

**ANUK COLLEGE OF
PRIVATE SECTOR
Accounting Journal**

VOL. 2 NO. 3 OCTOBER, 2025

**A Publication of College of Private Sector
Accounting
ANAN University Kwall, Plateau State, Nigeria.**

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Published October, 2025.

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Printed by:
MUSSAB Printers,
NB, 9 Muri road by gwari road, Kaduna State, Nigeria.
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- I. Title page
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- IV. Introduction
- V. Literature Review
- VI. Methodology
- VII. Results and Discussion
- VIII. Conclusion and Recommendations
- IX. References (APA 7th Edition)
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ENHANCING TAX FRAUD DETECTION THROUGH FORENSIC ACCOUNTING: THE MODERATING EFFECT OF TRAINING IN NIGERIA'S FEDERAL INLAND REVENUE SERVICE

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ABSTRACT

Tax fraud remains a critical challenge to revenue mobilization and national development, particularly in Nigeria, where the Federal Inland Revenue Service (FIRS) faces complex fraud schemes, an expansive informal sector, and institutional capacity gaps. This study examines how forensic accounting enhances tax fraud detection within the FIRS, with a specific focus on the moderating role of training. The study's objectives include evaluating the influence of ethics and integrity skills, assessing the effect of database management skills, and analyzing how training moderates their impact on fraud detection. A quantitative research design was employed using census sampling across 190 FIRS staff in audit, enforcement, and compliance departments. Data were analyzed using SPSS and Hayes' (2018) PROCESS macro to conduct moderation analysis. Findings reveal that both ethics and integrity skills ($\beta = 0.5527, p < .001$) and database management skills ($\beta = 0.1399, p < .05$) significantly affect fraud detection. Training emerged as a significant moderator, with its presence enhancing or compensating for lower skill levels. However, as training levels increased, the individual effect of ethics and database skills slightly diminished, demonstrating a compensatory moderation effect. The study concludes that technical and behavioral competencies must be reinforced through structured training initiatives. It recommends mandatory ethics education, modern database skill acquisition, and collaboration with academic and professional institutions to design cross-functional training for FIRS personnel.

Keywords: Tax fraud detection, forensic accounting.

1. Introduction

Tax fraud detection has emerged as a global challenge, threatening revenue mobilization at national, regional, and global levels. Governments rely heavily on taxes for development and public service delivery, but deliberate acts such as income underreporting, falsification of records, and non-compliance with tax laws persistently undermine these goals. According to the OECD (2023), member countries lose hundreds of billions of dollars annually due to tax fraud, while the IMF (2022) identifies tax evasion as a significant barrier to sustainable development. In response, advanced economies have increasingly adopted technological innovations like data analytics, artificial

intelligence, and digital audits to bolster compliance (KPMG, 2022). Yet, these tools are only as effective as the personnel who implement them, requiring both institutional readiness and specialized skills.

In Africa, tax fraud is further intensified by systemic challenges including weak enforcement, limited investigative capacity, and a large informal sector. The African Tax Administration Forum (ATAF, 2021) estimates over \$60 billion is lost annually to illicit financial flows and evasion. In countries like South Africa, Kenya, Ghana, and Nigeria, tax authorities often lack the forensic accounting expertise needed to investigate complex fraud schemes. Munyua and

Kamau (2021), for instance, observed that in Kenya, the absence of trained forensic accountants prolongs audits and leaves many cases unresolved. In Nigeria, the issue is particularly acute. The Federal Inland Revenue Service (FIRS), the country's primary tax authority, consistently reports massive losses due to widespread tax fraud including income underreporting, receipt falsification, and non-filing of returns. The World Bank (2020) estimates these losses at over ₦3.5 trillion annually, severely impacting infrastructure funding and social investment.

The informal sector over 60% of Nigeria's economy further complicates enforcement. Many businesses operate outside regulatory oversight, and even within the formal sector, compliance is hindered by weak monitoring and corruption (NBS, 2021; PwC Nigeria, 2021). Though platforms like TaxPro Max aim to digitize tax administration, limited digital skills within FIRS constrain their effectiveness, underlining the need for forensic accounting as a specialized tool for detecting fraud. Forensic accounting, which integrates accounting, auditing, and investigative methods, is increasingly recognized for its role in exposing fraudulent activity and supporting litigation. Globally, its relevance is growing as fraud schemes evolve. Okoye and Gbegi (2021) highlight that forensic accountants with IT and ERP skills can trace fraud embedded in digital systems, while Modugu and Anyaduba (2013) emphasize the importance of communication and ethics in successful investigations. Akanbi and Dada (2022) also point out the role of database analysis in identifying fraudulent deductions and transactions.

However, forensic accounting skills alone are insufficient without structured training and development. Defined as efforts such as workshops, certifications, and continuing education, training helps professionals stay updated with evolving fraud methods and tools. The Institute of Chartered Accountants of Nigeria (ICAN, 2021) emphasizes continuous up skilling as essential. Without it, even qualified personnel may lag behind. Studies like Idris and Musa (2022) show that training enhances forensic technique application and minimizes errors, while PwC Nigeria (2021) finds that lack of training is a major impediment to adopting digital tools in Nigeria's tax system. Despite ongoing reforms, many FIRS staff remain undertrained in forensic methods, prompting the need to examine how training moderates the relationship between forensic skills and fraud detection.

Ethics and integrity underpin public trust and investigative objectivity. In corruption-prone contexts like Nigeria, the risk of collusion is high. ICAN (2021) calls for adherence to ethical standards, while Onuorah and Appah (2020) link investigator integrity to successful fraud outcomes. Database management

is increasingly indispensable, given the digitization of tax systems. Forensic accountants must be skilled in querying, analyzing, and interpreting large datasets. Poor database skills lead to missed red flags and reliance on outdated, manual audits (Akanbi & Dada, 2022). Platforms like Tax Pro Max and ERP systems demand proficiency in SQL, spreadsheets, and audit software yet many FIRS staff lack this capacity (Adebayo & Yusuf, 2021).

Moreover, training serves as a moderator in the forensic accounting-tax fraud detection relationship. Studies consistently underscore that without ongoing learning, technical competencies erode. For example, Idris and Musa (2022) report that hands-on, case-based training significantly improves fraud detection accuracy. Similarly, both World Bank (2020) and PwC Nigeria (2021) identify capacity building as key to effective tax reform, yet note that most FIRS staff have never received formal forensic training. Several high-profile fraud cases in Nigeria demonstrate the transformative potential of forensic accounting. In the Ajao Estate case, ₦500 million in unpaid taxes was uncovered via market value analysis. In Kogi State, over ₦1 billion was traced to inflated credits and fictitious transactions (Ibrahim, 2021). Other examples include a ₦3 billion VAT fraud exposed using Benford's Law (Nigerian Customs Service, 2022), a ₦2.5 billion multinational underreporting scheme (Abdulaziz, 2020), and a ₦1.8 billion oil and gas case revealed through data mining (Okafor, 2020). Despite these successes, such outcomes are rare due to systemic skill gaps and institutional limitations.

Research in this field (Ibrahim, & Musa, 2022, Ibrahim, & Musa, 2022, Ibrahim, & Musa, 2022, Ibrahim, et al., 2022, Moses, et al 2022, Moses, et al., 2018, Ejura, et al. 2023, Oginni, et al.2014Success et al 2025 , Success, et al .2024, Success, et al 2025, Success, et al 2024, Success, et al 2025.) is often qualitative and lacks empirical rigor. Many studies do not explore training as a moderating factor, and most are concentrated in Southwestern Nigeria, leaving regional gaps. Therefore, this study aims to Enhancing Tax Fraud Detection through Forensic Accounting: The Moderating Effect of Training in Nigeria's Federal Inland Revenue Service. Based on the problem, the following research questions were raised, How do ethics and integrity skills affect tax fraud detection in Nigeria's Federal Inland Revenue Service? To what extent do database management skills influence tax fraud detection in Nigeria's Federal Inland Revenue Service? To what extent does training moderate the relationship between forensic accounting skills and tax fraud detection in Nigeria's Federal Inland Revenue Service?.

The main objective of the study is to examine Enhancing Tax Fraud Detection through Forensic Accounting: The Moderating Effect of Training in

Nigeria's Federal Inland Revenue Service. The specific objectives were to:

- iii. *Evaluate the influence of ethics and integrity skills on tax fraud detection in Nigeria's Federal Inland Revenue Service.*
- iv. *Determine the effect of database management skills on tax fraud detection in Nigeria's Federal Inland Revenue Service.*
- v. *Analyze the moderating effect of training on the relationship between forensic accounting skills and tax fraud detection in Nigeria's Federal Inland Revenue Service.*

2. Literature Review

Tax Fraud Detection

Tax fraud refers to the intentional and illegal manipulation of financial records or information by individuals or organizations to **evade tax obligations**. Unlike tax avoidance, which involves legal loopholes, tax fraud constitutes a criminal offense under tax laws due to its deliberate nature (OECD, 2022). It includes a variety of fraudulent actions such as underreporting income, inflating deductions, falsifying documents, and misclassifying income. In Nigeria, tax fraud is a persistent obstacle to effective revenue generation. The Federal Inland Revenue Service (FIRS) the country's main tax authority regularly uncovers tax fraud schemes through audits and special investigation units (FIRS, 2023). Common forms include non-remittance of VAT, use of fake invoices, and collusion between tax officers and taxpayers (Olatunji & Aderemi, 2020). These practices are not only widespread but are also symptomatic of deeper institutional weaknesses in fraud detection mechanisms. Tax fraud detection involves identifying, investigating, and preventing fraudulent activities within the tax system. It incorporates both proactive tools (like data analytics, risk profiling, and digital monitoring) and reactive mechanisms (such as audits and whistleblowing). According to Fagbemi et al. (2021), effective fraud detection depends on a synergy of technical capabilities, legal structures, digital tools, and institutional integrity.

Forensic accounting has gained prominence as a critical investigative tool in tax administration. It combines auditing, accounting, and investigative techniques to uncover evidence of fraud that can stand up in court. Okoye and Gbegi (2019) assert that forensic accounting significantly enhances fraud detection in public institutions, particularly when tax officers are equipped with skills in technology, ethics, and ERP systems. The use of tools like CAATs, database analytics, and ERP monitoring platforms allows for more accurate and timely detection of financial anomalies. Globally, tax fraud continues to result in significant revenue losses. For instance, the IRS (2016) identifies underreporting as the primary

contributor to the U.S. tax gap. Similarly, Alm and McKee (2004) find that taxpayers often inflate deductions using falsified documents, while the OECD (2013) warns that hidden offshore assets are draining global tax revenues. The GAO (2014) estimates that fraudulent claims on tax credits, like the EITC, cost the U.S. billions annually.

As fraud tactics evolve, enhancing the forensic capabilities of FIRS personnel becomes even more critical. Okoye and Gbegi (2019), along with Idris and Musa (2022), demonstrate that skills like technological proficiency, ethical conduct, and data analysis substantially improve fraud detection outcomes. These competencies must be supported by continuous training and institutional reforms.

In Nigeria, where financial crimes are becoming increasingly digitized, database management, audit software fluency, and ERP literacy are no longer optional. They are essential for modern tax fraud detection systems. Yet, these skills remain underdeveloped among many tax professionals.

Tax fraud detection is a complex, multidimensional process that requires more than just technical tools. It demands a blend of human skills, institutional capacity, and ethical commitment. In the context of Nigeria's evolving tax system, forensic accounting provides a promising pathway to strengthen fraud detection efforts.

Forensic Accounting Practice Skills

Forensic accounting is a specialized area of accounting that involves investigating financial fraud and misconduct using accounting, auditing, and investigative skills. This discipline plays a crucial role in legal proceedings and financial crime investigations, aiming to uncover and analyze financial evidence for litigation support and fraud detection. Albrecht et al. (2019) highlight the importance of forensic accounting in detecting financial statement fraud, where forensic accountants use various techniques to identify discrepancies and irregularities in financial reports.

Tax fraud remains a pervasive issue globally, with significant implications for national revenue generation and economic stability. As governments seek to maximize tax compliance and minimize fraudulent activities, the need for specialized techniques to detect tax fraud becomes increasingly critical. Forensic accounting, a field that integrates accounting, auditing, and investigative skills, offers unique tools and methodologies specifically designed to identify and address tax evasion and fraud. This study examines the role of forensic accounting

practices in tax fraud detection within Nigeria's Federal Inland Revenue Service (FIRS), emphasizing how these practices can enhance the agency's ability to combat tax-related fraud effectively.

Forensic accounting is defined as the application of accounting principles, techniques, and skills to investigate financial discrepancies and provide findings suitable for legal scrutiny (Crumbley et al., 2013). This field is particularly relevant to tax fraud detection, where the intricate nature of financial transactions and the sophistication of evasion schemes necessitate specialized investigative techniques. Forensic accountants employ various methodologies, including data analytics, trend analysis, and forensic interviews, to uncover fraudulent activities and provide critical insights into tax compliance. Tax fraud in Nigeria has manifested in various forms, leading to significant revenue losses for the government. This section explores notable cases of tax fraud in Nigeria, illustrating how forensic accountants within the Federal Inland Revenue Service (FIRS) have addressed these challenges through targeted investigative practices and specialized techniques.

Ethics and Integrity Skills

Ethics and integrity refer to the commitment of forensic accountants to uphold objectivity, honesty, confidentiality, and professional conduct while performing their investigative duties. Unethical behavior compromises the credibility of forensic accounting processes and creates avenues for collusion, evidence suppression, or biased reporting. Onuorah & Appah (2020) Found that unethical behavior among forensic accountants leads to compromised fraud investigations in Nigeria. ICAN (2021) Identifies ethics as a foundational element of forensic accounting professionalism. ACFE (2022) Emphasizes that ethics violations is one of the leading causes of failed fraud prosecutions globally. Okoye & Gbogi (2021) Stress that integrity is critical to securing judicial and institutional trust in forensic findings. Uchenna & Kizito (2018) found that ethical orientation correlates with reduced fraudulent practices in public sector accounting.

Database Management Skills

Database management skills involve the ability to retrieve, manipulate, and analyze large volumes of financial data stored in digital systems for the purpose of identifying irregularities or fraudulent activities. In modern tax systems, fraud is often hidden within layers of electronic data, and only skilled professionals can extract relevant evidence efficiently. Olaoye & Ogundele (2021) Observed that many Nigerian tax officers lack the database skills needed to detect fraud from electronic records. Adebayo & Yusuf (2021): Highlighted the need for SQL and Excel proficiency for effective fraud analytics in public

institutions. Bierstaker et al. (2014) Noted that database querying and data manipulation are key components of modern forensic accounting. Oboh & Ajibolade (2019) found that poor data handling capacity among investigators delays fraud detection in government agencies. Zager et al. (2016) Suggested that effective fraud detection requires expertise in data mining and data integrity verification techniques.

Training

Training refers to systematic activities designed to improve employees' knowledge, technical skills, and professional competence through workshops, seminars, certifications, and ongoing education. Training acts as a moderator in this study, potentially strengthening or weakening the relationship between forensic accounting skills and fraud detection effectiveness. Skilled individuals require continuous learning to stay relevant amid evolving fraud techniques and digital tools. Idris & Musa (2022) found that forensic training significantly improved fraud detection among tax personnel in Nigeria. ICAN (2021) Identified capacity-building programs as essential for forensic accounting success in both private and public sectors. PwC Nigeria (2021) Reported that lack of structured forensic training programs weakens institutional efforts to fight tax fraud. World Bank (2020): Highlighted capacity development as a core pillar for improving tax compliance and fraud detection in Africa. Arowoshegbe et al. (2019) Noted that continuous professional development contributes to reduced fraud incidence in public sector institutions.

Training and development are pivotal in enhancing organizational capabilities, particularly in specialized fields such as fraud detection. In the context of the Federal Inland Revenue Service (FIRS), effective training and development programs can significantly impact the ability to detect and prevent financial fraud. This discussion explores how training and development contribute to fraud detection, with a focus on its application within FIRS, and reviews relevant literature to provide a comprehensive understanding. Training and development encompass activities designed to improve employees' skills, knowledge, and performance. These activities are essential for equipping employees with the necessary tools to perform their duties effectively. In the realm of fraud detection, training and development focus on enhancing employees' ability to identify, investigate, and mitigate fraudulent activities.

Empirical Review

Jafaru (2024) in a study titled "Effect of Management Policies and Ethical Standards on Financial Fraud in the Public Sector" employed a descriptive research design using structured questionnaires distributed among public sector financial officers in Abuja and Lagos. The study found that organizations with strong

ethical cultures, bolstered by management's personal integrity and clearly defined ethical codes, recorded significantly lower instances of financial fraud. The study also emphasized that ethics training, internal whistleblowing structures, and leadership accountability are key factors in enhancing fraud detection. However, the study focused more on general public sector institutions and did not specifically evaluate the FIRS or tax fraud, presenting a gap in the specificity of the findings.

Okoye and Gbegi (2024), in their work "Forensic Accounting and Fraud Prevention in Nigerian Public Sector," identified that forensic accounting practices were most effective when carried out by individuals with high ethical standards and professional integrity. Using survey data collected from internal auditors and revenue officers in Kogi State, the authors found that integrity-related skills like confidentiality, independence, and professional skepticism were more significant predictors of fraud detection effectiveness than technical audit knowledge. They recommended mandatory ethics certifications and the incorporation of ethical behavior assessments during the recruitment and promotion processes of public finance staff. Nonetheless, the study's geographical limitation and its exclusion of FIRS officers restrict its generalizability.

Onuiri, Osuoha, (2024) examined the application of e-taxation systems in Nigeria in their study titled "An E-Taxation System for Improving Revenue Generation in Nigeria." Employing a case study design, the researchers evaluated system models and conducted expert interviews to assess the role of digital tax systems in improving revenue outcomes. The findings emphasized that effective database systems enable real-time transaction tracking and promote transparency. The study further revealed that weak database management such as manual filing systems and poor data storage creates opportunities for manipulation and concealment of tax fraud. Although the study highlighted the value of automated systems and data-driven management, it did not empirically measure the direct impact of database management skills on fraud detection. Additionally, the research was limited in scope, focusing more on system modeling than on actual FIRS operations or staff capabilities.

Domino, (2021) investigated Factors that impact the perceived value of forensic accounting certifications. Sixteen commonly held forensic certifications were selected for analysis, evaluation, and ranking of perceived value. The selection of the certifications included in the study was based upon prior literature that identifies certifications widely held by accountants who perform forensic services. Additionally, a survey of 217 practicing accountants also provided information on widely held forensic certifications. To compare the forensic accounting

certifications, data were gathered from each granting organization's website. The factors deemed to be relevant to the perceived value of the certifications were then identified. Results show three certifications perceived to be of most value to accountants for forensic support services by both the attorney and academic experts: Certified Financial Forensics (CFF), Certified Forensic Accountant (CRFAC), and Accredited in Business Valuation (ABV). Their study focused on the perceived value of certifications which was achieved by ranking different certifications issued by professional bodies in the United States. Findings from their study failed to empirically examine if such certifications fulfilled the core conditionality's required of a profession, probably because few prior studies already addressed it. Their study was conducted in a developed economy while the present study attempts to ascertain the relationship between forensic certification and fraud detection in a developing economy, particularly in Nigeria.

Theoretical Review

White Collar Crime Theory (Sutherland, 1949)

Sutherland (1949) defined white-collar crime as a crime committed by a person of respectability and high social status in the course of his occupation. Corporate crime and occupational crime are viewed as "the two principals or 'pure' forms of white-collar crime" (Friedrichs, 2002). The researchers defined white-collar crime as illegal or unethical acts that violate fiduciary responsibility or banking trust for personal or organizational gain" (Kane & Wall, 2006). According to Abdullahi & Mansor (2015,) cited in Wolfe & Hermanson (2004) quoting Sutherland's (1977) "Theory of White Collar Criminals" state that, "As fraudsters found themselves successful at this crime, they began to gain some secondary delight in the knowledge that they are fooling the world, that they are showing their superiority to others". Sutherland's theory on fraud was coined as the theory of differential association that: (1) Crime is learned; (2) Not genetic; and (3) Learned from intimate personal groups. Thereby, he (Sutherland) submitted in his book that most crimes committed were from people of good backgrounds. His attention was called to prove that criminal activities were not only for the business of lower-class people but including those of the upper class. Sutherland was criticized based on the following ambiguity: (i) conceptual, (ii) empirical, (iii) methodological, (iv) legal, and (v) policy. Despite the criticism of Sutherland on the proposition of White Collar Crime Theory, his work still has an impact on how fraud is being perpetrated. RBV complements this perspective by advocating for unique internal resources (strong ethical culture, advanced fraud detection systems, and skilled auditors) as strategic defenses against white-collar crime.

3. Methodology

This study adopts a survey research design to collect

data directly from respondents. A survey method ensures standardization in the data collection process, providing consistency and comparability of responses across a large sample. The design is suitable for collecting quantitative data to test hypotheses and measure relationships between variables related to forensic accounting practices and fraud detection. The population for this study consists of the entire staff of the Tax Audit Department, compliance and enforcement of the Federal Inland Revenue Service (FIRS). A total of 190 staff members were identified through a preliminary survey, and all were included in the study using a census sampling technique. Census sampling was chosen to ensure the comprehensive inclusion of the population, avoiding sampling bias and increasing the reliability of the data. The main instrument for data collection is a structured questionnaire, designed based on existing validated scales from literature. The questionnaire will use a Likert scale, ranging from 1 (Strongly Disagree) to 4 (Strongly Agree). The development of the questionnaire for investigating forensic accounting practices and tax fraud detection in FIRS was a multi-step process that involved sourcing questions from

previous studies, adapting them to the FIRS context, and testing for reliability through a pilot study. Ethical considerations such as informed consent, confidentiality, and data protection were rigorously adhered to.

This study employed quantitative data analysis techniques to examine the relationship between skill-based independent variables namely, database management skills, technological proficiency, communication skills, and ethical integrity and the dependent variable, tax fraud detection within Nigeria's Federal Inland Revenue Service (FIRS). In addition, the moderating role of training was tested to assess its conditional impact on the relationships between forensic accounting skills and tax fraud detection. Data were collected through structured questionnaires and analyzed using IBM SPSS version 30, with the integration of the PROCESS macro (Model 1) developed by Hayes (2018). The PROCESS macro was employed due to its robustness in conducting moderation analyses and probing conditional effects through bootstrapped confidence intervals and Johnson-Neyman techniques.

3. Results and Discussion

Descriptive Statistics of Independent and Dependent Variables

Descriptive Statistics				
	Fraud detection	TRAINING	Ethics Integrity	Database Management Skills
Mean	4.6004	4.4739	4.4398	4.3132
Std. errors	.50407	.39627	.55261	.55864
Skewness	-1.827	-.381	-1.013	-1.143
Kurtosis	3.220	.739	1.318	1.355

Source: Field Survey (2025)

Descriptive statistics were computed for all key study variables, including fraud detection, training, and the core forensic accounting skillsets. Table 4.5 presents the means, standard errors, skewness, and kurtosis values for each construct. The results indicate that fraud detection had the highest mean score ($M = 4.60$, $SE = 0.50$), suggesting that respondents generally agreed with items indicating high fraud detection capacity. This was followed closely by training ($M = 4.47$, $SE = 0.40$) and technological proficiency ($M = 4.44$, $SE = 0.55$), reflecting the importance of structured capacity building and ICT skills in fraud

detection within the FIRS. Skewness values ranged from -0.381 (training) to -1.827 (fraud detection), indicating negatively skewed distributions. This suggests that most respondents rated the constructs at the higher end of the Likert scale. Kurtosis values ranged from 0.739 to 3.220 , indicating moderate to high peakedness in the distributions. These statistics demonstrate that respondents generally perceive strong alignment with key forensic skills and training efforts, supporting the quantitative analysis presented in the subsequent sections.

Ethics and Integrity Skills and Tax Fraud Detection with Training as a Moderator Regression Model 3

OUTCOME VARIABLE: fraud detection

Model Summary

R	R-sq	MSE	F	df1	df2	p
.7941	.6305	.0955	97.8403	3.0000	172.0000	.0000

Model 3

	coeff	se	t	p	LLCI	ULCI
constant	4.6053	.0234	196.8942	.0000	4.5591	4.6515
EthicsIn	.5527	.0454	12.1674	.0000	.4631	.6424
TRAINING	.4233	.0644	6.5689	.0000	.2961	.5505
Int_1	-.1963	.0835	-2.3514	.0198	-.3611	-.0315

Product terms key:

Int_1 : EthicsIn x TRAINING

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	.0119	5.5291	1.0000	172.0000	.0198

Focal predict: EthicsIn (X)

Mod var: TRAINING (W)

Source: Field Survey (2025)

To test whether ethics and integrity skills influence tax fraud detection and whether training moderates the relationship between ethics and integrity skills and tax fraud detection, a moderation analysis was conducted using Hayes' (2018) PROCESS macro (Model 3). In this model, ethics and integrity skills was entered as the predictor variable (X), training as the moderator (M), and tax fraud detection as the outcome variable (Y).

The overall regression model was statistically significant, $F(3, 172) = 97.84, p < .001$, with an R^2 of .6305, indicating that approximately 63.1% of the variance in tax fraud detection was explained by the combined effects of ethical integrity, training, and their interaction. Ethical integrity significantly

predicted tax fraud detection, $B = 0.5527, SE = 0.0454, t(172) = 12.17, p < .001$. This indicates that higher levels of ethical integrity are associated with increased effectiveness in detecting tax fraud. Training also demonstrated a significant positive effect on fraud detection, $B = 0.4233, SE = 0.0644, t(172) = 6.57, p < .001$, suggesting that individuals who have received more training tend to detect tax fraud more effectively. The interaction between ethical integrity and training was statistically significant, $B = -0.1963, SE = 0.0835, t(172) = -2.35, p = .0198$. The negative sign of the interaction coefficient suggests that the positive relationship between ethical integrity and fraud detection diminishes as training increases.

Conditional Effects for Model 3

Conditional effects of the focal predictor at values of the moderator(s):

TRAINING	Effect	se	t	p	LLCI	ULCI
-.3963	.6305	.0459	13.7366	.0000	.5399	.7211
.0000	.5527	.0454	12.1674	.0000	.4631	.6424
.3963	.4749	.0649	7.3205	.0000	.3469	.6030

Source: Field Survey (2025)

The results in Table 4.13 show that training moderates the relationship between ethics and integrity skills and tax fraud detection. At all levels of training, ethics and integrity skills have a significant positive effect on fraud detection, but the strength of this effect decreases as training increases. When training is low (-0.40 SD), the effect of ethics and integrity skills is strongest ($\beta = 0.6305, p < .001$), indicating that in the absence of extensive training, ethical conduct and personal integrity are crucial for identifying fraud. At the mean level of training, the effect remains significant but slightly reduced ($\beta = 0.5527, p < .001$). At high training levels ($+0.40$ SD), the effect is still positive but weakest ($\beta = 0.4749, p < .001$).

This suggests that while training equips staff with formal mechanisms to detect fraud, ethics and

integrity remain essential across all training levels, though their relative influence diminishes as training increases. Thus, FIRS should promote both strong ethical values and ongoing training to maximize fraud detection effectiveness. The findings demonstrate a compensatory moderation effect, where training partially offsets the need for high ethics and integrity skills in tax fraud detection. In other words, when training is limited, ethics and integrity skills play a more crucial role in enhancing detection effectiveness. However, as training increases, it can partly compensate for lower levels of ethical integrity, thereby reducing the strength of their relationship. This has important implications for policy and training design, highlighting the need for both ethical grounding and structured training programs to maximize fraud detection efficiency.

Johnson-Neyman Analysis for Ethics and Integrity Skills $\times$ Training

There are no statistical significance transition points within the observed range of the moderator found using the Johnson-Neyman method.

Conditional effect of focal predictor at values of the moderator:

TRAINING	Effect	se	t	p	LLCI	ULCI
-1.6739	.8813	.1310	6.7296	.0000	.6228	1.1398
-1.5691	.8608	.1227	7.0138	.0000	.6185	1.1030
-1.4643	.8402	.1146	7.3340	.0000	.6141	1.0663
-1.3596	.8196	.1065	7.6967	.0000	.6094	1.0298
-1.2548	.7991	.0985	8.1094	.0000	.6046	.9936
-1.1501	.7785	.0907	8.5808	.0000	.5994	.9576
-1.0453	.7579	.0831	9.1204	.0000	.5939	.9220
-.9405	.7374	.0757	9.7376	.0000	.5879	.8868
-.8358	.7168	.0687	10.4390	.0000	.5813	.8523
-.7310	.6962	.0620	11.2224	.0000	.5738	.8187
-.6262	.6757	.0560	12.0659	.0000	.5651	.7862
-.5215	.6551	.0508	12.9082	.0000	.5549	.7553
-.4167	.6345	.0466	13.6262	.0000	.5426	.7265
-.3120	.6140	.0438	14.0324	.0000	.5276	.7003
-.2072	.5934	.0426	13.9356	.0000	.5094	.6775
-.1024	.5728	.0432	13.2644	.0000	.4876	.6581
.0023	.5523	.0455	12.1391	.0000	.4625	.6421
.1071	.5317	.0493	10.7915	.0000	.4345	.6290
.2119	.5111	.0542	9.4294	.0000	.4041	.6181
.3166	.4906	.0600	8.1738	.0000	.3721	.6090
.4214	.4700	.0665	7.0705	.0000	.3388	.6012
.5261	.4495	.0734	6.1226	.0000	.3046	.5943

Source: Field Survey (2025)

The Johnson-Neyman technique was used to probe the interaction between ethical integrity and training on tax fraud detection. The analysis revealed that the conditional effect of ethical integrity on tax fraud detection was statistically significant across the entire observed range of the moderator (training). Specifically, at low levels of training (e.g., $z = -1.67$), ethical integrity had a strong, significant positive effect on tax fraud detection ($B = 0.8813$, $p < .001$, 95% CI [0.6228, 1.1398]). As training increased, the effect of ethical integrity gradually decreased,

although it remained statistically significant. At mean levels of training ($z = 0.00$), the effect was still substantial ($B = 0.5523$, $p < .001$, 95% CI [0.4625, 0.6421]). Even at higher levels of training (e.g., $z = +0.53$), ethical integrity maintained a significant but reduced effect ($B = 0.4495$, $p < .001$, 95% CI [0.3046, 0.5943]). These findings suggest that training slightly dampens but does not eliminate the positive influence of ethical integrity on tax fraud detection. Ethical integrity consistently enhances detection, but its impact is strongest when training is low.

Database Management Skills and Tax Fraud Detection with Training as a Moderator Regression Model 4

OUTCOME VARIABLE: frauddet

Model4 Summary

R	R-sq	MSE	F	df1	df2	p
.4936	.2437	.1955	18.4704	3.0000	172.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	4.6094	.0337	136.9277	.0000	4.5430	4.6759
Database	.1399	.0605	2.3121	.0220	.0205	.2594
TRAINING	.5639	.0856	6.5897	.0000	.3950	.7328
Int_1	-.2843	.1488	-1.9109	.0577	-.5779	.0094

Product terms key:

Int_1 : Database x TRAINING

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	.0161	3.6516	1.0000	172.0000	.0577

Focal predict: Database (X)

Mod var: TRAINING (W)

Source: Field Survey (2025)

To investigate whether the relationship between database management skill and tax fraud detection is moderated by training, a moderation analysis was conducted using Hayes' (2018) PROCESS macro (Model 4). In this model, database management skill was the independent variable (X), training was the moderator (M), and tax fraud detection served as the dependent variable (Y). The overall regression model was statistically significant, $F(3, 172) = 18.47$, $p < .001$, with an R^2 of .2437. This indicates that approximately 24.37% of the variance in tax fraud detection was accounted for by the model. In the main effects model, database management skill was found to have a significant positive effect on tax fraud detection, $B = 0.1399$, $p = .022$, 95% CI [0.0205, 0.2594]. This suggests that individuals with stronger database management skills are better equipped to detect tax fraud. Training also exerted a strong and statistically significant positive effect, $B = 0.5639$, $p < .001$, 95% CI [0.3950, 0.7328], indicating that greater training enhances tax fraud detection capability.

The interaction between database management skill and training approached statistical significance, $B = -.2843$, $p = .0577$, 95% CI [-0.5761, 0.0076]. Although marginally above the conventional threshold for statistical significance ($p < .05$), the result suggests a potential moderating effect, such that the influence of database skills on fraud detection may weaken as training increases. While both database management skill and training independently contribute to improved tax fraud detection, the marginally significant negative interaction implies a possible substitution effect. Specifically, the benefit of database skills appears less critical when individuals have received extensive training. Conversely, for individuals with limited training, database management competency may play a more prominent role in fraud detection. Although the moderation effect was not statistically conclusive ($p = .0577$), it warrants further investigation in future research using larger or more diverse samples.

Conditional Effects for Model 4

Conditional effects of the focal predictor at values of the moderator(s):

TRAINING	Effect	se	t	p	LLCI	ULCI
-.3963	.2526	.0863	2.9284	.0039	.0823	.4228
.0000	.1399	.0605	2.3121	.0220	.0205	.2594
.3963	.0273	.0827	.3300	.7418	-.1359	.1905

Source: Field Survey (2025)

The results indicate that training moderates the relationship between database management skills and tax fraud prevention. At low levels of training (-0.40 SD), database management skills have a significant positive effect on fraud prevention ($\beta = 0.2526, p = .0039$). This suggests that when training is limited, strong database skills play a critical role in preventing fraud. At the mean level of training, the effect is still significant but weaker ($\beta = 0.1399, p = .0220$), indicating a reduced but meaningful contribution of

database skills as training increases. However, at high levels of training ($+0.40$ SD), the effect becomes non-significant ($\beta = 0.0273, p = .7418$), with the confidence interval including zero. This pattern suggests that as training increases, it may compensate for weaker database skills, making them less critical for tax fraud prevention. Therefore, in low-training environments, investing in database management capabilities is important, but in high-training contexts, their marginal impact diminishes significantly.

Johnson-Neyman Analysis for Database Management Skills $\times$ Training

Moderator value(s) defining Johnson-Neyman significance region(s):

Value	% below	% above
.0690	57.9545	42.0455

Conditional effect of focal predictor at values of the moderator:

TRAINING	Effect	se	t	p	LLCI	ULCI
-1.6739	.6158	.2587	2.3799	.0184	.1051	1.1264
-1.5639	.5845	.2428	2.4068	.0172	.1051	1.0638
-1.4539	.5532	.2270	2.4367	.0158	.1051	1.0013
-1.3439	.5219	.2113	2.4701	.0145	.1049	.9390
-1.2339	.4907	.1957	2.5075	.0131	.1044	.8769
-1.1239	.4594	.1802	2.5495	.0117	.1037	.8151
-1.0139	.4281	.1649	2.5968	.0102	.1027	.7536
-.9039	.3969	.1498	2.6499	.0088	.1013	.6925
-.7939	.3656	.1350	2.7090	.0074	.0992	.6320
-.6839	.3343	.1206	2.7733	.0062	.0964	.5723
-.5739	.3031	.1067	2.8400	.0051	.0924	.5137
-.4639	.2718	.0937	2.9010	.0042	.0869	.4567
-.3539	.2405	.0819	2.9377	.0038	.0789	.4021
-.2439	.2093	.0719	2.9118	.0041	.0674	.3511
-.1339	.1780	.0645	2.7591	.0064	.0507	.3053
-.0239	.1467	.0608	2.4141	.0168	.0268	.2667
.0690	.1203	.0610	1.9739	.0500	.0000	.2406
.0861	.1154	.0613	1.8824	.0615	-.0056	.2365
.1961	.0842	.0661	1.2741	.2043	-.0462	.2146
.3061	.0529	.0742	.7132	.4767	-.0935	.1993
.4161	.0216	.0847	.2554	.7987	-.1456	.1889
.5261	-.0096	.0969	-.0994	.9209	-.2009	.1816

Source: Field Survey (2025)

Page 17To further probe the marginal interaction between database management skill and training on tax fraud detection, the Johnson-Neyman (J-N) technique was employed. In Table 4.17, this method identifies the specific values of the moderator (training) at which the effect of the predictor (database management skill) on the outcome (tax fraud detection) transitions between statistically significant and non-significant. These findings reinforce the moderation interpretation discussed previously. Specifically, the Johnson-Neyman technique highlights that the predictive power of database management skills is conditioned by the level of training. When training is limited, database proficiency plays a meaningful role in enhancing fraud detection. However, as training increases beyond a certain point (0.0690 SD), the independent contribution of database skills diminishes and eventually becomes statistically negligible. This suggests a functional overlap between formal training and database management skill. Training may equip individuals with similar competencies that reduce reliance on pre-existing database expertise. Thus, in highly trained contexts, additional database skill

provides limited added value for fraud detection outcomes.

Discussion of findings

Ethics and integrity skills demonstrated a statistically significant impact on fraud detection ($\beta = 0.304, p = 0.015$), reinforcing the idea that personal values and professional conduct are crucial for maintaining transparency and resisting collusion. This finding echoes the work of Jafaru (2021), who highlighted the role of ethical conduct in curbing financial irregularities in public service. His study showed that officials with high moral standards are less susceptible to bribery and more committed to enforcing tax regulations objectively. Similarly, Okoye and Gbegi (2019) observed that forensic auditors who exhibited integrity and professional skepticism were more effective in identifying irregularities and resisting internal pressure. On the other hand, Aguolu and Enyi (2020) emphasized that while ethics are important, they are often insufficient without systemic reinforcement. Their qualitative interviews with FIRS officers revealed that even morally upright individuals may be limited by an unethical work culture or lack of

whistleblower protection. Thus, while this study validates the importance of ethical orientation, it also points to the need for ethical leadership, support systems, and reward mechanisms that promote accountability within tax institutions.

Database management skills were positively associated with tax fraud detection ($\beta = 0.144$, $p = 0.022$), showing that officials who are competent in data entry, storage, querying, and analysis are better positioned to detect suspicious tax patterns and inconsistencies. This is consistent with Onuiri et al. (2015), who found that structured digital databases allow tax authorities to monitor, analyze, and reconcile tax declarations with actual financial activity. Their study demonstrated that robust database systems reduce the risks of data tampering and help expose hidden incomes. Similarly, Balogun and Lawal (2023) found that the integration of tax databases with national identification systems (BVN, NIN) greatly enhanced fraud detection. However, Ezekwesili and Okafor (2022) identified major challenges, including poor database design, lack of standardized formats, and limited staff training, which they argued undermined the full potential of database tools in Nigerian tax institutions. This study contributes by emphasizing that it is not just the availability of digital infrastructure, but the actual skills of FIRS staff in managing and interrogating tax data that make a difference.

Perhaps most notably, the interaction terms showed that training (or organizational support) significantly moderated the relationships between each skill set and tax fraud detection. This finding confirms that technical and behavioral skills yield better outcomes when nurtured in a supportive learning environment. This result aligns with Ajibade and Arowoshegbe (2020), who stressed the importance of continuous professional development in enhancing fraud detection capabilities. It is also consistent with the ICPC-FIRS (2022) initiative, which emphasized staff training as a frontline strategy for combating corruption and tax evasion. In contrast, some authors like Ofili et al. (2024) have argued that training alone is insufficient unless accompanied by structural reforms, ethical culture, and accountability mechanisms. Nonetheless, the empirical results of this study clearly show that training significantly enhances the effectiveness of core competencies in tax fraud detection.

5. Conclusion and Recommendations

This study examined Enhancing Tax Fraud Detection through Forensic Accounting: The Moderating Effect of Training in Nigeria's Federal Inland Revenue Service. This finding highlights the importance of non-technical skills in complementing technical capabilities.

Based on the findings from this study, the following

recommendations are proposed to enhance financial fraud detection at Nigeria's Federal Inland Revenue Service (FIRS).

- i. **Foster a Culture of Ethics and Integrity.** Ethics and Integrity Training: To strengthen the ethical standards at FIRS, ethical training should be mandatory for all staff members. This training should focus on promoting personal and organizational integrity, ethical decision-making, and the role of ethics in fraud prevention.
- ii. **Improve Database Management Skills.** Database Management Training: Since database management skills play a vital role in fraud detection, FIRS should focus on training staff in using modern database management systems. This training should enable employees to effectively manage, track, and analyze data for fraudulent patterns.
- iii. **Implement Comprehensive Training Programs for Continuous Development.** Cross-Functional Training: FIRS should establish cross-functional training programs that address all main areas: technological proficiency, communication skills, ethics, database management, and ERP systems.
- iv. **Develop a Feedback Mechanism for Training Programs.** Monitoring and Evaluation of Training Programs: FIRS should establish a robust feedback mechanism to evaluate the effectiveness of its training programs. Regular surveys and performance assessments should be conducted to gauge the success of training initiatives in enhancing fraud detection skills.
- v. **Strengthen Collaboration with External Partners and Stakeholders.** Collaborate with. FIRS should collaborate with external experts, such as universities, training centers, and professional organizations, to develop and implement state-of-the-art training programs in fraud detection and prevention.

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