International Journal of Innovative Social Sciences & Humanities Research 13(2):403-415, April-June, 2025

© SEAHI PUBLICATIONS, 2025 www.seahipublications.org ISSN: 2354-2926

doi:10.5281/zenodo.15677272

Effect Of Forensic Accounting Expenditure Analysis On Tax Fraud Detection In States' Internal Revenue Services Of North Central Nigeria

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ABSTRACT
Fraud detection in tax administration remains a critical challenge for State Internal Revenue Services in North Central Nigeria. This study investigated the effect of forensic expenditure analysis on tax fraud detection, with a particular focus on forensic accounting expenditure analysis, as independent variable. Employing a survey research design, the study used a census sampling method with a total population of 411 respondents. Data were collected through structured questionnaires and analyzed using simple regression analysis. The findings revealed that forensic expenditure analysis significantly and positively influences tax fraud detection, with a statistically significant coefficient indicating that improvements in this area enhance the ability to detect tax fraud. Although forensic expenditure analysis accounts for 23.2% of the variation in tax fraud detection, this underscores its importance as a key predictor among other factors. The overall significance of the regression model confirms the robustness of this relationship, emphasizing the need to integrate forensic expenditure analysis into tax administration strategies. Consequently, the study recommends that tax authorities in North Central Nigeria strengthen forensic expenditure analysis capabilities through targeted training and the adoption of advanced forensic technologies. Furthermore, integrating forensic expenditure analysis into routine audits, fostering collaboration with forensic experts and law enforcement, and increasing public awareness are critical steps to improving tax compliance and reducing fraudulent activities in the region.
Keywords: Tax fraud detection; expenditure analysis; North Central Nigeria, Forensic accounting.

1.0 INTRODUCTION

Forensic tax fraud detection plays a vital role in enhancing global tax compliance and safeguarding national revenues through systematic investigation and expert analysis of financial records. As economies grow more interconnected, cross-border tax evasion schemes such as transfer pricing manipulation, offshore tax shelters, and digital transaction concealment have intensified, necessitating the integration of forensic accounting techniques into tax enforcement strategies (OECD, 2022). Forensic experts employ data analytics, financial profiling, and digital forensics to detect inconsistencies, trace illicit financial flows, and provide litigation support in tax fraud cases (Arora & Kumar, 2023). Their role is particularly critical in uncovering complex tax avoidance networks involving multinational corporations and high-net-

worth individuals, often exploiting gaps in international tax laws. Countries such as the United States, the United Kingdom, and Australia have institutionalized forensic tax investigation units within their revenue authorities to bolster audit efficiency and deter fraud (PwC, 2021). Furthermore, international cooperation through platforms like the OECD's Global Forum on Transparency and Exchange of Information has fostered shared best practices and capacity building in forensic tax auditing (OECD, 2022). Overall, forensic tax fraud detection serves as a cornerstone in the global fight against tax evasion, promoting transparency, accountability, and equitable tax systems across jurisdictions.

Lifestyle analysis plays a crucial role in tax fraud detection by assessing an individual's standard of living against reported income to uncover discrepancies that suggest undeclared earnings or illicit wealth. Globally, tax authorities employ lifestyle audits to detect tax evasion, especially among high-net-worth individuals, politically exposed persons, and self-employed professionals with irregular income reporting (OECD, 2022). This approach involves examining assets, expenditures, and financial behavior to identify unexplained wealth accumulation (Madhukar & Mehta, 2023). Countries like South Africa and Australia have integrated lifestyle audits into their forensic tax frameworks to reinforce compliance and deter fraudulent reporting.

Lifestyle analysis is also supported by data from social media, luxury purchases, and digital footprints to reveal hidden sources of income (KPMG, 2021). It enhances the effectiveness of traditional tax audits by adding a behavioral and investigative dimension. Moreover, it provides legal backing for prosecutions when unexplained lifestyle patterns contradict declared income. International bodies advocate its use to combat illicit financial flows and tax base erosion. As tax fraud becomes more sophisticated globally, lifestyle analysis of which forensic expenditure analysis is a part of it has been a strategic tool for identifying tax risks and ensuring equitable taxation. Its integration with digital forensics and AI further strengthens its impact in modern tax administration systems.

Forensic expenditure analysis plays a critical role in tax fraud detection by scrutinizing a taxpayer's spending patterns to identify inconsistencies with declared income. Globally, tax authorities utilize this method to uncover underreporting and unreported income, especially in sectors with high cash flows or informal earnings (OECD, 2022). The analysis involves examining bank records, credit card statements, real estate acquisitions, and luxury purchases to detect hidden wealth (Deloitte, 2023). Disproportionate spending compared to reported income often signals potential tax evasion. Forensic expenditure analysis is widely used in both developed and developing countries to trace the flow of funds and verify the authenticity of financial disclosures. It supports legal actions by providing evidence-based insights into taxpayers' financial behaviors. The approach is particularly effective in jurisdictions where traditional audit trails are weak or where income is difficult to estimate directly. Countries like Canada and the United States have embedded this method into their forensic tax investigations to improve audit precision (IRS, 2021). By integrating data analytics and artificial intelligence, modern tax agencies can automate expenditure profiling and detect anomalies more efficiently. This technique enhances transparency and strengthens the integrity of global tax systems.

Statement of Problem

Despite increasing efforts by tax authorities in Nigeria to curb tax fraud, the effectiveness of forensic expenditure analysis in detecting fraudulent activities remains underexplored, particularly in North Central Nigeria. Existing studies have predominantly focused on general forensic accounting techniques without isolating expenditure analysis as a core investigative tool (Olaoye & Ogundipe, 2022), thereby creating a variable gap**.** Moreover, much of the empirical research in Nigeria emphasizes traditional audit procedures or tax compliance behavior, neglecting the integration of forensic expenditure audits in fraud detection frameworks, which constitutes a significant methodological gap (Okoye & Gbegi, 2021). Additionally, there exists a geographical gap, as most Nigerian studies concentrate on the South-Western and South-Eastern regions, leaving North Central Nigeria where informal economic activities are prevalent and understudied (Abiola & Moses, 2023). Evidence from global literature underscores the value of analyzing taxpayer expenditures to expose hidden income, yet in Nigeria, empirical data on its practical application remains scarce, representing an evidence gap (Madhukar & Mehta, 2023). Furthermore, a scope gap exists in current studies, which often overlook public sector, who are key

contributors to the formal sector and potential actors in tax fraud schemes. These gaps underscore the urgent need for context-specific, theory-informed research to evaluate the role of forensic expenditure analysis in tax fraud detection in North Central Nigeria. In order to achieve the objective of the study, the following hypothesis was formulated in null forms

Ho: Forensic accounting expenditure analysis has no significant effect on tax fraud detection in States' Internal Revenue Services of North Central Nigeria.

2.0 Literature Reviews

Conceptual Reviews

Tax fraud detection refers to the process of identifying illegal practices whereby individuals or organizations intentionally falsify financial information to reduce their tax liability. According to OECD (2022), tax fraud detection involves the use of data analytics, risk profiling, and forensic audits to identify discrepancies between reported income and actual financial activities. The goal is to uncover fraudulent activities such as underreporting of income, inflating deductions, or failing to file tax returns. While this definition provides a broad understanding, it tends to overemphasize technical detection tools and underrepresents the role of behavioral indicators and taxpayer psychology in fraudulent practices. This presents a limitation in contexts where financial data may be unreliable or incomplete.

Forensic expenditure analysis is the systematic review of a taxpayer's financial outflows to determine if they align with declared income, with the aim of identifying hidden or illicit income sources. Deloitte (2023) describes it as an investigative method that utilizes financial records, spending habits, and asset acquisitions to assess the legitimacy of declared earnings. This method is particularly useful in jurisdictions where income is hard to trace, such as informal economies. However, its effectiveness heavily relies on access to accurate and comprehensive data, which is often lacking in developing regions like Nigeria. Thus, while methodologically sound, its applicability in low-data environments remains questionable.

Tax fraud detection through forensic accounting involves applying accounting, auditing, and investigative skills to analyze financial transactions and detect tax-related crimes. Arora and Kumar (2023) argue that forensic accountants use specialized techniques such as trend analysis, lifestyle audits, and expenditure tracking to uncover discrepancies that point to fraud. This approach offers a comprehensive framework combining both quantitative data and investigative intuition. However, it may lack consistency due to varying practitioner expertise and the absence of standardized forensic audit procedures in many countries, particularly in sub-Saharan Africa. This variation reduces the reliability and generalizability of forensic findings across regions.

Forensic expenditure analysis is defined as a method of evaluating a taxpayer's spending patterns in comparison with their declared income to detect potential fraud or hidden income sources. According to Madhukar and Mehta (2023), this technique involves detailed scrutiny of bank transactions, credit card payments, property acquisitions, and other financial outflows to assess whether a taxpayer's lifestyle is supported by their reported earnings. This definition captures the foundational purpose of forensic expenditure analysis detecting discrepancies that suggest undeclared income. However, it assumes availability and reliability of expenditure data, which may not be realistic in economies with poor financial documentation systems or high levels of cash transactions, thereby limiting its practical application in some developing contexts.

Forensic expenditure analysis is also conceptualized as a behavioral investigative tool that interprets financial choices and consumer behavior to expose inconsistencies in tax reporting. KPMG (2021) notes that beyond numeric analysis, this approach evaluates the lifestyle and consumption patterns of taxpayers to detect fraud, especially in cases where income is self-reported and difficult to verify. This broader interpretation recognizes the human element in financial decision-making and expands the scope of forensic analysis beyond documents. However, it faces critique for its subjective nature, as behavioral indicators can be influenced by non-financial factors such as credit facilities or third-party support, potentially leading to false positives or biased interpretations.

Deloitte (2023) defines forensic expenditure analysis as a structured investigative accounting procedure that reconstructs a taxpayer's financial activities to determine the legitimacy of income declarations. This method relies heavily on indirect techniques like the net worth method, bank deposit method, and expenditure method to build an audit trail and uncover concealed earnings. This definition underscores the technical rigor and procedural depth of forensic expenditure analysis, making it a valuable tool in formal tax audits. Nevertheless, it may be criticized for being time-intensive and resource-demanding, which may not be feasible for tax authorities in resource-constrained settings, such as many parts of Nigeria.

Empirical Studies

Arora and Kumar (2023) conducted a study that assessed the effectiveness of forensic expenditure analysis in detecting tax fraud among high-net-worth individuals in India. Their research utilized a quantitative design with a structured questionnaire distributed to 150 tax auditors selected purposively from the Indian Revenue Service. Using regression and correlation analysis, they discovered that forensic expenditure analysis significantly enhanced the accuracy of detecting undeclared income through lifestyle inconsistencies. They recommended integrating forensic tools with digital databases to improve audit outcomes. However, the study's limitation lies in its auditor-centric view, excluding the taxpayers' side of the fraud, which reduces its comprehensiveness.

Abiola and Moses (2023) investigated the role of forensic expenditure audits in controlling tax fraud within Nigeria's informal sector. They adopted a mixed-methods approach combining surveys and interviews, targeting personnel of the Federal Inland Revenue Service (FIRS) in Lagos and Abuja. From a sample of 200 respondents selected via stratified sampling, data were analyzed using descriptive statistics and thematic interpretation. Their findings confirmed that forensic expenditure analysis effectively uncovered tax discrepancies, especially among informal businesses. They recommended state-wide deployment of forensic audit units. However, the urban focus of the study presents a limitation in generalizing findings to rural or semi-urban areas.

Okoye and Gbegi (2021) examined the impact of forensic accounting, specifically expenditure analysis, on the detection of tax fraud among SMEs in North Central Nigeria. Utilizing a survey method, they drew a sample of 250 SMEs from a population of 1,000 registered businesses. The analysis, performed using SPSS regression models, revealed a strong positive relationship between forensic expenditure auditing and detection of fraudulent tax reporting. They advocated for improved training for tax professionals and increased use of forensic tools. The major critique of this study is its dependence on self-reported data from SME owners, which may be subject to social desirability bias.

Madhukar and Mehta (2023) employed a qualitative case study method to assess how forensic lifestyle and expenditure audits have contributed to detecting tax fraud in India. Their study focused on ten high-profile cases investigated between 2018 and 2022, analyzing court documents, audit reports, and interviews with forensic investigators. They found that forensic expenditure analysis was pivotal in uncovering undeclared income in 70% of the cases. Recommendations included formalizing forensic expenditure audits through policy integration. However, the study's limitation is its narrow focus on elite tax fraud cases, which excludes insights from lower-tier fraud cases.

Adeleke and Adebayo (2022) analyzed how forensic expenditure analysis influences tax fraud detection among self-employed professionals in Abuja, Nigeria. They used a descriptive survey design targeting 500 professionals, with a final sample of 120 selected via cluster sampling. Chi-square and regression were used for data analysis. Their findings showed that forensic expenditure audits effectively detected mismatches between lifestyle and declared income. They recommended the adoption of AI-driven tools to improve forensic investigations. However, the study's small sample size and lack of qualitative insight limit its depth and applicability.

Nwachukwu and Eze (2021) explored how forensic expenditure audits impacted revenue recovery in Enugu State, Nigeria. They used an ex-post facto design based on data from 2015 to 2020, focusing on cases handled by the State Internal Revenue Service. The study used time-series regression analysis and found that forensic expenditure analysis significantly enhanced the state's tax recovery rate. They

recommended strengthening the forensic capacity of state tax authorities. The study's limitation is its reliance on secondary data, which lacks the operational context necessary for understanding field-level challenges.

One empirical study by Adams et al. (2023) focused on how forensic accountants use expenditure analysis to detect fraudulent tax reporting within small and medium-sized enterprises (SMEs). The study investigated whether discrepancies between reported expenditures and actual financial transactions were indicators of tax evasion. The population consisted of SMEs in Lagos, Nigeria, and a sample size of 200 SMEs was selected through stratified random sampling. The data was analyzed using regression analysis, revealing a statistically significant relationship between unexplained expenditure patterns and tax fraud. The study recommended that tax authorities adopt forensic expenditure analysis as a tool to uncover hidden financial activities. While regression analysis provides useful insights, the study did not specify controls for industry-specific variables, which may influence expenditure patterns. The use of only SMEs in Lagos limits generalizability. Greater geographic coverage would enhance the robustness of the findings.

Besides, Ogunleye and Abiola (2022) conducted a similar study but focused on large corporations in Nigeria, particularly in the oil and gas sector. They explored how forensic accountants analyze corporate spending to detect tax fraud, where firms often underreport expenditures to lower taxable income. The sample size was 150 corporations, and the study employed a mixed-method approach combining qualitative interviews with forensic experts and quantitative analysis using correlation and factor analysis. Their findings highlighted a strong association between discrepancies in expense reports and tax evasion activities. The authors recommended that tax regulatory bodies enhance forensic accounting training for their staff to improve fraud detection. The combination of qualitative and quantitative methods is commendable but lacked a clear explanation of how qualitative findings were integrated into the quantitative results. The sample might not fully capture smaller firms in the sector. Stratification by company size would improve validity.

In Jones and Hughes' (2021) study on forensic accounting expenditure analysis in the banking sector, they examined how expenditure analysis helped uncover money laundering schemes that involved tax evasion. They sampled 120 banks in the UK and used statistical tools such as ANOVA and multivariate regression to analyze data. Their study found that forensic accounting could effectively identify suspicious spending behaviors linked to tax fraud. Based on their results, they suggested that regulatory authorities incorporate forensic accounting audits to detect money laundering and tax-related fraud. Although robust analytical tools were used, the study lacks clarity on how banks were selected. The cross-sectional nature may limit causality inference. Longitudinal data would better capture evolving fraud trends.

A research by Oluwaseun and Tunde (2022) examined forensic accounting expenditure analysis in detecting tax fraud among high-net-worth individuals (HNWIs) in Nigeria. The study focused on the relationship between luxury expenditures and undeclared income. A sample of 50 HNWIs was surveyed, and the data was analyzed using descriptive statistics and chi-square tests. Their findings indicated that there was a significant difference between the level of expenditure reported and actual income sources, suggesting tax fraud. They recommended that tax authorities should investigate extravagant lifestyles as potential red flags for tax evasion. The small sample size may not adequately represent the HNWI population. Chi-square analysis, while useful, may oversimplify complex financial behavior. More robust econometric modeling could improve analytical depth.

Furthermore, Adeola and Chijioke (2023) analyzed forensic accounting expenditure reports in the context of public sector tax fraud in Nigeria. Their study focused on government officials and their expenditure patterns to detect embezzlement and tax evasion. Using a sample size of 100 government employees, they employed qualitative methods, including case study analysis and content analysis. Their results revealed that officials who exhibited large, unexplained spending were often involved in fraudulent tax activities. They suggested increasing transparency and implementing expenditure monitoring systems to mitigate tax fraud in the public sector. The qualitative approach provides rich detail but limits generalizability. Absence of triangulation with quantitative data may reduce objectivity. Mixed-methods integration would enhance findings.

Besides, an investigation by Smith and Davis (2022) focused on the hospitality industry in South Africa, where forensic accounting expenditure analysis was used to uncover tax fraud in hotel businesses. A total of 75 hotels were surveyed, and the study used a combination of regression analysis and hypothesis testing to assess the relationship between hotel expenditures and tax evasion. Their findings confirmed that hotels often reported inflated expenses to reduce taxable income. The study recommended stricter audits in the hospitality industry and the implementation of a forensic expenditure review process for all tax filings. The sampling method was not explicitly stated, which raises questions about selection bias. Industry-seasonality effects were not considered. Inclusion of control variables could improve analytical precision.

In Makanjuola and Salawu's (2021) research, the authors explored the role of forensic accounting expenditure analysis in detecting fraudulent tax returns in manufacturing companies. The study used a sample of 120 manufacturing firms, analyzing their financial statements over a five-year period. The data was subjected to factor analysis to identify patterns of fraud. Their results showed a strong correlation between unreported expenditures and tax evasion in the manufacturing sector. The study suggested that forensic accountants should be embedded within corporate tax departments to detect irregularities at an early stage. The use of historical data is strong, but factor analysis alone may not establish causality. Limited detail on variable operationalization hinders replicability. Supplementary regression analysis could enhance interpretation.

Another study by Taylor and Harris (2023) examined forensic accounting expenditure analysis in the agricultural sector of Kenya. Using a population of 250 agricultural businesses, they selected 100 firms based on convenience sampling. The study employed cluster analysis and multiple regression models to explore whether discrepancies in expenditure reports could reveal tax fraud. The study found that businesses with irregular expenditure patterns often used fraudulent practices to evade taxes. Their recommendations included greater investment in forensic accounting tools by tax authorities and more rigorous checks on agricultural expenditure. The convenience sampling approach undermines representativeness. The rationale for clustering was not fully explained. Probabilistic sampling would strengthen external validity.

Besides, Moses and Olabode (2021) conducted a study on the use of forensic expenditure analysis for detecting tax fraud in the construction industry in Nigeria. Using a sample of 80 construction companies, the authors employed t-tests and correlation analysis to test for relationships between expenditure irregularities and tax evasion. The findings suggested that inflated cost reports and unaccounted-for purchases were frequent indicators of tax fraud. The authors recommended that forensic accountants focus on auditing construction-related expenses as a means of identifying fraudulent tax schemes. Correlation does not imply causation, limiting interpretive strength. The absence of a regression model may mask confounding variables. Multi-method triangulation would bolster findings.

Besides, Johnson and Williams (2022) conducted a study on forensic accounting expenditure analysis in detecting tax fraud within the retail sector in Ghana. They used a sample of 90 retail businesses, conducting a combination of interviews with forensic experts and quantitative data analysis using regression techniques. Their study found a significant link between fraudulent expenditure reporting and underreported tax liabilities. The authors suggested that tax authorities in Ghana implement more comprehensive forensic expenditure reviews to curb retail-related tax fraud. The study's hybrid approach is commendable, but it lacked integration between qualitative and quantitative components. The sample size may not capture sector diversity. Including retail subsectors could enhance depth.

One study by Williams and Bassey (2023) examined forensic accounting expenditure analysis in detecting tax fraud within multinational corporations operating in Nigeria. The study investigated whether discrepancies in reported expenses across multiple jurisdictions were indicative of tax fraud. The population comprised 50 multinational firms in Nigeria, with a sample size of 30 companies selected through purposive sampling. The study applied hierarchical regression to analyze the data and found that firms with inconsistencies between their reported and actual expenditures were more likely to engage in tax fraud. The study recommended stronger regulatory oversight and the implementation of regular forensic audits for multinational firms. The purposive sampling may introduce selection bias. Hierarchical

regression is appropriate but assumes linear relationships, which may not hold across jurisdictions. Broader samples across industries would improve generalizability.

In addition, Davidson and Thompson (2022) explored the role of forensic accounting expenditure analysis in detecting fraudulent tax practices within the public sector in Ghana. They focused on government spending discrepancies and their links to tax fraud. The study included a sample of 150 government entities, and data were analyzed using a combination of descriptive statistics and path analysis. The study's findings revealed that significant anomalies in government spending often pointed to tax fraud schemes, such as the underreporting of government income. The authors recommended that forensic accounting teams be established within public sector auditing bodies to detect and prevent financial mismanagement and tax fraud. Path analysis is statistically rigorous but assumes model correctness without testing alternative paths. The study does not clarify control for multicollinearity. Sensitivity analysis would add robustness.

In another study by Coleman and Harris (2021), the authors investigated the relationship between forensic accounting expenditure analysis and tax fraud detection in the financial services industry in South Africa. The study used a sample of 100 financial institutions, with data being analyzed through regression analysis and factor analysis. The results indicated that forensic expenditure analysis was particularly effective in uncovering fraudulent claims related to operational expenses, which were often used to reduce taxable income. The authors suggested that financial institutions should employ forensic accountants to audit their expense reports regularly and recommended training financial officers in forensic accounting principles. There is little detail on how financial institutions were selected. Relying solely on internal reports could introduce bias. External validation sources would improve credibility.

Similarly, Sulaimon and Odunlami (2023) conducted an empirical study on the effectiveness of forensic accounting expenditure analysis in detecting tax fraud in the telecommunications industry in Nigeria. The study aimed to assess whether inflated operating costs reported by telecommunications companies were indicative of tax evasion. The sample consisted of 70 companies, and the data was analyzed using correlation analysis and t-tests. The results revealed that discrepancies between operating expenses and actual expenditures were significant indicators of tax fraud. The study recommended that forensic accounting techniques be routinely applied to the telecommunications sector to prevent tax evasion. The analysis lacked robustness in controlling for industry-specific cost structures. T-tests are insufficient for multivariate relationships. A more comprehensive regression approach is needed.

In addition, Okoro and Olaniyan (2023) examined the role of forensic accounting in detecting tax fraud in Nigeria's retail sector. The study investigated the financial reports of 200 retail businesses to identify potential fraudulent activities related to tax evasion. Using data from the Nigerian corporate tax authorities, the authors applied statistical techniques such as regression and variance analysis. Their findings revealed a strong correlation between inflated expenditure claims and the underreporting of income. The authors called for the implementation of a forensic expenditure audit program for retail businesses, which would allow tax authorities to scrutinize expenses and detect fraudulent behavior. Though the large sample adds value, the study doesn't clarify how businesses were selected. The variance analysis could benefit from post-hoc tests. Sector-specific models would provide deeper insight.

A study by Nwachukwu and Chukwu (2023) delved into the use of forensic accounting expenditure analysis for detecting tax fraud within Nigeria's banking industry. The study focused on the role of forensic accountants in identifying discrepancies in financial reports related to bank expenditures, such as bonuses, salaries, and operational costs. The sample size consisted of 50 banks, and the data was analyzed using factor analysis and multiple regression. The study concluded that forensic accounting techniques could effectively uncover fraudulent practices in the banking sector, particularly when discrepancies between reported and actual expenses were found. The authors recommended periodic forensic audits and the development of specialized forensic accounting units in tax offices. The sample size is relatively small for industry-wide conclusions. Details on variable scaling were missing. More granularity on fraud types would improve relevance.

Theoretical Reviews

Signaling theory, originally propounded by Michael Spence in 1973, provides a useful framework for understanding the effect of forensic expenditure analysis on tax fraud detection. The theory assumes that in situations of information asymmetry, one party (the sender) conveys credible signals to reduce uncertainty for the other party (the receiver) (Spence, 1973). In the context of tax administration, forensic expenditure analysis acts as a signal sent by taxpayers or internal revenue agencies, revealing truthful or suspicious patterns in expenditure behavior that help detect tax fraud. The fundamental assumption is that fraudulent taxpayers will have difficulty mimicking legitimate expenditure signals due to inconsistencies in their financial records, which forensic analysts can identify. However, a limitation of signaling theory is that it presumes signals are costly and difficult to fake; in some cases, sophisticated fraudsters may successfully manipulate their expenditure patterns to avoid detection, thereby weakening the theory's explanatory power (Connelly et al., 2011). Despite this limitation, signaling theory effectively explains how forensic expenditure analysis functions as a mechanism to differentiate between honest and fraudulent tax behavior by uncovering discrepancies in financial signals. Thus, it highlights the importance of forensic tools in tax fraud detection by reducing information asymmetry between taxpayers and tax authorities, ultimately improving compliance and enforcement (Spence, 1973; Connelly et al., 2011).

3.0 METHODOLOGY

This study utilized a survey research design, with a population comprising 411 Inspectors of Taxes employed in the Internal Revenue Services located in the state capitals of Nigeria's North Central region. The region includes Nasarawa, Plateau, Niger, Kogi, Kwara, and Benue States. The selection of tax offices in state capitals was intentional, given the study's focus on bank statement analysis, which is more applicable in urban areas where high-net-worth individuals are more commonly found.

Table 3.1 Population of the Study

S/NO	Category	Total
1.	Nasarawa State Internal Revenue Service	71
2.	Plateau State Internal Revenue Service	65
3	Niger State Internal Revenue Service	58
4	Kogi State Internal Revenue Service	73
5	Kwara State Internal Revenue Service	66
6	Benue State Internal Revenue Service	78
	Total	411

Source: Admin Unit of Individual States' internal revenue service, 2024

The study involved a population of 411 respondents, and a census method was employed, whereby the entire population also constituted the sample size. Data collection was carried out using a structured questionnaire comprising 10 items—five items each for the independent and dependent variables. The reliability of the instrument was assessed using Cronbach's alpha, which produced values of 0.77 for the independent variables and 0.80 for the dependent variables, indicating good reliability as both values surpassed the acceptable threshold of 0.70.

A modified five-point Likert scale was utilized, featuring response options of Strongly Disagree, Disagree, Undecided, Agree, and Strongly Agree, assigned scores of 1, 2, 3, 4, and 5 respectively. The data gathered were analyzed using various statistical methods. The null hypotheses were tested using simple regression analysis with the aid of SPSS Version 23 software, in order to determine the strength of the relationship between the dependent variable (tax fraud detection) and the independent variable (forensic expenditure analysis). The functional form of the simple regression model is outlined as follows.

TAFD= f (FAEA, ……..……..……....(1)

With the aid of this equation the study arrived at a model which is mathematically presented as follows

$TAFD\ i_t = \beta 0 + \beta 1\ FAEA_{It} + Ui_t$,……..……..(2)

Where, TAFD = Tax fraud detection as measured by response from questionnaires.
FAEA=Forensic Accounting Expenditure analysis as measured by response from questionnaires.
A Priori expectation is that all the independent variables will have positive effect on Tax fraud detection

4.0 DATA ANALYSIS, RESULTS AND DISCUSSION OF FINDINGS

Table 2 provides a detailed summary of the descriptive statistics for the study variables reveal important insights into the perceptions of respondents regarding tax fraud detection and forensic expenditure analysis within the States' Internal Revenue Services of North Central Nigeria.

Table 2. Descriptive statistics of variables

Variables	Obs	Minimum	Maximum	Mean	St Deviation
Tax fraud detection	349	2.00	5.00	4.1559	.64130
Forensic expenditure analysis	349	2.80	5.00	4.3943	.41129

Source: SPSS Outputs 2025.

For tax fraud detection, based on 349 observations, responses ranged from a minimum score of 2.00 to a maximum of 5.00, with an average rating of 4.16. This mean value indicates that most respondents generally agree that tax fraud detection mechanisms are effective, though the minimum score and standard deviation of 0.64 suggest some variation in how strongly this effectiveness is perceived across different respondents or states. In contrast, forensic expenditure analysis received a higher average score of 4.39, with responses ranging between 2.80 and 5.00, reflecting a stronger overall agreement on the application and relevance of forensic expenditure analysis in detecting tax fraud. Moreover, the standard deviation of 0.41 indicates a tighter consensus among respondents, highlighting that forensic expenditure analysis is more uniformly acknowledged and practiced within the revenue services. Together, these findings suggest that while tax fraud detection is widely accepted as effective, forensic expenditure analysis is perceived even more positively and consistently as a critical tool in uncovering fraudulent tax activities. This strong endorsement of forensic expenditure analysis underscores its potential influence on improving tax fraud detection efforts in the region.

The correlation matrix in Table 3 examines the relationship between forensic expenditure analysis and tax fraud detection within the States' Internal Revenue Services of North Central Nigeria. ***Table 3 Correlation Matrix of Dependent and Independent variables***

Variables	Tax fraud detection	Forensic expenditure analysis	VIF
Tax fraud detection	1.000	.519**	
Forensic expenditure analysis	.519**	1.000	1.00

Source: SPSS Outputs 2025.

The matrix shows a positive and statistically significant correlation coefficient of **0.519** between forensic expenditure analysis and tax fraud detection at the 0.01 level (indicated by **). This moderate positive correlation suggests that as the use of forensic expenditure analysis increases, there is a corresponding improvement in the effectiveness of tax fraud detection. In other words, forensic expenditure analysis plays a meaningful role in enhancing the ability of internal revenue services to identify and address tax fraud cases. Additionally, the Variance Inflation Factor (VIF) value of 1.00 for forensic expenditure analysis indicates that there is no multicollinearity problem, confirming that the independent variable is suitably distinct and reliable for further regression analysis. Overall, these results provide initial empirical support for the positive effect of forensic expenditure analysis on tax fraud detection in the region, warranting further investigation into the strength and causality of this relationship.

The regression results in Table 4 provide important insights into the effect of forensic expenditure analysis on tax fraud detection in States' Internal Revenue Services of North Central Nigeria.

Table 4 Regression Results

Ind. Variables	Coefficients OLS	T Statistics OLS	P-Values
Constants	857	2.647	.008
Forensic expenditure analysis	.481	10.232	.000
R-Squared	.232		
Adj. R-Squared	.230		
F-Statistic	104.700		
P-Value	0.0000		

Source: SPSS Outputs 2025.

The constant term has a coefficient of 0.857 with a t-statistic of 2.647 and a p-value of 0.008, indicating that the intercept is statistically significant at the 1% level. The coefficient for forensic expenditure analysis is 0.481, with a very high t-statistic of 10.232 and a p-value of 0.000, which is highly significant. This suggests that a one-unit increase in forensic expenditure analysis is associated with a 0.481 increase in the level of tax fraud detection, implying a strong positive effect. This finding confirms those of Arora and Kumar (2023); Abiola and Moses (2023) and Adeleke and Adebayo (2022). The model's R-squared value of 0.232 indicates that approximately 23.2% of the variation in tax fraud detection can be explained by forensic expenditure analysis alone. The adjusted R-squared of 0.230 further confirms the model's explanatory power while accounting for the number of predictors. The F-statistic of 104.700 with an associated p-value of 0.000 indicates that the overall regression model is statistically significant, confirming that forensic expenditure analysis significantly predicts tax fraud detection. These results strongly support the hypothesis that forensic expenditure analysis positively influences the effectiveness of tax fraud detection within the States' Internal Revenue Services in North Central Nigeria.

5.0 CONCLUSION AND RECOMMENDATION

Based on the findings, it can be concluded that forensic expenditure analysis plays a significant and positive role in enhancing tax fraud detection within the States' Internal Revenue Services of North Central Nigeria. The statistically significant coefficient indicates that improvements in forensic expenditure analysis are associated with notable increases in the ability to detect tax fraud. Although forensic expenditure analysis explains about 23.2% of the variation in tax fraud detection, this highlights its meaningful contribution as a key predictor among other potential factors. The overall significance of the regression model confirms the robustness of this relationship, underscoring the importance of integrating forensic expenditure analysis into tax administration strategies. Therefore, policymakers and revenue authorities in the region should prioritize strengthening forensic expenditure analysis capabilities to improve tax compliance and reduce fraudulent activities effectively.

Based on the findings of this study, it is recommended that the States' Internal Revenue Services in North Central Nigeria enhance their forensic expenditure analysis capabilities by providing targeted training and professional development for tax officials. Strengthening the skills and knowledge of personnel will improve the accuracy and effectiveness of detecting fraudulent tax activities. Additionally, the adoption of advanced forensic tools and technologies, such as data analytics and artificial intelligence, should be prioritized to support more thorough and efficient expenditure investigations.

Furthermore, forensic expenditure analysis should be integrated into routine tax audit procedures to ensure systematic identification of suspicious transactions. Collaboration between revenue services, forensic experts, and law enforcement agencies is also essential to facilitate information sharing and strengthen enforcement efforts. Finally, public awareness campaigns should be conducted to educate taxpayers about the consequences of tax fraud and the use of forensic methods as a deterrent, fostering greater voluntary compliance. These measures will collectively improve tax fraud detection and enhance revenue mobilization in the region.

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Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Tax fraud detection	349	2.00	5.00	4.1559	.64130
Forensic expenditure analysis	349	2.80	5.00	4.3943	.41129
Valid N (listwise)	349				

Correlations

			Tax fraud detection	Forensic expenditure analysis
Spearman's rho	Tax fraud detection	Correlation Coefficient	1.000	.519**
		Sig. (2-tailed)	.	.000
		N	349	349
	Forensic expenditure analysis	Correlation Coefficient	.519**	1.000
		Sig. (2-tailed)	.000	.
		N	349	349

**. Correlation is significant at the 0.01 level (2-tailed).

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.481[a]	.232	.230	.56289	.232	104.700	1	347	.000	1.258

a. Predictors: (Constant), Forensic expenditure analysis
b. Dependent Variable: Tax fraud detection

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	33.174	1	33.174	104.700	.000[b]
	Residual	109.946	347	.317		
	Total	143.120	348			

a. Dependent Variable: Tax fraud detection
b. Predictors: (Constant), Forensic expenditure analysis

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1 (Constant)	.857	.324		2.647	.008	.220	1.494					
Forensic expenditure analysis	.751	.073	.481	10.232	.000	.606	.895	.481	.481	.481	1.000	1.000

a. Dependent Variable: Tax fraud detection