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MODERATING ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN CORPORATE GOVERNANCE AND FRAUD DETECTION IN LISTED DEPOSIT MONEY BANKS IN NIGERIA

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ABSTRACT

The study examined the moderating role of information and communication technology on the relationship between corporate governance and fraud detection in listed deposit money banks in Nigeria. Corporate governance was proxied using board competence (BODC), board diversity (BODD) and board independence (BODIND); fraud detection on the other hand was measured using Beneish M-Score Model while the moderating variable of information and communication technology (ICT) was proxied using information and communication technology expenditure (ICTE). Ex post facto research design was adopted and the data for the study was collected from the annual reports and accounts of the 14 listed deposit money banks on Nigeria Exchange Group (NGX) as of December 31, 2024 for the period of 2019-2024. Panel Least squares regression model was used in the data analysis and the results of the study showed a significant and positive association between board competence (BODC), board diversity (BODD), board independence (BODIND) and fraud detection in listed deposit money banks in Nigeria at 1%-5% significant level. Information and communication technology (ICT) was also found to moderate the relationship between corporate governance and fraud detection at 1%-5% level of significance. The study therefore concludes that corporate governance enables fraud detection in listed deposit money banks in Nigeria. Also, ICT moderated the relationship between corporate governance and fraud detection. The study therefore recommends that banks should prioritize the recruitment of highly competent individuals for their boards so as to enable fraud detection in listed deposit money banks in Nigeria. Ensuring diversity across gender could deter the likelihood of fraud commitment in listed deposit money banks in Nigeria. Also, DMBs are encouraged to increase the number of their independent directors in order to reduce the likelihood of fraud commitment.

Key words: *Corporate Governance; Fraud Detection, Information and Communication Technology.*

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INTRODUCTION

The increasing integration of information and communication technology (ICT) into corporate governance frameworks offers significant potential for enabling fraud detection in emerging markets, particularly in Nigeria. The rapid digital transformation within the banking sector in Nigeria presents a unique opportunity to explore the interaction between ICT investments and corporate governance attributes. Nigerian banks are grappling with fluctuating regulatory environments, technological upgrades, and the need to balance operational efficiency with consumer trust and investor confidence (Central Bank of Nigeria, 2022). Despite the significant growth in ICT expenditure in the banking sector, there remains a limited understanding of how these investments influence the relationship between corporate governance attributes and fraud detection. Thus, fraud continues to undermine the integrity and financial stability of corporate organizations, particularly in developing economies (Ayodeji, 2024). Although corporate governance frameworks are designed to enhance transparency and accountability, their effectiveness in detecting and preventing fraud is often limited without robust IT integration (Jizi & Nehme, 2024). In Nigeria, where banks face rapid digital transformation and a high prevalence of fraud cases, the interplay between governance and ICT utilization remains underexplored.

Previous research predominantly focuses on developed economies where stable regulatory environments and advanced technological infrastructures are the norm. However, these findings are not fully applicable to emerging economies like Nigeria, where distinct economic, technological, and regulatory challenges prevail (Bhagat & Bolton, 2022). Banking sector in Nigeria is a key sector for economic growth, that requires more localized analysis to understand how ICT spending moderates the effectiveness of governance attributes in ensuring fraud detection outcomes (PwC Nigeria, 2023). Existing studies treated ICT expenditure and governance attributes such as; board competence, diversity and independence as a separate influence on fraud detection. The role of ICT in moderating the relationship between corporate governance and fraud detection remains underexplored, particularly in the context of Nigeria (Jizi & Nehme, 2024). While some studies (Zeitoun et al 2021; Bhagat & Bolton, 2022; Nakpodia & Adegbite, 2022 etc) addressed the impact of ICT on corporate governance, few studies (Adeusi et al., 2022; Tarighi et al., 2023; Boshnak et al., 2023 etc) examined how ICT investment interacts with specific corporate governance attributes with the exception of board competence and independence (Schmidt & Fahlenbrach, 2021).

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Objectives

The broad intent of this study is to assess the moderating role of information and communication technology on the relationship between corporate governance and fraud detection in Nigeria. To achieve this o, the following specific objectives were envisaged:

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1. to determine if Board competence has any significant effect on fraud detection in listed Deposit Money Banks in Nigeria.
2. to assess the effect of Board diversity does on fraud detection in listed deposit money banks in Nigeria.
3. to ascertain the extent to which Board independence affects fraud detection in listed deposit money banks in Nigeria.
4. to evaluate if ICT significantly moderates the relationship between board competence and fraud detection in listed deposit money banks in Nigeria
5. to determine if ICT significantly enhances the relationship between board diversity and fraud detection in listed deposit money banks in Nigeria.
6. to assess if ICT significantly moderates the effectiveness of board independence in fraud detection in listed deposit money banks in Nigeria

LITERATURE REVIEW

Corporate Governance

Corporate governance is pivotal in shaping corporate strategy, decision-making, and performance, with board-specific attributes playing a critical role in its effectiveness (Kanakriyah, 2021). These attributes center on harmonizing the interests and priorities of various stakeholders, including shareholders, management, consumers, suppliers, financiers, governments, and communities (OECD, 2023). Boards of directors (BoDs) serve as the cornerstone of effective governance, tasked with appointing executive directors and general managers, defining functional responsibilities, and providing strategic direction by establishing the organizations vision, mission, and goals (Kanakriyah, 2021).

Global corporate governance codes have undergone substantial revisions in response to prominent corporate scandals and financial crises. High-profile cases, such as the collapses of Enron, Lehman Brothers, and WorldCom, revealed severe governance deficiencies. The Enron scandal exposed issues in financial reporting, executive compensation, and board

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oversight, prompting the implementation of the Sarbanes-Oxley Act of 2002 in the United States (OECD, 2023). Similarly, the 2008 collapse of Lehman Brothers, driven by risky financial products and inadequate accountability, underscored the necessity of robust governance frameworks in financial institutions (Basel Committee on Banking Supervision, 2022). These events, along with others such as the Volkswagen emissions scandal, have led to a global push for more transparent, accountable, and ethical corporate practices. According to Dan (2024), corporate governance is a set of rules, practices, and processes used to direct and control an organization. Boards of directors are the primary force determining corporate governance. Accounting, transparency, fairness, and responsibility are the four fundamental principles of corporate governance. Corporate governance according to (Meghan, 2024) is the process by which corporations establish their rules and policies and implement and monitor them.

Board Competence

Foss et al. (2021) defined competence as encompassing a range of essential attributes that individuals should possess to effectively perform their roles. Similarly, the International Accounting Education Standards Board (IAESB, 2019) elaborates that competence is a multifaceted concept, integrating skills, knowledge, training, and experience. Al-Shammari et al. (2023) further emphasize the three core responsibilities of the board: overseeing management activities, making strategic decisions, and advising the CEO. Beyond roles, boards also play a crucial part in advancing the Sustainable Development Goals these(SDGs) (Guerrero-Villegas et al., 2023) and in developing and implementing effective communication strategies (Gaa, 2022).

As noted by Aluchna (2023), large boards often bring a wide array of expertise, skills, and competencies, enabling them to assist management in delivering clear and transparent disclosures to stakeholders. Organizations with competent boards and skilled management that uphold integrity and maintain transparent engagement with shareholders and stakeholders are better positioned to meet their strategic goals while contributing positively to societal well-being (Code of Corporate Governance, 2018).

H_{o1}: *Board competence has no significant effect on fraud detection in listed Deposit Money Banks in Nigeria.*

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Board Diversity

Adams and Ferreira (2022) highlighted that female directors demonstrate greater engagement levels than their male counterparts, leading to improved board effectiveness when womens representation increases. Similarly, Liu et al. (2024) observed that companies with at least three female board members experience a stronger impact on performance than those with fewer women. Strøm et al. (2024) further emphasized that firms benefit from having women in management roles, as they facilitate better connections with a predominantly female customer base. Consequently, the increased participation of women in decision-making processes enhances firms social performance.

Hafsi and Turgut (2023) argue that the exact meaning of boardroom diversity remains unclear, distinguishing between two types: structural diversity across different boards and demographic diversity within boards. Structural diversity refers to variations in board characteristics, such as board size, leadership structure (e.g., CEO-chairman duality), the presence of founder leaders or international directors, board committee operations, independence, director ownership, tenure, and compensation. Demographic diversity, on the other hand, refers to differences among directors, categorized into observable (demographic) and less visible (cognitive) dimensions. Demographic dimensions include gender, age, and ethnicity, while cognitive dimensions encompass educational background and political ideology (Mahadeo et al., 2022).

H_{o2}: Board diversity does not significantly influence fraud detection in listed deposit money banks in Nigeria.

Board Independence

Board independence, in the context of corporate governance, refers to the degree to which a board of directors is free from undue influence by management or other stakeholders. It's often measured by the ratio of independent directors (those with no conflict of interest) to the total number of directors (Liu et al., 2024). The independence of directors in carrying out their roles and duties without undue influence makes it possible for the achievement of set goals and objectives. Directors who possess the quality of independence are seen to put the interest of shareholders and other stakeholders for alignment of Corporate goals.

Independent directors are the person entrusted by shareholders to represent them and will help to reduce agency problems. Further, the Code of Corporate Governance and regulators recommend the composition of board members should be balanced and consist of independent

directors (Sharifah, et al, 2022). A well-qualified board with a high level of independence is better equipped to guide strategy, oversee management and be accountable to shareholders. Safeguards are necessary to protect minority shareholders from potential abuse by dominant shareholders or other insiders. Independent board members are in a better position to scrutinise decisions for signs of inequitable treatment and request additional information.

H_{o3}: Board independence has no significant effect on fraud detection in listed deposit money banks in Nigeria.

Fraud Detection

Fraud detection is essential for organizations to maintain operational integrity and safeguard against financial losses due to fraudulent activities. The ability to detect fraud efficiently and effectively is crucial for ensuring stakeholder trust, maintaining regulatory compliance, and protecting the organizations assets. The rise in fraudulent activities has highlighted the urgent need for financial platforms to implement comprehensive fraud detection and prevention systems to minimize financial losses. Fraud prevention focuses on identifying and stopping fraudulent actions before they occur, while fraud detection aims to uncover fraudulent activities after they have taken place. In the era of advanced information systems, organizations are increasingly turning to modern technologies and risk management techniques to address a growing spectrum of fraudulent behaviors. These strategies utilize big data and real-time monitoring, integrating adaptive and predictive analytics approaches, including machine learning, to assess fraud risks effectively (Omaliko & Mordi, 2016; Baesens et al., 2021).

Through the application of data analytics, specialized software, and integrated prevention strategies, organizations can predict traditional fraud methods, automate data comparisons, perform continuous real-time transaction monitoring, and detect emerging fraudulent patterns. Fraud detection systems analyze customer data, examining online browsing patterns, historical interactions, and behavioral traits to identify irregularities (Baesens et al., 2021).

Information and Communication Technology

Gartner (2023), ICT in financial firms now encompasses core banking systems, digital banking platforms, cybersecurity infrastructure, data analytics and business intelligence tools, and cloud computing services. Additionally, it includes applications of artificial intelligence (AI) and machine learning (ML), blockchain and distributed ledger technologies, customer relationship management (CRM) systems, and regulatory technology (RegTech) solutions.

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Zhu et al. (2021) emphasized the dynamic character of ICT in financial organizations, specifically highlighting the trend towards the use of more interconnected and intelligent systems. It is observed that the current ICT infrastructure in financial institutions is becoming more and more defined by its capacity to facilitate real-time data processing, sophisticated analytics, and smooth client experiences across many channels. ICT has experienced significant growth in its importance within the financial sector, emerging as a crucial catalyst for innovation, productivity, and competitive edge. Several recent studies emphasize the significance of ICT in the financial sector. According to Vial (2021), ICT is vital to the digital transformation of financial institutions, enabling banks and other financial organizations to reimagine their business models, boost operational efficiency, and enhance customer experiences.

H_{o4}: *ICT does not significantly moderate the relationship between board competence and fraud detection in listed deposit money banks in Nigeria*

H_{o5}: *ICT does not significantly enhance the relationship between board diversity and fraud detection in listed deposit money banks in Nigeria.*

H_{o6}: *ICT does not significantly moderate the effectiveness of board independence in fraud detection in listed deposit money banks in Nigeria*

Theoretical Review

The theoretical framework which gives meaning of a work in terms of theories on corporate governance, fraud detection and ICT established in this study was Agency theory and information processing theory. It is assumed that both knowledge and acceptance of these theories that this research work depends

Agency Theory (AT)

The agency theory (AT) was developed by Jensen and Meckling (1976) in Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure. AT is a fundamental concept for comprehending corporate governance and its influence on the success of a company. Corporate Governance (CG) systems are essential for effective management and oversight of corporations. Agency theory (AT) primarily focuses on the conflicts of interest that occur when a principal delegates work to an agent. Within the realm of CG, shareholders serve as the principals who delegate the responsibility of managing the company to executives, who

act as agents. The theory postulates that agents may not consistently operate in the optimal interests of principals, resulting in what is commonly referred to as the "agency problem." The theory offers a structured framework to comprehend the reasons behind their necessity. The purpose of these measures, including board monitoring, auditing, and performance-based compensation, is to ensure that managers have the same interests as shareholders, which could lead to better financial performance. Agency Theory emphasizes the presence of knowledge asymmetry between principals and agents. ICT expenditure in this study can be seen as a means to decrease this imbalance, potentially influencing the connection between governance and fraud detection. The idea examines the expenses related to supervising agents and establishing motivations for them to operate in the best interests of the proprietors. ICT investments might be regarded as a means of managing expenses related to monitoring, thereby enhancing supervision and regulation. The concept of Agency Theory explores the divergent risk attitudes between principals and agents. Investments in information and communication technology (ICT) might potentially alter the way organizations manage risks, which in turn can affect how governance practices affect fraud detection (Omaliko et al, 2017).

The relevance of Agency Theory to this particular study rests in its capacity to elucidate the fundamental mechanisms by which corporate governance influences fraud detection, and how ICT expenditure may potentially temper this relationship: ICT can be used as a tool for governance. By investing in ICT, organizations can improve their ability to monitor activities, which in turn can reinforce the influence of corporate governance on fraud detection. ICT expenditure has the potential to enhance operational efficiency and increase transparency, hence magnifying the positive impact of good governance on fraud detection. Agency Theory in this study, enables a deeper comprehension of the intricate relationship between board-specific attributes, ICT expenditure, and fraud detection in Nigerian financial organizations. This theoretical foundation offers a strong framework for formulating and examining the moderating role of ICT on the link between corporate governance and fraud detection.

Information Processing Theory

The Information Processing Theory, initially formulated by George A. Miller, Eugene Galanter, and Karl H. Pribram in their 1960 publication "Plans and the Structure of Behavior" within the realm of cognitive psychology, has subsequently been modified and utilized in organizational settings. In the field of organizational studies, this theory underwent additional refinement by researchers such as Galbraith (1974), Richard L. Daft and Robert H. Lengel in

the 1980s. The theory suggests that organizations function as information processing systems, where information is considered a crucial resource. This perspective is particularly pertinent in financial organizations, where making decisions based on data is of utmost importance. According to the Information Processing Theory, companies make use of information systems to minimize uncertainty. The allocation of funds towards ICT in Nigerian financial businesses can be seen as a deliberate attempt to improve the ability to analyze information and minimize uncertainty in the process of making decisions (Omaliko & Okpala, 2021).

The relationship between governance and information flow can be understood as the utilization of corporate governance systems to effectively manage the flow of information inside an organization. ICT systems can improve or alter these information flows, which might influence the connection between governance and fraud detection. The theory posits that the arrangement of an organization should align with its requirements for processing information. ICT investments in Nigerian financial firms might be seen as a means to synchronize the organizational structure with the information processing needs. ICT investments can enhance the quality of decisions made by governing bodies, which can ultimately lead to greater fraud detection. This is achieved via enhancing information processing skills. The influence of ICT expenditure on board-specific attributes may differ according to the particular elements being examined, such as board structure, ownership concentration, and audit quality. Nigerian financial firms should see ICT expenditure as a strategic investment rather than just an operating cost. This investment has the potential to improve the effectiveness of their corporate governance frameworks. ICT investments should be in accordance with the specific information processing requirements of the firms governance structures. This may entail customizing ICT solutions to facilitate board decision-making, risk management, and shareholder communication. However, banks and financial services firms should prioritize the development of the necessary skills and expertise to efficiently employ information and communication technology (ICT) resources. This encompasses providing training to board members and executives on how to effectively utilize information and communication technology (ICT) for the purpose of governance. Striving for a balanced approach is crucial for organizations when considering the governance and fraud detection relationship, as it involves taking into account variables beyond just ICT investment. Banking institutions should therefore routinely evaluate the efficacy of their ICT investments in facilitating governance and improving overall fraud detection. Information Processing Theory offer useful insights into the impact of ICT expenditure on the intricate

connection between board-specific attributes and fraud detection in Nigerian financial organizations.

Empirical Review

Al Frijat et al. (2024) undertook a study titled "Exploring the mediating role of corporate social responsibility in the connection between board competence and corporate financial performance amidst global uncertainties". The study analyzed data from a sample of 209 Jordanian companies listed on the Amman Stock Exchange, employing partial least square structural equation modelling for data analysis. The findings indicate that the CSR competence of boards of directors has both a direct and indirect positive effect on the financial performance of these companies. This suggests that the CSR competence of boards plays a crucial role in enabling effective CSR activities, ultimately contributing to improved organizational outcomes.

Khan et al. (2024) conducted a study titled "Board diversity and working capital management strategies: evidence from energy sector of Pakistan". They explored the mediating role of WCM efficiency in the relationship between board diversity (gender and financial knowledge) and firm performance. The sample comprised 241 firm-year observations from listed energy firms from 2010 to 2019. The secondary data were analysed using the system GMM and logit model. The findings reveal that WCM efficiency partially mediates the connection between board financial expertise and firm performance. However, the presence of female directors only becomes significant when they reach a certain threshold, as the quadratic term of board gender diversity has a notable effect on firm performance, while female directors do not influence WCM efficiency. The study shows that board gender diversity promotes a conservative WCM approach, while board financial expertise leads to a moderate WCM approach. Both conservative and moderate WCM strategies are significantly linked to improved firm performance.

Al-Matari (2024) conducted a study titled "Board of directors' attributes effects on firm performance and the moderating role of women: Alternative measurements". Using data from 46 listed financial firms (2014–2022) in Saudi Arabia the research employs OLS regression to examine variables like board size (BOSE), non-executive membership (BOIER), meeting frequency (BOMG), board commitment (BOCT), accounting/finance expertise (BOAFE), with ROE. The findings reveal that larger boards and higher proportions of non-executive members negatively affect firm performance, while financial expertise positively contributes

to it. Gender diversity moderates these relationships, as women on boards enhance the positive impacts of board size and non-executive membership but show a negative interaction with board commitment.

Essien and Akpan (2024) conducted a study titled "Board Diversity and Earnings Quality of Listed Deposit Money Banks in Nigeria". The sample comprised 10 deposit money banks listed on the Nigerian Exchange Group between 2014 and 2023. Board diversity, the independent variable, was measured using proxies such as board age diversity, board experience diversity, and board financial expertise. The dependent variable, earnings quality, was represented by discretionary loan loss provisions. They employed an ex post facto research design, and the secondary data was analysed using OLS. The findings revealed that board age diversity had an insignificant negative impact on discretionary loan loss provisions, while both board experience diversity and financial expertise had significant negative effects on the DLLP of the selected banks.

Danso et al. (2024) conducted a study titled "Board expertise diversity and firm performance in sub-Saharan Africa: do firm age and size matter?." The sample comprised 128 publicly listed companies across Ghana, Kenya, and Nigeria. The data were analysed using OLS. The findings reveal that a diverse mix of professional expertise on corporate boards has a notable positive effect on a company's Return on Assets (ROA), although no significant impact was observed when using Tobin's Q to measure performance. However, we also found that the combination of firm size and age negatively affects the relationship between board diversity and firm performance.

Ekwunife and Adelakun (2024) examined the relationship between corporate governance attributes and fraud risk of listed Information and Communication Technology (ICT) firms listed on the Nigerian Exchange Group. The study focuses on three specific governance attributes: board size, independence, and board gender diversity. Research evidence indicates that board size and board gender diversity are negatively related to fraud risk, but the relationship between fraud risk and board independence is more complex. It was found that board size, which can be associated with stronger monitoring capacity, has a negative relationship with fraud risk, while the influence of board independence and gender diversity on fraud risk is contingent on contextual factors. The paper gives insights into the relationship between corporate governance and fraud risk and suggests steps to improve governance systems

Izwan et al. (2024) conducted a study titled "Confluence of board members' financial literacy, corporate environmental disclosure, and financial reporting quality". With a robust sample of 258 firms, covering the period from 2016 to 2021, the study includes 1,290 firm-year observations, analysed using multiple linear regression. The findings showed a significant relationship between CED and EM, revealing that the presence of financial literacy among board members strengthens the negative association between CED and EM practices. Specifically, when board members possess higher levels of financial literacy, the impact of CED on curbing earnings manipulation is more pronounced, highlighting the critical role that competent governance plays in enhancing transparency and reducing manipulative financial practices.

Mukhibad et al. (2024) conducted a study titled "Corporate governance and Islamic bank risk–do the directors' and the Shariah board's diversity attributes matter?" This study examines the impact of board of directors (BOD) and Shariah supervisory board (SSB) diversity on various risks faced by Islamic banks (IBs), including credit risk, insolvency, operational risk, reputation risk, rate of deposit return risk (RDRR), and equity-based financing risk (EBFR). The research, which analyzed data from 68 IBs across 19 countries between 2009 and 2019, found that diversity in board members' experience and cross-membership reduces risk, while gender diversity increases risk. However, the diversity in the BOD's education level showed no significant effect on risk. On the other hand, diversity in SSB members' experience and cross-membership positively influenced risk, while education level and gender diversity in the SSB had no effect.

Sidki et al. (2024) conducted a study titled "The effect of board members' education and experience on the financial performance of German state-owned enterprises". The study utilized a sample of 58 state-owned utility companies in Germany from 2011 to 2016. The secondary data were analysed using OLS. The study focused on education, management, and industry experience and found no significant effects of these dimensions on company profitability. However, further investigation reveals that board members with management experience outside the energy sector negatively affect performance, suggesting a potential bias of self-overestimation.

Jonah (2023) conducted a study titled "Board member's competence and financial performance of listed pharmaceutical companies in Nigeria". The study used an ex-post-facto research design grounded in stewardship theory on a sample of six listed pharmaceutical companies from 2016 to 2022. The board members' tenure (BMT) and qualifications (BMQ)

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were proxies for board competence, while return on equity (ROE) and return on assets (ROA) represent financial performance. The secondary data was analyzed using descriptive and regression techniques. The findings revealed that BMQ positively and significantly influences ROE and ROA. Conversely, BMT had a significant negative relationship with ROE and ROA, suggesting that extended tenures may hinder performance.

MATERIALS AND METHOD

An *ex post facto* design was used in the study based on the fact that the data for the study was secondary which already existed and cannot be controlled. The population of the study consists of 14 listed deposit money banks on Nigerian Exchange Group (NGX) as at December 31, 2024, covering the period 2019-2024. The data was collected from the annual accounts and annual accounts of the sampled banks. Panel least square regression model was used to examine the moderating role of information and communication technology in corporate governance and fraud detection.

Table 1: Measurement for Independent Variable

Variable	Proxy	Measurement	Source
Independent			
Board Competence	BODC	The proportion of financial experts on board.	Peni (2014); Izwan et al. (2024); Jonah (2023)
Board Diversity	BODD	The proportion of female directors on board.	Khan et al. (2024)
Board Independence	BODIND	The ratio of independent directors to the total number of directors	Osahon and Rita (2023), Yang et al. (2022), Mordi & Omaliko (2015)
Moderating			
ICT Expenditure	ICTE	Natural log of ICT expenditure.	Zhu et al. (2021)
Control			
Firm Size	FSIZ	Natural log of total assets.	Khan et al. (2024); Danso et al. (2024); Pamarta & Utama (2023), Mordi & Omaliko (2016)

Source: Authors Compilation (2025)

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Table 2: Measurement for Dependent Variable

Variable	Proxy	Measurement	Source
Fraud Detection	FD	Beneish M-Score Model = -4.84 + (0.920 x DSRI) + (0.528 x GMI) + (0.404 x AQI) + (0.892 x SGI) + (0.115 x DEPI) – (0.172 x GAEI) + (4.679 x TATA) – (0.327 x LVGI)	Obunmeme et al. (2024), Purwiyanti and Laksito (2022), Ibadin and Ehigie (2019).

Source: Empirical Survey (2025).

Where:

DSRI = Days' Sales in Receivable Index

GMI = Gross Margin Index

AQI = Assets Quality Index

SGI = Sales Growth Index

DEPI = Depreciation Index

GAEI = General and Administrative Expenses Index

TATA = Total Accrual to Total Assets Index

LVGI = Leverage Index

NB: *A calculated M-Score greater than -2.22 suggests a higher likelihood of fraud detection.*

In line with the previous researches, the researcher adapted and modified the model of Khan et al. (2019) to suit the objectives of the current study. This is shown below as thus;

$$ROEit = a0 + a1LROEit + \beta1BSIZEit + \beta2NEDit + \beta3CEODit + \beta6LEVit + \beta7FSit + \beta8FAGEit + \mu i + \eta t + \varepsilon it \ldots\ldots\ldots\ldots \text{ Eqn 1.}$$

The econometric form of the regression modified for the study is expressed as thus:

$$FDit = \beta0 + \beta1BODCit + \beta2BODDit + \beta3BODINDit + \beta4FSIZit + \beta5ICTEit + \beta6ICTE*BODC + \beta7ICTE*BODD + \beta8ICTE*BODIND + \varepsilon i \ldots\ldots\ldots\ldots\ldots \text{ Eqn 2.}$$

Where:

FD = Fraud Detection of firm i at time t

BODC = Board Competence of firm i at time t

BODD = Board Diversity of firm i at time t

BODIND = Board independence of firm i at time t

FSIZ = Firm Size of firm i at time t

ICTE = ICT Expenditure of firm i at time t

εi = Error term

0 = Constant coefficient (intercept) of the model

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β1–β8 = Coefficient of Regression Equation

'A Priori' is given as: β0, β1, β2, β3, β4, β5, β6, β7, β8 > 0

Decision Rule: accept Ho if P-value > 1%-5% significant level otherwise reject Ho

RESULT AND DISCUSSIONS

Table 3: Descriptive Statistics

	FD	BODC	BODD	BODIND	FSIZ	ICTE
Mean	3.638714	0.401905	0.212500	0.180833	9.029738	6.145940
Median	4.409000	0.200000	0.200000	0.180000	9.181000	6.584500
Maximum	8.444000	0.480000	0.700000	0.900000	10.63700	7.910000
Minimum	-6.526000	0.050000	0.000000	0.000000	6.800000	0.000000
Std. Dev.	2.464183	1.835776	0.130485	0.117721	0.880781	1.904862
Skewness	2.899196	2.956362	0.995626	2.806584	-0.424113	-2.368730
Kurtosis	2.938744	1.485428	2.279354	1.195020	2.839184	2.094853
Jarque-Bera	397.3282	22682.82	19.60642	917.8741	2.608726	169.4037
Probability	0.673454	0.986353	0.324055	0.709842	0.271345	0.183330
Sum	-305.6520	33.76000	17.85000	15.19000	758.4980	516.2590
Sum Sq. Dev.	503.9924	279.7161	1.413175	1.150242	64.38939	301.1655
Observations	84	84	84	84	84	84

Source: E-View 12 Computational Results (2025).

Key: FD- Fraud Detection; BODC-Board Competence; BODD-Board Diversity; BODIND Board Independence; FSIZ-Firm Size; ICTE-ICT Expenditure.

The Table 3 shows that the mean value of fraud detection (FD) for the period covering 2019 to 2024 was 3.639. This implies that corporate governance enables fraud detection in the banking sector. The maximum value for the study was 8.44 while the minimum value was -6.526. This wide variation in maximum and minimum FD values justify the need for this study that banks with higher FD values have a higher likelihood of fraud detection than those banks with low FD values at a degree risk of 2.46 %. The distribution for fraud detection is platykurtic since the kurtosis (2.89) is less than 3, implying that the outliers are few. The Jarque-Bera probability of 0.673 is greater than 0.05, which means that the distribution of fraud detection is not different from a normal distribution.

Board Competence (BODC) has an average value of 0.402, showing that 40.2% of board members, on average are financial experts. The median value of 0.20 closely aligns with the mean, indicating a symmetrical central tendency. The data ranges from a minimum of 0.05 to a maximum of 0.48, highlighting variability in financial expertise across banks. A standard deviation of 1.84 reflects relatively low dispersion around the mean. The skewness value of 2.956 indicates a strong positive skew, suggesting a concentration of banks with lower board

competence but with some having exceptionally high values. The distribution for board competence is platykurtic since the kurtosis (1.48) is less than 3, implying that the outliers are few. The Jarque-Bera probability of 0.986 is greater than 0.05, which means that the distribution of board competence does not deviate from a normal distribution.

The mean of BODD is 0.213, indicating that, on average, 21.3% of board members are women. The median value of 0.20 shows that many banks have board diversity levels below the mean. The range extends from 0.00 to 0.70, reflecting a wide disparity in gender representation across banks. A standard deviation of 0.130 suggests moderate variability. The skewness value of 0.996 reflects a slight positive skew, with most banks having lower board diversity levels. The distribution for board diversity is platykurtic since the kurtosis (2.28) is less than 3, implying that the outliers are few. The Jarque-Bera probability of 0.324 is greater than 0.05, which means that the distribution of board diversity is not different from a normal distribution.

BODIND has a mean of 0.181, with a median of 0.180, indicating a relatively low representation of board independence. The minimum value is 0.00 and the maximum is 0.90, showing that some banks have independent directors in their board. The standard deviation of 0.118 indicates relatively low dispersion. A skewness of 2.81 suggests a strong positive skew, while a kurtosis value of 1.19 is close to normal implying that the outliers are few. The Jarque-Bera probability of 0.709 is greater than 0.05, which means that the distribution of board independence is not deviated from a normal distribution.

FSIZ has a mean value of 9.029 and a median of 9.181, indicating that most banks cluster around this size. The range spans from 10.64 to 6.80 showing substantial differences in banks sizes. The standard deviation of 0.881 suggests moderate variability. A negative skewness of -0.424 indicates a left-skewed distribution, with many banks having sizes closer to the upper range. The kurtosis of 2.84 is near normal, but the Jarque-Bera statistic of 2.61 and a probability of 0.271 confirm no deviations from normality.

ICT Expenditure (ICTE), expressed as the natural log of ICT expenditures, has a mean of 6.146 and a median of 6.584, indicating moderate ICT investments across firms. The range from 7.91 to 0.00 reflects significant differences in ICT expenditure. A standard deviation of 1.905 indicates high variability. The skewness of -2.369 suggests a slight negative skew, while the kurtosis of 2.095 indicates a *platykurtic* distribution. The Jarque-Bera statistic of 169.4 and a probability of 0.183 suggest that ICTE follows a normal distribution, supporting the use

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of standard statistical approaches. The larger banks, such as Access Bank, GTB, UBA and Zenith typically lead the charge in these areas.

Correlation Matrix

The relationship between the variables was assessed using the correlation (i.e., correlation matrix), and the results are presented in Table 4.

Table 4: Correlation Matrix

	FD	BODC	BODD	BODIND	FSIZ	ICTE
FD	1.0000					
BODC	0.2910	1.0000				
BODD	0.4139	0.8608	1.0000			
BODIND	0.3031	0.7927	0.6763	1.0000		
FSIZ	0.5352	-0.6515	-0.5402	0.5196	1.0000	
ICTE	0.1970	0.5508	0.2976	-0.4307	0.8861	1.0000

Source: E-View 12 Computational Results (2025).

Key: FD- Fraud Detection; BODC-Board Competence; BODD-Board Diversity; BODIND Board Independence; FSIZ-Firm Size; ICTE-ICT Expenditure.

In the correlation matrix shown in Table 4, above shows the relationship between the independent variable and all pairs of the dependent variables used in the regression model. It reveals that FD exhibits a positive correlation with all board-related variables (BODC, BODD, BODIND), the control variable (FSIZ) and moderating variable (ICTE) while some of these components of corporate governance, control and moderating variable have negative relationship with one another. The values on the diagonal are all 1.0000 which shows that each variable is perfectly correlated with itself. In checking for multi-collinearity, we noticed that no two explanatory variables were perfectly correlated. This means that there is an absence of multi-collinearity in our models. Multi-collinearity between the explanatory variables may result to wrong signs or implausible magnitudes in the estimated model coefficients and the bias of the standard errors of the coefficients.

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Variance Inflation Factor

The VIF was carried out to assess the strength of the collinearity subsisting among the predictors. This is illustrated on table 5 as thus:

Table 5: Variance Inflation Factor (VIF) Test

Date: 06/25/25 Time: 21:54
Sample: 2019-2024
Included observations: 84

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
BODC	1.66E-05	1.235427	1.018514
BODD	0.022328	1.634082	1.123431
BODIND	4.05E-08	1.051679	1.024571
FSIZ	0.019120	2.546727	1.098276
ICTE	0.006999	95.05641	1.026057
C	0.409930	96.00157	NA

Source: E-Views 12 Computational Results (2025)

Key: FD- Fraud Detection; BODC-Board Competence; BODD-Board Diversity; BODIND Board Independence; FSIZ-Firm Size; ICTE-ICT Expenditure.

From the table above, the centered VIF ranges from 1.02 to 1.03 which suggests non multi-collinearity feature. Multi-collinearity feature according to Sabo, Rabi, Usman, Fatima, and Tjjani (2015) exists when the centered VIF exceeds 10 i.e VIF>10

Test of Hypotheses

Panel Least Squares Regression Model was developed to test the linear relationship between the dependent and independent variables. It was operated using E-View 12 as shown in the table 6 below:

Table 6: Panel Least Squares Regression Result

Dependent Variable: FD
Method: Panel Least Squares
Date: 06/25/25 Time: 21:52
Sample: 2019 2024
Periods included: 6
Cross-sections included: 14
Total panel (balanced) observations: 84

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BODC	0.603326	0.194068	3.108838	0.0240
BODD	0.493006	0.149426	3.299323	0.0049
BODIND	2.268605	0.312301	7.264162	0.0000
FSIZ	0.551248	0.138276	3.986581	0.0007

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ICTE	0.323699	0.083659	3.869257	0.0010
ICTE*BODC	0.586640	0.128212	4.575550	0.0001
ICTE*BODD	0.546542	0.152632	3.580771	0.0025
ICTE*BOIND	1.057462	0.354198	2.985512	0.0396
C	9.160665	0.640258	14.30778	0.0000

R-squared	0.750070	Mean dependent var	7.155500
Adjusted R-squared	0.725722	S.D. dependent var	0.939349
S.E. of regression	0.826562	Akaike info criterion	7.493696
Sum squared resid	105.2136	Schwarz criterion	8.609015
Log likelihood	-193.4957	Hannan-Quinn criter.	8.540523
F-statistic	10.27052	Durbin-Watson stat	2.012582
Prob(F-statistic)	0.000000		

Source: E-Views 12 Computational Results (2025)

In table 6, R-squared and its adjusted R-squared values were (0.75) and (0.73) respectively. This is an indication that all the independent variables jointly explain about 75% of the systematic variations in fraud detection (FD) of our sampled banks over the six-year period (2019-2024) while 25% of the systematic variations are captured by the error term. The F-statistics 10.27052 and its P-value of (0.000000) portrays the fact that the Panel Least Squares Regression Model is well specified. With this, the researcher affirms the validity of the regression model adopted in this study.

Test of Autocorrelation: Using Durbin Watson (DW) statistics, 2.012582 was obtained from the regression result as shown on table 4.3.2. This agrees with the Durbin Watson rule of thumb which indicates that the data is free from autocorrelation problem and as such fits for the regression result to be interpreted and relied on. Akika Info Criterion and Schwarz Criterion which are 7.493696 and 8.609015 respectively further strengthen the fitness of our regression result for reliability as it confirms the goodness of fit of the model specified.
In addition to the above, the specific findings from each explanatory variable from panel least squares regression model as shown on table 6 is provided below as follows:

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Hypothesis One

Ho_1: Board competence has no significant effect on the fraud detection in listed banks in Nigeria.

Hi_1: Board competence has significant effect on the fraud detection in listed banks in Nigeria.

The coefficient of BODC is 0.603326, with a t-statistic of 3.108838 (p-value = 0.0240). This positive relationship between board competence and fraud detection implies that greater competence of the board is associated with fraud detection in listed deposit money banks in Nigeria. The test is therefore statistically significant at 5% level. The implication of this is that board competence ensures fraud detection in listed deposit money banks in Nigeria. The alternate hypothesis is therefore accepted which portends that board competence has a significant effect on fraud detection in listed banks in Nigeria.

Hypothesis Two

Ho_2: Board diversity has no significant effect on fraud detection in listed banks in Nigeria.

Hi_2: Board diversity has significant effect on fraud detection in listed banks in Nigeria.

The coefficient of BODD is 0.493006 but with a t-statistic of 3.299323 (p-value = 0.0049), which is statistically significant at 1% level. This suggests that board diversity have a meaningful effect on fraud detection in listed deposit money banks. This leads to an acceptance of the alternate hypothesis which contends that board diversity has significant effect on fraud detection in listed banks in Nigeria".

Hypothesis Three

Ho_3: Board independence has no significant effect on fraud detection in listed banks in Nigeria.

Hi_3: Board independence has significant effect on fraud detection in listed banks in Nigeria.

The coefficient of BODIND is 2.268605, with a t-statistic of 7.264162 (p-value = 0.0000), which is highly significant at 1% level. This suggests that a strong board independence significantly ensures fraud detection in listed deposit money banks in Nigeria. The alternate hypothesis is therefore accepted which portends that board independence has significant effect on fraud detection in listed deposit money banks in Nigeria.

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Hypothesis Four

Ho_4: ICT does not significantly moderate the relationship between board competence and fraud detection in listed banks in Nigeria.

Hi_4: ICT significantly moderates the relationship between board competence and fraud detection in listed banks in Nigeria.

This hypothesis was tested and the result of the regression model indicates that the relationship between board competence (BODC) and fraud detection (FD) as moderated by ICT is positive and significant with a P-value (significance) of 0.0001 for the model which is less than the 1% level of significance adopted. Likewise the result of positive coefficient of 0.586640 for the model indicates that information and communication technology enables a positive relationship between board competence and fraud detection in listed deposit money banks in Nigeria. We therefore rejected the null hypothesis and accepted the alternate hypothesis which contends that ICT significantly moderates the relationship between board competence and fraud detection in listed banks in Nigeria.

Hypothesis Five

Ho_5: ICT does not significantly enhance the relationship between boarddiversity and fraud detection in listed banks in Nigeria.

Hi_5: ICT significantly enhances the relationship between board diversity and fraud detection in listed banks in Nigeria.

This hypothesis was tested and the result of the regression model indicates that the relationship between board diversity (BODD) and fraud detection (FD) as moderated by ICT is positive and significant with a P-value (significance) of 0.0025 for the model which is less than the 1% level of significance adopted. Likewise, the result of positive coefficient of 0.546542 for the model indicates that information and communication technology ensure a positive relationship between board diversity and fraud detection in listed deposit money banks in Nigeria. We therefore rejected the null hypothesis and accepted the alternate hypothesis which contends that ICT significantly moderates the relationship between board diversity and fraud detection in listed banks in Nigeria.

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Hypothesis Six

Ho_6: ICT does not significantly moderate the effectiveness of board independence in listed deposit money banks in Nigeria

Hi_6: ICT significantly moderates the effectiveness of board independence in listed deposit money banks in Nigeria

This hypothesis was tested and the result of the regression model indicates that the relationship between board independence (BODIND) and fraud detection (FD) as moderated by ICT is positive and significant with a P-value (significance) of 0.0396 for the model which is less than the 5% level of significance adopted. Likewise the result of positive coefficient of 1.057462 for the model indicates that information and communication technology enables a positive relationship between board independence and fraud detection in listed deposit money banks in Nigeria. We therefore rejected the null hypothesis and accepted the alternate hypothesis which contends that ICT significantly moderates the effectiveness of board independence on fraud detection in listed banks in Nigeria.

Also, firm size (control variable) and ICT (moderator) when tested as an independent variable have positive and significant effect on fraud detection in listed deposit money banks in Nigeria. With a p-value of 0.0007 and 0.0010 respectively, the test is considered statistically significant at 1% level. Also, the coefficient of correlation value of 0.551248 and 0.323699 respectively implies that firm size controls the relationship between corporate governance and fraud detection in listed deposit money banks in Nigeria. Also, ICT moderates the relationship between corporate governance and fraud detection in listed deposit money banks in Nigeria

CONCLUSION AND RECOMMENDATIONS

The study having developed a model fit on corporate governance using (BODC, BODD & BODIND) notes that among the three categories of corporate governance covered in this study; board independence (BODIND) has the highest level of influence on fraud detection (FD) by the model used in the study followed by board competence (BODC) and then board diversity (BODD). Thus, the study concludes that corporate governance enables fraud detection in listed deposit money banks in Nigeria. Also, information and communication technology moderated the relationship between corporate governance and fraud detection in listed deposit money banks in Nigeria.

The study makes the following recommendations as thus:

a. To enable fraud detection, banks should prioritize the recruitment of highly competent individuals for their boards. A board with strong expertise can make informed decisions that will deter fraud.
b. A diverse board can offer a broader range of ideas and perspectives, which is essential for innovation and adapting to a rapidly changing financial landscape. Ensuring diversity across gender could deter the likelihood of fraud commitment in listed deposit money banks in Nigeria.
c. An independent director is a valuable asset that directly impacts fraud detection in listed deposit money banks in Nigeria. Thus, DMBs are encouraged to increase the number of their independent directors in order to reduce the likelihood of fraud commitment.
d. DMBs should consider increasing their investments in technology to enhance the effectiveness of their boards (competence). Banks should focus on equipping their boards with the latest technological tools to support decision-making, improve operational efficiency, and enhance governance practices. Additionally, ICT expenditure should be used to improve data analytics capabilities, which will help the board make more informed decisions that will deter fraud commitment. However, investments in ICT should be strategically aligned with the bank's business goals to maximize its impact.

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