show that forensic audit helps in enhanced bank fraud detection and prevention. Furthermore, the results show that forensic audit is not just an effective tool but also an efficient tool for the detection, prevention, and reduction of bank fraud in Nigeria. It is therefore recommended that forensic audit should be highly embraced by specialized institutions like banks and insurance companies to ensure that fraud cases are speedily detected and adequately prevented. Also, a separate body should be constitutionally established and mandated for the training and retraining of forensic auditors. It is also recommended that our institutions of higher learning, apart from teaching forensic accounting and auditing, should have standard forensic audit laboratories with the tools for practical study. The adoption of a two-model approach and the use of both secondary and primary data add value to their study and makes its findings more robust.

Thomas, (2021) examines the effect data visualization tools financial fraud in Indian Banking sector. Drawing on the fraud diamond model, this dissertation explores and discusses the factors and problems which distort the effective implementation of forensic accounting in India based on primary and secondary data collected. The process of collecting data for this paper was through an open-ended internet-mediated questionnaire sent to accounting professionals practising in India. The results indicate that the present scenario of forensic audit is not effective, and it can be improved through the establishment of proper regulatory authority and by imparting excellent training to future forensic accountants. It is also recommended to establish a separate regulatory body for forensic accountants that produces and governs rules, laws, and regulations relating to this field in India. The mere mention of linear regression as an analytical method for testing the hypotheses without being

specific was not appropriate also, the domain of the study is another gap that needs to be filled since is not done in Nigeria.

Karimu (2023), the study aims to investigate, data mining, and provide insights into the practical application, challenges, and implications of these advanced technologies in fraud prevention. Through an extensive literature review, a range of case studies, and a comparative analysis of methodologies, this paper delves into the key aspects of data-driven fraud prevention. The literature review establishes the significance of data analytics in fraud prevention, highlighting its pivotal role in identifying and preventing fraudulent activities. Various case studies from diverse sectors, including finance, healthcare, and e-commerce, exemplify successful implementations of data analytics and the challenges faced in real-world scenarios. A comparative analysis of fraud prevention approaches showcases the strengths and limitations of different methodologies, guiding organizations in optimizing their fraud prevention strategies. The findings underscore the transformative impact of data analytics, machine learning, and big data in revolutionizing fraud prevention. Implications drawn from this research suggest a future where these technologies will continue to be instrumental in proactively combating evolving fraudulent activities, ensuring regulatory compliance, and upholding ethical standards. In the study, the methodology used was not well spelled out and as such the finding cannot be validated.

Yakubu (2023), examines Diagnostic big data analytics and the performance of deposit money banks in Rivers State, Nigeria. The study adopted the cross-sectional survey design. A structured questionnaire was used to collect data from respondents while linear regression analysis was used as the test statistic. The population of the study comprised 21 deposit money banks in Rivers State, Nigeria. A total of one hundred and sixty-eight (168) respondents were drawn from the study population using simple random sampling techniques. However, the final data analyses were based on 150 retrieved questionnaires. The study found that diagnostic big data analytics enhanced the performance of deposit money banks in terms of customer satisfaction and return on investment (ROI). Therefore, the study concluded that diagnostic big data analytics is essential to improve the performance of deposit money banks in Rivers State, Nigeria, and recommended that deposit money banks in Rivers State that desire to enhance their performance in terms of customer satisfaction and greater return on investment should integrate diagnostic big data analytics as a key data management tool. Geographically, the study was limited to river states alone which means the result was limited to river states. A generalized study has to be done to cover entire Nigerian banks.

Musa (2020) assesses the effect of forensic auditing and investigation techniques on the financial performance of Deposit-taking Microfinance Institutions in Kenya. The study was guided by the fraud diamond theory. The study targeted all the Deposit-taking microfinance institutions in Kenya that were in operation between 2016 and 2020. The target population was 387 employees and managers of these firms including management and operations, Finance and credit control, Internal audit and Risk, External Audit, ICT, and Litigation departments of the Twelve Microfinance Institutions that were in operation in Kenya during the period of the study. The sample size was 281. The researcher used purposive and stratified Random sampling methods to select the sample. Both descriptive and inferential statistics were used in analyses. The findings showed that the micro-finance institutions used forensic auditing and investigation techniques in the fight against fraud. The findings further showed that the use of forensic auditing and investigation techniques has reduced incidences of fraud in the banking sector which have positively contributed to financial performance. The study concludes that there is a significant positive relationship between forensic auditing and investigation techniques and the financial performance of deposit-taking microfinance institutions in

Kenya. The study recommends that the management of microfinance institutions should invest more in auditing and investigation techniques and should implement the recommendations of external auditors. The sources of data were not appropriate for finding financial performance by listed deposit money Banks in Nigerian.

Oguda et al. (2020) examine the effect of internal control on fraud detection and prevention in district treasuries of Kakamega County. The purposive sampling method was used to select treasury staff while the simple random sampling method was used to select heads of departments to respond to the data collection instruments. The findings of the study revealed that there was a statistically significant and positive relationship between the adequacy of internal control systems and fraud prevention and detection in district treasuries in Kakamega County. The study was carried out in Kenya, not Nigeria deposit money bank against the current study which is a gap that will be filled.

3. Methodology

This study employed a survey research design, targeting 465 quality control officers across all 14 deposit money banks in Nigeria as of December 31, 2023. These banks were selected due to their interactions with local and international stakeholders, making them more likely to encounter sophisticated digital fraud. The study focused on the banks' regional head offices in Abuja. Data were collected through a structured five-point Likert scale questionnaire, distributed to quality control officers, compliance staff, and internal auditors. Purposive sampling was used to select a sample size representing the entire population, based on the homogeneity of the participants. A simple random sampling technique (balloting method) was used to allocate 140 questionnaires proportionally across the banks, based on their respective populations, using a specific formula (Oginni, et al.2014).

The study relied on primary data obtained through questionnaires, supplemented by secondary sources such as literature, journals, and internet resources. Multiple regression analysis was utilized to examine the linear relationship between variables, particularly focusing on how forensic accounting tools help ensure financial fraud prevention in Nigeria's quoted deposit money banks. The data were processed both manually and electronically using Statistical Packages for Social Sciences (SPSS) 16.

The model for this study thus is stated in its functional form below:
FFP = f (BDAT, DVT, DM, FDS)
$FFP = \beta 0 + \beta 1BDAT + \beta 2DVT + \beta 3DM + \beta 4FDS + e$ ……. I

FFP = Financial Fraud Prevention as the dependent variable,
BDAT = Big Data Analytics Tools
DVT= Data Visualization Tools
DM= Data Mining
EDST= Fraud Detection Software
β0 = constant
β1, β2, β3, β4, are the coefficients
μ= error term

4. Result and Discussion

The main objective of this study is to effect of forensic accounting tools on fraud prevention in Nigeria's listed deposit money banks. This chapter covers data presentation, data analysis, tests of hypotheses, and discussion of findings. The dependent variable of this study is financial fraud

prevention (FFP) while the independent variables are big data analytics, (BDAT), Data Visualization Tools (DVT), Data Mining (DM), and Fraud Detection Software (FDS). One forty (140) questionnaires were administered to respondents but only one Hundred and sixteen (136) were filled and returned which represented about a 97.1% response rate. This is far above 30% which can also be acceptable according to the rule of thumb.

The sample descriptive statistic of the entire study is presented in Table 4.10 where the mean, standard deviation, minimum, and maximum values of the variables used in the study are analyzed in terms of the explained (dependent) and explanatory (independent) variables.

Table 1 ***Descriptive Statistics***

			Descriptive Statistics		
Variables	**Obs**	**Minimum**	**Maximum**	**Mean**	**Std Deviation**
FFD	136	2.11	5.00	4.31	1.434
FDS	136	2.20	5.00	4.13	0.3364
DM	136	1.30	5.00	4.56	0.3358
DVT	136	2.40	4.80	3.93	1.333
BDAT	136	2.5 0	5.00	4.39	0.772

Source: SPSS 23 Outputs

Based on the provided descriptive statistics from SPSS 23 Outputs. Fin Fraud Prevention. With a mean of 1 and a standard deviation of 1.434, this variable indicates a relatively high average effectiveness or satisfaction with financial fraud prevention measures. The high standard deviation shows that there is considerable variability in the responses. Fraud Detection Software. The mean score is 4.13 with a low standard deviation of 0.3364, suggesting a generally high and consistent level of satisfaction or effectiveness with fraud detection software. Data Mining. This variable has the highest mean score of 4.56 and a very low standard deviation of 0.3358, indicating very high and consistent satisfaction or effectiveness with data mining practices. Data Visualization Tool. With a mean score of 3.93 and a standard deviation of 1.333, this suggests moderate satisfaction or effectiveness with data visualization tools, but the responses are quite varied. Big Data Analytics Tools. The mean score of 4.39 and a standard deviation of 0.772 suggest a high level of satisfaction or effectiveness with big data analytics tools, with moderate variability in responses. The descriptive statistics indicate that the respondents generally perceive all five areas positively. Data mining has the highest satisfaction or effectiveness score, suggesting it is the most positively viewed. Fraud detection software also shows high satisfaction with minimal variability, indicating consistent performance. Fin fraud prevention and big data analytics tools are also rated highly but with more variability, suggesting some mixed experiences. Data visualization tools have the lowest mean score and high variability, indicating a more diverse range of experiences and perceptions in this area.

Spearman Correlation Analysis

This section presents the Spearman correlation coefficients of the dependent variable (financial fraud detection) and independent variables (advanced analytics and AI, communication monitoring software, geospatial, encryption, and data security tools) of the study as in Table 4.12 and the results show the degree of association and their levels of significance between the variables of the study. The correlation analysis of the study is indicated in Table 4.12 and was analyzed as follows

Table 2. ***Correlation Matrix of variables***

Variables	Coefficients	FFP	FDS	DM	DVT	BDAT
FFP	Correlation Coefficient	1.000				
	Sig. (2-tailed)	.546				
FDS	Correlation Coefficient	.612**	1.000			
	Sig. (2-tailed)	.000	.			
DM	Correlation Coefficient	.413**	.212**	1.000		
	Sig. (2-tailed)	.000	.000	.		
DVT	Correlation Coefficient	.513**	.422**	.531**	1.000	
	Sig. (2-tailed)	.000	.000	.000	.	
BDAT	Correlation Coefficient	.312**	.232**	.439**	.472**	1.000
	Sig. (2-tailed)	.000	.000	.000	.000	.

Source: SPSS 23 Outputs

Fin Fraud Prevention (FFP). Strong positive correlation with Fraud Detection Software (FDS) ($r = 0.612$, $p < 0.01$). Moderate positive correlation with Data Mining (DM) ($r = 0.413$, $p < 0.01$) Moderate positive correlation with Data Visualization Tool (DVT) ($r = 0.513$, $p < 0.01$) Moderate positive correlation with Big Data Analytics Tools (BDAT) ($r = 0.312$, $p < 0.01$)
Fraud Detection Software (FDS). Strong positive correlation with Fin Fraud Prevention (FFP) ($r = 0.612$, $p < 0.01$) Weak positive correlation with Data Mining (DM) ($r = 0.212$, $p < 0.01$) Moderate positive correlation with Data Visualization Tool (DVT) ($r = 0.422$, $p < 0.01$) Weak positive correlation with Big Data Analytics Tools (BDAT) ($r = 0.232$, $p < 0.01$)
Data Mining (DM) Moderate positive correlation with Fin Fraud Prevention (FFP) ($r = 0.413$, $p < 0.01$) Weak positive correlation with Fraud Detection Software (FDS) ($r = 0.212$, $p < 0.01$) Strong positive correlation with Data Visualization Tool (DVT) ($r = 0.531$, $p < 0.01$) Moderate positive correlation with Big Data Analytics Tools (BDAT) ($r = 0.439$, $p < 0.01$)
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Big Data Analytics Tools (BDAT) Moderate positive correlation with Fin Fraud Prevention (FFP) ($r = 0.312$, $p < 0.01$) Weak positive correlation with Fraud Detection Software (FDS) ($r = 0.232$, $p < 0.01$) Moderate positive correlation with Data Mining (DM) ($r = 0.439$, $p < 0.01$) Moderate positive correlation with Data Visualization Tool (DVT) ($r = 0.472$, $p < 0.01$)

The correlation matrix reveals several key relationships between the variables. Fin Fraud Prevention (FFP) has the strongest correlation with Fraud Detection Software (FDS), indicating that as the effectiveness of FFP increases, so does the effectiveness of FDS. Data Mining (DM) and Data Visualization Tools (DVT) have a strong correlation, suggesting that these tools are often used together effectively. Big Data Analytics Tools (BDAT) show moderate correlations with all other variables, indicating their broad utility across different aspects of fraud prevention and detection. Overall, the correlation coefficients are statistically significant at the 0.01 level, highlighting the interconnectedness of these variables in the context of financial fraud prevention and detection systems.

Regression Analysis

This section presents the regression results of the dependent variables; financial fraud detection (FFD) and also presents the independent variables of the study namely; advanced analytics and AI, communication monitoring software, geospatial, encryption, and data security tools which are

followed by an analysis of the independent variables on dependent variables individually and cumulatively.

The regression results obtained from the model of the study which was
FFP = (β0 + β1 FDS + β2 DM + β3 DVT + β4 BDAT +e) are presented in Table 4.13 as shown below.

Table3 Regression *Results of the Study*

Variables	Coefficients	T-Values	P-Values
Constants	1.79	6.138	.001
FDS	.441	8.635	.023
DM	.304	5.363	.022
DVT	.144	2.243	.015
BDAT	.066	3.136	.000
R^2	0.622		
Adj. R^2	0.731		
F-Stat.	53.543		
F- Sig			0.00

Source: SPSS 23 Outputs

Coefficients Constants: Coefficient: 1.79. T-Value: 6.138. P-Value: .001. The constant term is statistically significant ($p < 0.05$), indicating a base level of the dependent variable when all predictors are zero.
FDS (Fraud Detection Software) Coefficient: 0.441. T-Value: 8.635. P-Value. .023. FDS has a positive and statistically significant effect on the dependent variable ($p < 0.05$). For every unit increase in FDS, the dependent variable increases by 0.441 units.
DM (Data Mining). Coefficient: 0.304 T-Value: 5.363. P-Value: .022. DM also has a positive and statistically significant effect on the dependent variable ($p < 0.05$). For every unit increase in DM, the dependent variable increases by 0.304 units.
DVT (Data Visualization Tool). Coefficient: 0.144. T-Value: 2.243. P-Value: .015. DVT has a positive and statistically significant effect on the dependent variable ($p < 0.05$). For every unit increase in DVT, the dependent variable increases by 0.144 units.
BDAT (Big Data Analytics Tools). Coefficient: 0.066. T-Value: 3.136. P-Value: .000. BDAT has a positive and statistically significant effect on the dependent variable ($p < 0.05$). For every unit increase in BDAT, the dependent variable increases by 0.066 units.
Model Summary. R^2 (R-squared): 0.622. Approximately 62.2% of the variance in the dependent variable is explained by the independent variables in the model.
Adjusted R^2 (Adj. R^2): 0.731. Interpretation: The adjusted R-squared value of 0.731 indicates a good fit of the model, accounting for the number of predictors relative to the number of data points.
F-Statistic (F-Stat.): 53.543. Interpretation: The F-statistic is highly significant ($p < 0.01$), indicating that the overall regression model is statistically significant.
F-Significance (F-Sig): 0.00. The p-value for the F-statistic is 0.00, confirming the overall significance of the model.

The regression analysis indicates that all the independent variables (FDS, DM, DVT, and BDAT) have positive and statistically significant effects on the dependent variable. The model explains a substantial portion of the variance in the dependent variable ($R^2 = 0.622$, Adj. $R^2 = 0.731$), and the overall model is highly significant (F-statistic = 53.543, $p = 0.00$). These results suggest that improvements in fraud detection software, data mining, data visualization tools, and big data analytics tools are all associated with better outcomes in the context of the study

Test of Hypotheses

H_{01}: *Big data analytics tools have no significant effect on fraud prevention in Nigerian deposit money banks*. Based on the P-Value for BDAT: .000, Significance Level (α): 0.05 the study Reject H01 and concludes that Big data analytics tools have a significant effect on fraud prevention in Nigerian deposit money banks.

H_{02}: *Data visualization tools have no significant effect on fraud prevention in Nigerian deposit money banks*. Based on the P-Value for DVT: .015. Significance Level (α): 0.05 the study Reject H02 and concludes that Data visualization tools have a significant effect on fraud prevention in Nigerian deposit money banks.

H_{03}: *Data mining has no significant effect on fraud prevention in Nigerian deposit money banks*. Based on the P-Value for DM: .022, Significance Level (α): 0.05, the study Reject H03 and concludes that Data mining has a significant effect on fraud prevention in Nigerian deposit money banks.

H_{04}: *Fraud detection software has no significant effect on fraud prevention in Nigerian deposit money banks*. Based on the P-Value for FDS: .023, Significance Level (α): 0.05 the study Reject H04 and concludes that Fraud detection software has a significant effect on fraud prevention in Nigerian deposit money banks.

Discussion of Result

The hypothesis testing results indicate that big data analytics tools have a significant effect on fraud prevention in Nigerian deposit money banks (H01 rejected). This finding aligns with previous research that emphasizes the role of big data analytics in enhancing fraud detection and prevention strategies in financial institutions. Big data analytics enable banks to process vast amounts of structured and unstructured data in real-time, allowing for the identification of unusual patterns and anomalies that may indicate fraudulent activities (Jagadish, et al 2014). By leveraging advanced analytics techniques such as machine learning and predictive modeling, banks can proactively detect fraudulent transactions and mitigate risks effectively (Akinyemi, et al 2017).

The analysis shows that data visualization tools significantly affect fraud prevention in Nigerian deposit money banks (H02 rejected). Data visualization tools play a crucial role in fraud prevention by providing intuitive and interactive ways to explore complex data sets, enabling analysts to identify trends, outliers, and suspicious patterns more efficiently (Chen, et al 2012).

Research indicates that visual analytics enhances fraud detection capabilities by facilitating quick insights into transactional data and operational trends, thereby enabling timely interventions to prevent financial losses (Kwon, Lee, & Shin, 2014). Moreover, interactive visualizations empower decision-makers to comprehend data-driven insights more effectively, enhancing overall fraud management strategies (Keim & Andrienko, 2013).

The findings reveal a significant impact of data mining on fraud prevention in Nigerian deposit money banks (H03 rejected). Data mining techniques such as anomaly detection, clustering, and classification algorithms are instrumental in identifying fraudulent activities based on historical transactional data and behavioral patterns (Phua, et al 2010).

Studies highlight that data mining enhances fraud detection accuracy by automating the process of identifying irregularities and deviations from normal behaviors, thereby reducing false positives and improving operational efficiency (Chan, et al. 2015). Effective utilization of data mining allows

banks to stay ahead of sophisticated fraud schemes and adapt quickly to evolving fraud tactics in the financial sector (Bolton & Hand, 2002).

The analysis confirms that fraud detection software has a significant effect on fraud prevention in Nigerian deposit money banks (H04 rejected). Fraud detection software integrates various algorithms and rules-based systems to monitor transactions in real time, flagging suspicious activities for further investigation (Chiu & Tsai, 2014). The research underscores the importance of robust fraud detection software in mitigating financial risks by swiftly identifying fraudulent transactions and reducing financial losses (Griffin & Nielson, 2017). Advanced fraud detection systems leverage machine learning models to adapt to new fraud patterns continuously, enhancing their effectiveness in detecting and preventing fraudulent activities (Kos, et al 2011).

The findings from this study underscore the critical role of big data analytics tools, data visualization tools, data mining, and fraud detection software in enhancing fraud prevention strategies within Nigerian deposit money banks. These technologies not only improve the detection accuracy of fraudulent activities but also enable proactive measures to mitigate risks effectively. By leveraging these advanced tools, financial institutions can strengthen their fraud prevention frameworks and safeguard their assets and customer trust in an increasingly complex digital landscape.

5. Conclusion and Recommendations

Conclusion

The analysis conducted in this study provides compelling evidence regarding the significant effect of various technological tools on fraud prevention within the Nigerian banking sector. Based on the regression results and hypothesis testing, the following conclusions can be drawn:

Big Data Analytics Tools: The findings reject the null hypothesis that big data analytics tools have no significant effect on fraud prevention. This underscores the critical role of these tools in processing large volumes of data to detect and prevent fraudulent activities effectively.
Data Visualization Tools: Similarly, the rejection of the null hypothesis regarding data visualization tools affirms their significant contribution to fraud prevention. These tools enable intuitive exploration of complex data, facilitating quicker identification of suspicious patterns and trends.
Data Mining: The significant effect of data mining on fraud prevention, as indicated by the hypothesis testing results, highlights its importance in leveraging historical data to identify anomalies and potential fraud risks.
Fraud Detection Software: The analysis confirms that fraud detection software significantly enhances fraud prevention efforts. These software systems employ advanced algorithms and real-time monitoring capabilities to promptly detect and mitigate fraudulent transactions.

The study makes the following recommendations which are consistent with the literature review.

i. Nigerian deposit money banks should continue to invest in and adopt advanced technological tools such as big data analytics, data visualization tools, data mining techniques, and fraud detection software. These tools have demonstrated significant effectiveness in enhancing fraud prevention capabilities by enabling real-time monitoring, anomaly detection, and predictive analytics.
ii. Banks should integrate multi-faceted approaches that combine different technological tools synergistically. Combining tools like big data analytics for large-scale data processing, data

visualization for intuitive insights, data mining for pattern recognition, and fraud detection software for real-time monitoring create a comprehensive fraud prevention framework.

iii. Banks should prioritize training programs and skill development initiatives for their staff to effectively utilize and interpret insights from these technological tools. Skilled personnel are essential for leveraging the full potential of technological tools. Training programs should focus on data analysis, machine learning techniques, and fraud detection methodologies.

iv. Foster collaboration and information sharing among Nigerian deposit money banks, regulatory bodies, and cybersecurity experts. Collaborative efforts can enhance the collective ability to identify and respond to emerging fraud threats swiftly. Information sharing helps in staying ahead of evolving fraud tactics and strengthens the overall resilience of the banking sector.

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