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Effect of Digital Forensic Accounting on Fraud Detection in Nigeria: A Case Study of Federal Inland Revenue Service

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ABSTRACT

Forensic accounting is a tool used to improve accountability in the public sector by prosecuting elements of financial fraud within the civil service. This study investigated the effects of forensic accounting on fraud detection in the federal Inland Revenue service of Nigeria. The study is built on the survey research design and employs the use of a questionnaire to collect primary data for statistical analysis. This study measure digital forensic accounting based on the procedures, tools and personnel used by the service. The study leveraged on a sample size of 325 respondents. The study tested the data collected using frequency distribution tables, descriptive statistics, correlation analysis, ANOVA tests and linear regression tests. The study found that digital forensic procedures, tools and personnel had statistically significant and positive effect on fraud detection in the Federal Inland Revenue Service in Nigeria. The study concluded that digital forensic accounting had significantly affected fraud detection capacity of Nigerian public sector organisations. The study recommended increased adherence to laid down forensic procedure, regular updates of forensic tools. The study also recommended increased training and compensation for forensic accounting personnel to improve forensic quality.

Keywords: *Digital, Forensic Accounting, Fraud Detection, Nigeria, FIRS*

1. Introduction

In recent years, the landscape of financial reporting has undergone significant transformations due to technological advancements and the increasing complexity of financial transactions. As organizations grapple with the challenges posed by fraud, mismanagement, and financial irregularities, the role of forensic accounting has become pivotal. Specifically, digital forensic accounting has emerged as a critical discipline in addressing these issues. According to Pham and Vu (2024), the digital age has revolutionized financial processes, leading to an exponential increase in electronic transactions, data volumes, and cyber threats. Digital forensic accounting leverages technology to investigate financial irregularities, detect fraud, and enhance the quality of financial reporting. Cybercrimes, including identity theft, hacking, and phishing, pose significant risks to financial systems.

Digital forensic accounting has emerged as a critical tool in enhancing transparency and accountability within public sector organizations globally. As governments strive to combat fraud and improve reporting standards, the integration of digital technologies in forensic accounting has become imperative (Adams, 2017). In Nigeria, like many developing countries, public sector financial management faces significant challenges such as misappropriation of funds, fraud, and inefficient resource allocation (Adebisi *et al.*, 2016).

The implementation of digital forensic accounting techniques offers promising solutions to these challenges by leveraging advanced data analytics and investigative methodologies (Afriyie, *et al,* 2023). Digital forensic accounting involves the systematic examination of financial records and electronic data to detect, analyze, and prevent fraudulent activities (Ahmed *et al,* 2021). This approach not only enhances fraud detection capabilities but also

improves the overall quality of financial reporting by ensuring accuracy and transparency (Akinbowale, *et al.* 2021).

Recent studies underscore the transformative impact of digital forensic accounting on public sector governance. For instance, research has shown that digital tools enable real-time monitoring of financial transactions, thereby minimizing the risk of revenue leakage and enhancing compliance with regulatory frameworks (Iheme, 2024). By integrating digital forensic accounting practices, public sector organizations can streamline reporting processes, mitigate financial fraud, and foster public trust (Al Shehab, 2022). Despite these advancements, the adoption of digital forensic accounting in Nigeria's public sector remains uneven and faces implementation challenges such as technological infrastructure deficits and skills gaps among accounting professionals. Addressing these barriers is crucial to realizing the full potential of digital forensic accounting in improving fraud detection in Nigerian public sector organizations.

In conclusion, while the potential benefits of digital forensic accounting in enhancing fraud detection are evident, there is a need for empirical research to explore its practical application and effectiveness within the Nigerian context. This study aims to fill this gap by examining how digital forensic accounting impacts the detection of fraud in public sector organizations in Nigeria, thereby contributing to both academic literature and policy formulation.

Public sector organizations in Nigeria face persistent challenges related to fraud, financial transparency and accountability. Despite efforts to improve fraud detection, issues such as misappropriation of funds and inefficiencies in financial management continue to undermine governance and public trust (Iheme, 2024). The integration of digital forensic accounting has been proposed as a solution to enhance reporting accuracy, detect financial irregularities as well as fraud. However, there is a lack of empirical evidence on how digital forensic accounting practices can effectively mitigate these challenges and improve reporting quality within Nigerian public sector organizations.

Several studies such as Ofili, et al (2024), Oyerogba (2021), Ugwu (2021), Nosiri, et al (2021), Sule, et al (2019) and Olaiya and Adekola (2022) have attempted to examine the effect of forensic accounting on the financial reporting of public sector organisations, however, a number of research gaps such as time gaps, methodology gaps and geographical gaps have obfuscated the real effect of digital forensic accounting on financial reporting quality. Studies like Ugwu (2021), Nosiri, et al (2021), Sule, et al (2019) focused on older time scopes which significantly limits the applicability of the findings to the Nigerian public sector in recent times. In view of this research gap identified, this study intends to fill the research gaps by leveraging on more recent data indigenous to Nigeria. This study aims to address this gap by investigating the impact of digital forensic accounting on fraud detection of public sector organizations in Nigeria, thereby contributing to the literature and informing policy recommendations.

The general objective of this study is to assess the effect of digital forensic accounting on the fraud detection of the Nigerian public sector using the Federal Inland Revenue Service as a case study, the specific objectives of this study are to:

i. assess the effect of digital forensic investigation procedures on the revenue mobilisation of Federal Inland Revenue Service Nigeria
ii. assess the effect of digital forensic investigation tools on the revenue mobilisation of Federal Inland Revenue Service Nigeria
iii. assess the effect of digital forensic investigation personnel on revenue mobilisation of Federal Inland Revenue Service Nigeria

2. Literature Review

Digital Forensic Accounting

The demand for forensic accountants has surged in recent years due to the escalation of financial fraud and white-collar crimes. Forensic accounting, as described by Al Shbail et al. (2022), involves employing accounting and auditing techniques to address legal issues. Afriyie et al. (2023) define forensic accounting as the application of accounting expertise to scrutinize instances of fraud, embezzlement, and financial misconduct, including the collection of non-financial organizational data as evidence in legal proceedings.

According to Hossain (2023), digital forensic accounting utilizes forensic accounting principles to digitally investigate and prevent financial crimes. The efficacy of digital forensic accounting services extends to enhancing fraud investigations, supporting legal cases, evaluating corporate worth, and identifying cybercrimes (Alshira'h et al., 2024). Additionally, Rehman and Hashim (2021) suggest that forensic accounting enhances sustainable corporate governance, while Awodiran et al. (2023) argue that digital forensic accounting aids in mitigating digital fraud. Darwazeh et al. (2024) highlight the significant impact of forensic accounting on firm performance within the Jordanian insurance sector, emphasizing components like trend analysis, data mining, financial ratios, and reasonableness testing. Pham and Vu (2024) propose a conceptual framework for digital forensic accounting encompassing anti-fraud policies, governance, fraud detection, and internal controls, aimed at exploring its integration with business model innovation and internationalization. While Hossain (2023) introduces the concept of cyber security forensic accounting, their study primarily serves as an introduction without a comprehensive analysis of its components, principles, and operational activities.

This study defines digital forensic accounting as the use of computerised tools for gathering financial evidence to be used in the court of law to determine the extent to which fraud or mismanagement has occurred. This study measures digital forensic accounting as the procedures, tools and personnel that are involved in digital forensic accounting of the Federal Inland Revenue Service of Nigeria.

Digital Forensic Accounting Procedures

Digital forensic accounting procedures refer to the systematic methods and practices used to investigate financial fraud and misconduct by examining digital records and data (Taiwo & Olorunleke, 2023). These procedures involve the collection, preservation, analysis, and interpretation of electronic financial information to uncover evidence of fraudulent activities, such as embezzlement, money laundering, and financial statement fraud. The goal is to ensure that digital evidence is handled in a manner that maintains its integrity and admissibility in legal proceedings. This aspect of digital forensic accounting procedures involves the identification, extraction, and secure storage of electronic financial records and data. Techniques are employed to ensure that the digital evidence is not altered or tampered with during the investigation process. Proper chain-of-custody documentation is maintained to track the handling of the evidence from collection to court presentation, ensuring its integrity and authenticity.

Digital financial data analysis is a crucial component of digital forensic accounting procedures. It involves the use of specialized software tools and analytical techniques to scrutinize electronic financial records for irregularities, patterns, or anomalies that may indicate fraudulent activity (Pham & Vu, 2024). This process may include the examination of transaction histories, audit trails, financial statements, and email communications to identify discrepancies or evidence of manipulation.

Digital forensic accounting procedures are investigative processes whose findings must be compiled into a comprehensive report that clearly presents the evidence and conclusions. This

report is often used in legal proceedings, and forensic accountants may be required to testify as expert witnesses. The testimony provides an explanation of the digital forensic procedures followed, the evidence uncovered, and the conclusions drawn, supporting the legal team in prosecuting or defending against claims of financial misconduct. For best results, these procedures are carried out regularly in line with existing laws and are regularly reviewed to sustain the effectiveness of these procedures.

Digital Forensic Accounting Tools

Digital forensic accounting tools are specialized software applications and hardware devices used by forensic accountants to identify, collect, analyze, and preserve digital evidence related to financial crimes (Saifullah & Abbas, 2020). These tools enable professionals to examine large volumes of financial data, trace digital transactions, and detect fraudulent activities such as embezzlement, money laundering, and financial statement manipulation. They are essential for ensuring that the evidence gathered is reliable, accurate, and admissible in legal proceedings. Data recovery and extraction tools are a subset of digital forensic accounting tools designed to retrieve financial data from various electronic devices, including computers, servers, smartphones, and cloud storage systems. These tools can recover deleted, hidden, or encrypted files, ensuring that all relevant financial information is captured for forensic analysis. The ability to extract data from damaged or corrupted storage media is also a critical function of these tools.

Digital audit and analysis software refer to tools specifically developed to perform in-depth analyses of financial records and transactions (Abu & Abu, 2020). These tools can automate the examination of accounting data, identify patterns or anomalies indicative of fraudulent behavior, and generate detailed audit trails. By providing visualizations, reports, and statistical analyses, digital audit tools help forensic accountants to interpret complex data sets and uncover evidence of financial irregularities.

Digital forensic accounting tools are tools are used to securely acquire, store and document digital evidence throughout the forensic accounting process. These tools ensure that digital financial data is preserved in its original state, preventing any unauthorized access, alteration, or loss. They also maintain detailed logs of who accessed the data, when it was accessed, and how it was handled, thus establishing a clear and verifiable chain of custody that is crucial for the admissibility of evidence in court. For these tools to produce optimal results, they have to be representative of the latest technology. This is because, in the digital sphere, changes occur rapidly and effectiveness of a system sometimes depends heavily on the ability of a system to keep up with relevant changes.

Digital Forensic Accounting Personnel

Digital forensic accounting personnel are specialized professionals trained in both forensic accounting and digital forensics, responsible for investigating financial crimes involving digital data (Pham & Vu, 2024). These individuals possess expertise in analyzing electronic financial records, detecting fraud, and recovering digital evidence. They play a critical role in uncovering complex financial schemes, such as embezzlement, money laundering, and fraudulent reporting, by utilizing advanced forensic techniques and tools. Digital forensic accountants are professionals who combine their knowledge of accounting, auditing, and digital forensics to investigate financial discrepancies and fraud (Iheme, 2024). They are skilled in examining digital financial records, identifying irregularities, and interpreting data to provide insights into fraudulent activities. These accountants often work closely with legal teams, providing expert analysis and testimony in court cases involving financial misconduct.

According to Akinadewo, *et al.* (2023), digital evidence analysts in forensic accounting specialize in the examination and interpretation of digital data related to financial transactions. These professionals use sophisticated software tools to analyze electronic financial records, detect anomalies, and trace illicit transactions. Their work is essential in gathering and preserving digital evidence that can be used in legal proceedings to prove or disprove allegations of financial fraud.

Cyber forensic auditors are digital forensic accounting personnel focused on auditing financial records and systems for signs of cyber-related financial crimes. They investigate incidents such as hacking, data breaches, and cyber fraud that impact financial data integrity. These auditors possess expertise in both cybersecurity and forensic accounting, enabling them to identify vulnerabilities, trace unauthorized access, and assess the financial impact of cyber incidents. Their findings help organizations strengthen their defences and support legal action against perpetrators. For these personnel to carry out their duties effectively, they must be well trained, compensated and protected. The protection element is important as criminal elements at risk of prosecution from findings of forensic investigations may threaten the lives of personnel to undermine the forensic process.

Fraud Detection

Fraud detection is the process of identifying and preventing fraudulent activities within an organization or financial system. It involves the use of various techniques, including data analysis, monitoring systems, and investigative procedures, to uncover and address instances of fraud such as embezzlement, identity theft, and financial statement manipulation (Taiwo & Olorunleke, 2023). Effective fraud detection aims to protect an organization's assets, maintain financial integrity, and ensure compliance with legal and regulatory standards.

According to Kpojime (2022), automated fraud detection systems are technology-driven solutions designed to continuously monitor transactions, user behavior, and financial activities in real-time to identify suspicious patterns that may indicate fraud. These systems use algorithms, machine learning, and artificial intelligence to analyze large volumes of data, flagging potential fraudulent activities for further investigation. By automating the detection process, organizations can respond quickly to threats and minimize financial losses. Risk-based fraud detection is a method that prioritizes the identification of fraud based on the level of risk associated with different transactions or activities (Saifullah and Abbas, 2020). This approach involves assessing the likelihood and potential impact of fraud in various scenarios, allowing organizations to focus their detection efforts on high-risk areas. By aligning detection strategies with risk assessments, this method enhances the efficiency and effectiveness of fraud prevention measures.

Fraud detection is the ability of a person, system or process to detect fraud within its purview. Fraud detection has a higher chance of occurrence in a system where the individual elements are educated on what fraud is and how to detect it. Fraud detection is not complete until its detection is documented properly and reported through authorised systems for proper follow up.

Empirical Review

Ofili, et al (2024) examined the impact of forensic skills on fraud detection in federal government agencies in Nigeria. The study employed a survey research design and covered the period from 2019 to 2023. Data were analyzed using descriptive and inferential statistics. Forensic and audit skills were measured using a structured questionnaire, while fraud detection was assessed through reported cases of fraud. The population comprised federal government agencies in Nigeria, with a sample size of 150 respondents. The findings indicated that forensic

skills significantly enhance fraud detection. The study concluded that improving forensic skills is crucial for effective fraud detection in government agencies. It recommended continuous training and development of forensic skills among auditors. However, the study's reliance on primary data presents a methodology gap, and future research could benefit from incorporating secondary data for a more comprehensive analysis.

Olaiya and Adekola (2022) examined the role of forensic audit tools in fraud detection within Nigerian federal parastatals. The study employed a survey research design and focused on data collected in 2022. Using both primary and secondary data sources, the analysis was conducted through mean, standard deviation, ANOVA, and multiple regression analysis. The population consisted of 608 federal parastatals, with a sample size determined through stratified and proportionate purposive sampling techniques. The study found that forensic audit tools significantly impact fraud detection, with an R-square value of 0.477. It concluded that enhancing forensic audit skills, techniques, and experience can substantially reduce fraud in federal parastatals. The study recommended that forensic audit firms should focus on acquiring innovative skills and that federal parastatals should prioritize competence in selecting forensic auditors. Despite its contributions, the study's reliance on data from 2022 presents a time gap, and its use of primary data indicates a methodology gap that future research could address by incorporating more recent data and diverse methodologies.

Oyerogba (2021) investigated the perception of professionals in accounting and forensic auditing regarding the essential knowledge, skills, and techniques required for high-quality fraud detection services. The study adopted a survey design with a self-administered questionnaire, focusing on data collected in 2020. Descriptive statistics (ranking, mean, and standard deviation) and inferential statistics (binary logistic regression and ordinary least square regression) were used for analysis. The study measured variables such as economic damage calculation and financial statement valuation. The population consisted of professionals in the Nigerian public sector, with a sample size of 298 respondents. Findings indicated that forensic auditors' skills and techniques significantly predict fraud detection. The study concluded that enhancing internal control systems is crucial for reducing fraudulent practices in federal government parastatals. Recommendations included revising accounting curricula to better train graduates and professionals.

Ugwu (2021) critically reviewed the application of forensic accounting in fraud detection, investigation, and litigation support services in Nigeria. The study adopted a descriptive research design with an extensive literature review. The study did not specify a time scope, indicating a potential time gap. The method of analysis was qualitative, focusing on secondary data sources. The population was the Nigerian public sector, but the sample size was not explicitly mentioned. The study found that forensic accounting significantly contributes to fraud control but is not a complete solution to fraud issues in Nigeria. It concluded that forensic accounting should be integrated into auditors' work, and forensic accountants should receive continuous training. The study recommended policy changes to enforce fraud detection as part of auditors' responsibilities. However, the reliance on secondary data presents a methodology gap, suggesting the need for empirical research.

Nosiri, et al (2021) examined the role of forensic accounting in detecting tax fraud in the Nigerian public sector. The study employed a theoretical research design, focusing on secondary data sources. The time scope of the study was not explicitly stated, indicating a potential time gap. Content analysis was used to analyze the data, with variables measured through existing literature and documented cases. The population consisted of public sector entities in Nigeria, but the sample size was not specified, highlighting a geographical research gap. The findings revealed that forensic accounting significantly reduces tax fraud in the public sector. The study concluded that forensic accounting is crucial for fraud detection and

recommended its mandatory adoption in public sector entities. However, the reliance on secondary data presents a methodology gap, suggesting the need for primary data in future research.

Sule, et al (2019) examined the effect of forensic accounting investigation in detecting financial fraud in Nigeria. The study utilized a literature review research design, focusing on previous studies and their findings. The method of analysis was qualitative, relying on the synthesis of existing literature. The population included various studies on forensic accounting, with no specific sample size mentioned. The findings indicated that forensic accounting significantly aids in detecting financial fraud. The study concluded that forensic accounting is crucial for uncovering fraudulent activities in Nigeria. It recommended that professional accounting bodies encourage specialization in forensic accounting. However, the study's reliance on literature review presents a methodology gap, and the time scope is outdated, necessitating more recent data.

Theoretical Review

Innovation Diffusion Theory

Innovation diffusion theory, introduced by Rogers in 1962, provides valuable insights into how innovations are adopted and implemented within organizations. In the context of this study, IDT offers a pertinent framework for understanding how Information Communication Technology (ICT) diffuses through public finance through forensic accounting. This theory emphasizes key factors such as relative advantage, compatibility, complexity, trialability, and observability, which influence the adoption and diffusion of innovations. Applying IDT in this context allows for an exploration of how the adoption of ICT in forensic accounting in Nigeria shapes financial reporting quality considering factors such as perceived benefits, compatibility with existing systems, complexity, trialability, and observability of these technological innovations.

IDT is based on several foundational assumptions. It posits a predictable pattern of innovation adoption, facilitating the analysis and prediction of adoption rates. The theory underscores the social aspect of adoption, highlighting the role of interpersonal communication and social networks in the spread of innovations. It categorizes adopters into groups such as innovators, early adopters, early majority, late majority, and laggards based on their readiness to embrace new technologies. Additionally, IDT stresses the importance of communication channels in facilitating the diffusion process, suggesting that effective dissemination of innovations depends on the choice of communication channels.

Supporters of IDT commend its descriptive power, noting its effectiveness in explaining how innovation adoption unfolds across various contexts. The theory's practical applications in marketing and policy formulation are widely recognized, offering organizations valuable insights to customize adoption strategies. Moreover, IDT's predictive capability has proven beneficial in forecasting the acceptance of new technologies, products, and practices. Critics argue that IDT oversimplifies the adoption process by assuming uniformity within adopter groups, overlooking individual variations. They also point out that external factors such as economic conditions, cultural norms, and regulatory frameworks are often neglected in the theory, despite their significant influence on adoption decisions. Another criticism concerns the static nature of IDT's adopter categories, which may not adequately account for the dynamic changes individuals and organizations undergo as they transition between adopter groups over time.

In conclusion, while IDT provides valuable insights into the adoption of ICT and other innovations, acknowledging the dynamic nature of adoption processes and considering a broader range of influencing factors can enrich its application in understanding how

technologies are embraced and utilized in organizational contexts. It is the theoretical framework that underpins this research work because it seeks to explain the motivation behind the adoption of digital forensic accounting tools in the Nigerian public sector.

3. Methodology

This study tested the hypothesis using the survey research design. This is a methodological approach used to collect and analyze data from a defined group of respondents to gather information on their attitudes, opinions, behaviours, or characteristics. This design is commonly employed in various fields, including social sciences, marketing, and public health, to gain insights into a population's perspectives or to test hypotheses. The population of the study is the Federal Inland Revenue Service of Nigeria. The sample of the study is made up of 325 respondents chosen from the staff of the Federal Inland Revenue Service of Nigeria. The study employed the Taro Yamane formula to calculate the sample size. A total of 325 questionnaires were issued and only 316 were returned. The responses to the questionnaire were structured as numeric characters in line with the likehart scale. The average responses per section were calculated and used to express the opinion of the respondents of the given scale. The following model was formed for the purpose of this study:

$FDit = \beta_0 + \beta_1 DFAPit + \beta_2 DFATit + \beta_3 FAPit + eit$ ……..…… i

Where:
FD= Fraud Detection
DFAP = Digital Forensic Accounting Procedure
DFAT = Digital Forensic Accounting Tools
FAP = Forensic Accounting Personnel

Table 1: Measurement of Variables

S/n	Proxy	Type	Measurement
1	Fraud Detection	Dependent	Average response to fraud detection section using Likert scale
2	Digital Forensic Accounting Procedure	Independent	Average Response to forensic procedure section using Likert scale
3	Digital Forensic Accounting Tools	Independent	Average Response to forensic procedure section using Likert scale
4	Forensic Accounting Personnel	Independent	Average Response to forensic personnel section using Likert scale

Source: Researchers' Compilation (2024)

For this study, the Apriori expectation proposes that a growth in digital forensic accounting will have a positive and significant effect on fraud detection of the public sector in Nigeria.

4. Results And Discussion

Frequency Tables

Table 2: Fraud Detection

Fraud is easily detected in my office

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	58	18.4	18.4	18.4
	Disagree	39	12.3	12.3	30.7
	Neutral	67	21.2	21.2	51.9
	Agree	68	21.5	21.5	73.4
	Strongly Agree	84	26.6	26.6	100.0
	Total	316	100.0	100.0	

We report all cases of fraud in my office

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	1.6	1.6	1.6
	Disagree	8	2.5	2.5	4.1
	Neutral	60	19.0	19.0	23.1
	Agree	67	21.2	21.2	44.3
	Strongly Agree	176	55.7	55.7	100.0
	Total	316	100.0	100.0	

We are well informed of what constitutes fraud and how to avoid it

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	56	17.7	17.7	17.7
	Disagree	54	17.1	17.1	34.8
	Neutral	71	22.5	22.5	57.3
	Agree	85	26.9	26.9	84.2
	Strongly Agree	50	15.8	15.8	100.0
	Total	316	100.0	100.0	

Source: Authors' Computation Using SPSS (2024)

The frequency distribution regarding the perception of fraud detection in the office reveals a varied response. Out of 316 respondents, 26.6% strongly agree that fraud is easily detected, while 21.5% agree. This indicates that nearly half of the participants (48.1%) believe that fraud detection is effective. However, a significant portion remains neutral (21.2%), suggesting uncertainty or variability in detection efficacy. On the other end of the spectrum, 18.4% strongly disagree and 12.3% disagree, which means about 30.7% perceive a lack of effective fraud detection in the office. The cumulative percent reaches 100% at the strongly agree level, indicating the overall distribution of opinions.

The responses indicate that a substantial portion of the respondents agree (26.9%) or strongly agree (15.8%) that they are well-informed about what constitutes fraud and how to avoid it, totaling 42.7%. Meanwhile, 22.5% of respondents are neutral on this matter, showing that some are uncertain about their level of knowledge. On the negative side, 17.1% disagree, and 17.7% strongly disagree, which together make up 34.8% of the respondents. This indicates a significant need for further education or awareness regarding fraud and its prevention.

Regarding the reporting of fraud cases, a strong majority (55.7%) of the respondents strongly agree that all cases are reported, with an additional 21.2% agreeing, leading to a cumulative agreement of 76.9%. A smaller proportion of the respondents remain neutral (19.0%), indicating some uncertainty or indifference. On the contrary, only 4.1% of respondents express disagreement, with 2.5% disagreeing and 1.6% strongly disagreeing. This suggests that most participants feel confident that fraud cases are reported within the office.

Table 3: Digital Forensic Investigation Procedures

Digital forensic investigation procedures are carried out in line with existing laws

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	82	25.9	25.9	25.9
	Disagree	72	22.8	22.8	48.7
	Neutral	102	32.3	32.3	81.0
	Agree	60	19.0	19.0	100.0
	Total	316	100.0	100.0	

Digital forensic investigation procedures are carried out regularly

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	79	25.0	25.0	25.0
	Disagree	37	11.7	11.7	36.7
	Neutral	68	21.5	21.5	58.2
	Agree	108	34.2	34.2	92.4
	Strongly Agree	24	7.6	7.6	100.0
	Total	316	100.0	100.0	

Digital forensic investigation procedures are reviewed regularly

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	64	20.3	20.3	20.3
	Disagree	84	26.6	26.6	46.8
	Neutral	64	20.3	20.3	67.1
	Agree	80	25.3	25.3	92.4
	Strongly Agree	24	7.6	7.6	100.0
	Total	316	100.0	100.0	

Source: Authors' Computation Using SPSS (2024)

The distribution shows that a notable portion of respondents either strongly disagree (25.9%) or disagree (22.8%) that digital forensic investigation procedures are conducted in line with existing laws, totaling 48.7%. This suggests concerns about compliance. The largest group, 32.3%, is neutral, indicating uncertainty or lack of knowledge about the procedures' legality. Only 19.0% of respondents agree, with no respondents strongly agreeing, suggesting a general lack of confidence in the adherence to legal standards.

When asked about the regularity of digital forensic investigations, 34.2% agree that they are conducted regularly, with only 7.6% strongly agreeing. However, 21.5% remain neutral, while a significant proportion (25.0% strongly disagree and 11.7% disagree) believe that these

investigations are not conducted regularly. This distribution highlights a mixed perception, with almost half of the respondents unsure or disagreeing about the frequency of these investigations.

The responses show a relatively even split between agreement and disagreement regarding the regular review of digital forensic investigation procedures. About 25.3% of respondents agree, and 7.6% strongly agree that the procedures are reviewed regularly. Conversely, 26.6% disagree, and 20.3% strongly disagree, totalling 46.8% who believe that regular reviews are lacking. An equal percentage of respondents (20.3%) remain neutral, indicating varying levels of awareness or engagement with the review processes.

Table 4: Digital Forensic Investigation Tools

Digital forensic investigation tools used are in line with latest technology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	20	6.3	6.3	6.3
	Disagree	16	5.1	5.1	11.4
	Neutral	56	17.7	17.7	29.1
	Agree	69	21.8	21.8	50.9
	Strongly Agree	155	49.1	49.1	100.0
	Total	316	100.0	100.0	

Digital forensic investigation tools are expensive

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	10	3.2	3.2	3.2
	Disagree	22	7.0	7.0	10.1
	Neutral	84	26.6	26.6	36.7
	Agree	148	46.8	46.8	83.5
	Strongly Agree	52	16.5	16.5	100.0
	Total	316	100.0	100.0	

Digital forensic investigation tools are regularly updated

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	22	7.0	7.0	7.0
	Disagree	75	23.7	23.7	30.7
	Neutral	76	24.1	24.1	54.7
	Agree	116	36.7	36.7	91.5
	Strongly Agree	27	8.5	8.5	100.0
	Total	316	100.0	100.0	

Source: Authors' Computation Using SPSS (2024)

A significant portion of respondents strongly agree (49.1%) that digital forensic investigation tools are aligned with the latest technology, and 21.8% agree, making a cumulative agreement of 70.9%. Meanwhile, 17.7% remain neutral, suggesting some uncertainty. A small fraction of respondents (5.1% disagree and 6.3% strongly disagree) believe the tools are outdated. This distribution indicates strong confidence in the technological relevance of the tools used in digital forensic investigations.

The distribution regarding the cost of digital forensic tools shows that nearly half of the respondents (46.8%) agree that the tools are expensive, with an additional 16.5% strongly agreeing, leading to a cumulative agreement of 63.3%. A significant portion remains neutral (26.6%), indicating some indifference or lack of awareness about the costs. Only a small fraction of respondents disagrees (7.0%) or strongly disagree (3.2%), suggesting that the majority view the tools as costly.

The responses indicate that 36.7% of respondents agree that digital forensic investigation tools are regularly updated, with an additional 8.5% strongly agreeing. However, 24.1% remain neutral, and a notable portion (23.7% disagree and 7.0% strongly disagree) believe the tools are not updated regularly. This suggests that while a significant number of respondents see updates occurring regularly, there is still a sizable group that either doubts this or lacks sufficient information.

Table 5: Digital Forensic Investigation Personnel

Digital forensic investigation personnel are trained on latest technology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	46	14.6	14.6	14.6
	Disagree	31	9.8	9.8	24.4
	Neutral	44	13.9	13.9	38.3
	Agree	115	36.4	36.4	74.7
	Strongly Agree	80	25.3	25.3	100.0
	Total	316	100.0	100.0	

Digital forensic investigation personnel are well compensated

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	.6	.6	.6
	Disagree	6	1.9	1.9	2.5
	Neutral	55	17.4	17.4	19.9
	Agree	90	28.5	28.5	48.4
	Strongly Agree	163	51.6	51.6	100.0
	Total	316	100.0	100.0	

Digital forensic investigation tools are protected

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	40	12.7	12.7	12.7
	Disagree	40	12.7	12.7	25.3
	Neutral	63	19.9	19.9	45.3
	Agree	105	33.2	33.2	78.5
	Strongly Agree	68	21.5	21.5	100.0
	Total	316	100.0	100.0	

Source: Authors' Computation Using SPSS (2024)

Regarding the training of digital forensic personnel on the latest technology, 36.4% agree, and 25.3% strongly agree that such training occurs, totaling 61.7%. Meanwhile, 13.9% are neutral, and 9.8% disagree, with an additional 14.6% strongly disagreeing. This distribution highlights that while a majority perceive that adequate training is provided, there remains a considerable minority who are either uncertain or dissatisfied with the training provided.

A significant majority of respondents (51.6% strongly agree and 28.5% agree) believe that digital forensic investigation personnel are well-compensated, totaling 80.1% in agreement. Only 17.4% are neutral on this matter, with a negligible portion disagreeing (1.9%) or strongly disagreeing (0.6%). This indicates that most participants view the compensation for digital forensic personnel as satisfactory.

The final frequency distribution shows that 33.2% agree, and 21.5% strongly agree that digital forensic tools are protected, making a cumulative agreement of 54.7%. Meanwhile, 19.9% are neutral, and a combined 25.4% disagree (12.7%) or strongly disagree (12.7%) with this statement. This distribution indicates that while a majority feel confident in the protection measures, a notable portion of respondents either lack confidence or are uncertain about the protection of these tools.

Table 6: Descriptive Statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Fraud detection	316	2.00	5.00	3.5285	.70202	-.081	.137	-.506	.273
Digital Forensic Procedures	316	1.00	4.33	2.6848	.71852	.028	.137	-.278	.273
Digital Forensic Tools	316	1.33	5.00	3.6157	.69778	-.919	.137	.906	.273
Digital Forensic Personnel	316	2.00	5.00	3.7162	.64445	-.168	.137	-.535	.273
Valid N (listwise)	316								

Source: Authors' Computation Using SPSS (2024)

Fraud detection has a mean score of 3.5285 with a standard deviation of 0.70202 across 316 observations. The minimum value recorded is 2.00, and the maximum is 5.00, indicating that responses varied from moderate to very high levels of fraud detection. The skewness is -0.081 with a standard error of 0.137, suggesting that the distribution is slightly left-skewed but close to symmetric. The kurtosis is -0.506 with a standard error of 0.273, indicating a flatter distribution than the normal curve (platykurtic). Overall, the data on fraud detection shows moderate variability with a fairly symmetric distribution.

Digital forensic procedures have a mean score of 2.6848 and a standard deviation of 0.71852, also based on 316 observations. The scores range from a minimum of 1.00 to a maximum of 4.33, reflecting a broader range of responses compared to fraud detection. The skewness is 0.028 with a standard error of 0.137, indicating a nearly symmetrical distribution. The kurtosis is -0.278 with a standard error of 0.273, suggesting a distribution that is slightly flatter than the normal distribution. These results indicate that while responses to digital forensic procedures are somewhat varied, the distribution is relatively normal.

The mean score for digital forensic tools is 3.6157 with a standard deviation of 0.69778. The scores range from 1.33 to 5.00, showing a wide range of responses. The skewness of -0.919

with a standard error of 0.137 indicates a significant left skew, suggesting that more respondents rated digital forensic tools at the higher end of the scale. The kurtosis is 0.906 with a standard error of 0.273, indicating a distribution that is more peaked than normal (leptokurtic). This suggests that while most respondents view the tools positively, there is a concentration of responses at the higher end, with fewer low scores.

Digital forensic personnel scored a mean of 3.7162 with a standard deviation of 0.64445. The range of scores is from 2.00 to 5.00. The skewness is -0.168 with a standard error of 0.137, indicating a slight left skew, but overall, the distribution is relatively symmetrical. The kurtosis is -0.535 with a standard error of 0.273, suggesting a flatter distribution than normal. This implies that while most respondents rated digital forensic personnel positively, the distribution is relatively spread out without significant peaks.

The descriptive statistics reveal key insights into the distribution and central tendencies of the variables under study. Fraud detection and digital forensic personnel both have moderate to high mean scores, with relatively symmetrical distributions and moderate variability. Digital forensic tools, while also scoring highly on average, show a significant left skew and a leptokurtic distribution, indicating a concentration of high ratings. In contrast, digital forensic procedures have the lowest mean score and a nearly normal distribution, suggesting more varied responses with a tendency towards lower ratings. These findings highlight the overall positive perception of digital forensic tools and personnel, while also indicating areas for potential improvement in forensic procedures.

Table 7: Correlation Analysis

Correlations

		Fraud detection	Digital Forensic Procedures	Digital Forensic Tools	Digital Forensic Personnel
Fraud detection	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	316			
Digital Forensic Procedures	Pearson Correlation	.255**	1		
	Sig. (2-tailed)	.000			
	N	316	316		
Digital Forensic Tools	Pearson Correlation	.185**	-.002	1	
	Sig. (2-tailed)	.001	.978		
	N	316	316	316	
Digital Forensic Personnel	Pearson Correlation	.757**	.173**	.050	1
	Sig. (2-tailed)	.000	.002	.376	
	N	316	316	316	316

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

Source: Authors' Computation Using SPSS (2024)

The correlation analysis focuses on the relationship between fraud detection and digital forensic procedures, digital forensic tools, and digital forensic personnel. The null hypothesis of the test states that there is no significant correlation between the variables. The decision rule is to reject the null hypothesis if the probability value is less than 0.05. The correlation coefficient tells the direction and the strength of the correlation. A positive coefficient value indicates a positive correlation and a negative value indicates a negative correlation.

The strongest and most significant correlation is between fraud detection and digital forensic personnel, with a Pearson correlation coefficient of 0.757 with a pvalue of 0.000. This indicates a significant positive relationship, suggesting that the effectiveness of fraud detection is highly dependent on the involvement and capabilities of digital forensic personnel. The high correlation underscores the critical role that skilled personnel play in identifying and addressing fraudulent activities within an organization. There is also a statistically significant positive correlation between fraud detection and digital forensic procedures, with a Pearson correlation coefficient of 0.255 and a probability value of 0.000. Although this relationship is moderate, it indicates that well-established and rigorously followed forensic procedures contribute to improved fraud detection. This finding suggests that having clear, effective procedures in place can enhance the ability to detect fraud, though not as strongly as the impact of personnel. The correlation between fraud detection and digital forensic tools is weaker but still statistically significant, with a Pearson correlation coefficient of 0.185 and a probability value of 0.001. This positive correlation implies that the quality and appropriateness of digital forensic tools have some impact on fraud detection, albeit to a lesser extent than personnel and procedures. This suggests that while advanced tools can aid in detecting fraud, their effectiveness is somewhat limited compared to the influence of human and procedural factors.

The correlation analysis reveals that fraud detection is most strongly influenced by the capabilities of digital forensic personnel, followed by the rigor of forensic procedures, and lastly by the tools used in investigations. These findings emphasize the importance of investing in skilled personnel and robust procedures to enhance fraud detection, while also acknowledging the supporting role of appropriate digital forensic tools.

Table 8: Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.782[a]	.611	.607	.44005

a. Predictors: (Constant), Digital Forensic Personnel , Digital Forensic Tools , Digital Forensic Procedures

Source: Author's Computation Using SPSS (2024)

The model summary reveals that the regression model explains a substantial portion of the variance in fraud detection. The R value, representing the correlation coefficient, is 0.782, indicating a strong positive correlation between the predictors (digital forensic personnel, tools, and procedures) and fraud detection. The R Square value is 0.611, meaning that approximately 61.1% of the variance in fraud detection can be explained by the model. The Adjusted R Square, which adjusts for the number of predictors in the model, is slightly lower at 0.607, but still reflects a strong explanatory power. The standard error of the estimate is 0.44005, suggesting that the model's predictions are reasonably accurate, with a moderate level of prediction error.

Table 9: ANOVA Table

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	94.828	3	31.609	163.234	.000[b]
	Residual	60.417	312	.194		
	Total	155.244	315			

a. Dependent Variable: Fraud detection

b. Predictors: (Constant), Digital Forensic Personnel , Digital Forensic Tools , Digital Forensic Procedures

Source: Authors' Computation Using SPSS (2024)

The ANOVA results provide further confirmation of the model's effectiveness. The F statistic is 163.234, with a significance level (p-value) of 0.000, indicating that the regression model is statistically significant. This means that the combined influence of digital forensic personnel, tools, and procedures on fraud detection is significant and not due to random chance. The Sum of Squares for the regression is 94.828, compared to 60.417 for the residual, highlighting that the model accounts for a substantial portion of the total variance in fraud detection.

Table 10: Regression Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.296	.202		-1.467	.143
	Digital Forensic Procedures	.126	.035	.129	3.606	.000
	Digital Forensic Tools	.150	.036	.149	4.216	.000
	Digital Forensic Personnel	.792	.039	.727	20.247	.000

a. Dependent Variable: Fraud detection

Source: Authors' Computation Using SPSS (2024)

This report provides a comprehensive analysis of the regression model assessing the impact of digital forensic personnel, digital forensic tools, and digital forensic procedures on fraud detection. Then null hypothesis states that there is no significant relationship between the variables. The decision rule states to reject the null hypothesis if the probability value observed is less than 0.05. This means that the relationship between the dependent variable and the independent variable is statistically significant if the probability value observed for the variable combination is less than 0.05.

Digital Forensic Personnel has the highest impact on fraud detection, with an unstandardized coefficient (B) of 0.792 and a standardized Beta coefficient of 0.727. This indicates that for every one-unit increase in the effectiveness of digital forensic personnel, fraud detection increases by approximately 0.792 units, holding other variables constant. The t-value is 20.247, with a p-value of 0.000, confirming that this predictor is highly significant. Digital Forensic Tools also positively influence fraud detection, with an unstandardized coefficient of 0.150 and a Beta coefficient of 0.149. The t-value is 4.216, and the p-value is 0.000, indicating a statistically significant impact, though less pronounced than that of personnel.

Digital Forensic Procedures have a smaller yet significant positive effect on fraud detection, with an unstandardized coefficient of 0.126 and a Beta coefficient of 0.129. The t-value is 3.606 with a p-value of 0.000, demonstrating that while procedures do contribute to fraud detection, their impact is less than that of personnel and tools. The constant term, which represents the baseline level of fraud detection when all predictors are zero, is -0.296, but this value is not statistically significant ($t = -1.467$, $p = 0.143$). This suggests that without the influence of the predictors, the baseline fraud detection level is not reliably different from zero.

The regression analysis shows that digital forensic personnel, tools, and procedures significantly contribute to fraud detection, with personnel having the most substantial impact. The model explains a large portion of the variance in fraud detection, confirming the importance of these factors in combating fraud. The significance of the model and the predictors emphasizes the need for organizations to invest in skilled personnel, effective tools, and robust procedures to enhance their fraud detection capabilities.

Discussion of Findings

This study was designed to investigate the effect of digital forensic accounting on fraud detection in public sector organizations in Nigeria, with a specific focus on the Federal Inland Revenue Service (FIRS). The study utilized three key proxies to represent digital forensic accounting: digital forensic procedures, digital forensic tools, and digital forensic personnel. Each of these elements was statistically analyzed to determine its influence on the fraud detection capabilities of the FIRS. The study found that the proxies for digital forensic accounting (procedure, tools and people) were all statistically significant in affecting the fraud detection of the federal inland revenue service of Nigeria. The findings of this study are in line with the findings of Ofili, et al (2024), Oyerogba (2021), Ugwu (2021), Nosiri, et al (2021), Sule, et al (2019) and Olaiya and Adekola (2022) who all found significant effect of forensic accounting on fraud detection of sampled organisations. The findings clearly demonstrated that all three proxies had a significant and positive effect on the ability of the FIRS to detect fraudulent activities. This suggests that the integration of well-structured forensic accounting processes, the use of advanced digital tools, and the involvement of skilled personnel collectively enhance the fraud detection mechanisms of public sector organizations.

Digital Forensic Procedures and Fraud Detection

The findings revealed that forensic accounting procedures play a critical role in fraud detection. Digital forensic procedures, which include the systematic gathering, analysis, and interpretation of financial data, were found to significantly improve the detection of fraudulent activities. This implies that having well-defined and robust procedures for tracking financial discrepancies enhances an organization's ability to identify and address fraud in its early stages. The structured nature of these procedures ensures that financial data is consistently monitored, reducing the likelihood of fraudulent transactions going unnoticed. This finding corroborates the results of Ofili et al. (2024), who also found that the application of rigorous forensic accounting procedures significantly boosted fraud detection rates in public institutions. The procedures serve as the backbone of forensic accounting efforts, ensuring that there is a clear methodology for identifying and responding to suspicious activities within the organization.

Digital Forensic Accounting Tools and Fraud Detection

The role of digital tools in forensic accounting was another crucial element highlighted by the study. The findings suggest that the use of advanced forensic accounting tools such as data analytics software, fraud detection algorithms, and forensic auditing applications significantly enhances the ability of organizations to detect fraud. These tools allow for the efficient processing and analysis of large volumes of data, making it possible to identify anomalies and patterns that may indicate fraudulent behavior. Furthermore, digital tools automate many of the repetitive and manual processes involved in traditional forensic accounting, thereby reducing human error and increasing the speed and accuracy of fraud detection. The findings are consistent with those of Oyerogba (2021) and Ugwu (2021), who also reported that the use of forensic accounting technologies had a profound impact on fraud mitigation in public organizations. As technology evolves, these tools become even more critical, as they enable organizations to stay ahead of increasingly sophisticated fraudulent schemes.

Digital Forensic Accounting Personnel and Fraud Detection

The study also emphasized the importance of people, particularly skilled personnel, in the effectiveness of digital forensic accounting. The findings indicate that having a team of qualified and experienced forensic accountants is essential for detecting fraud in public sector organizations. This proxy focuses on the expertise, training, and professional judgment of forensic accounting professionals, who are responsible for interpreting the data and identifying

fraudulent activity. Skilled personnel are critical in bridging the gap between the technical output of forensic tools and the real-world application of fraud detection strategies. Their ability to apply their knowledge in analyzing complex financial data ensures that any irregularities are identified and addressed promptly. This aligns with the conclusions of Nosiri et al. (2021) and Sule et al. (2019), who stressed that human expertise is a key component of effective fraud detection, particularly in complex financial environments like the public sector. Furthermore, Olaiya and Adekola (2022) found that forensic accounting personnel who are proficient in both financial analysis and digital tools significantly enhance the accuracy and timeliness of fraud detection.

Comparison with Previous Studies

The findings of this study are consistent with several other studies in the field of forensic accounting. Ofili et al. (2024) found a significant positive relationship between forensic accounting procedures and fraud detection in public institutions, mirroring the current study's results on the role of structured processes in fraud mitigation. Similarly, the work of Oyerogba (2021) and Ugwu (2021) demonstrated the transformative impact of forensic accounting tools on fraud detection, confirming the critical role that technology plays in enhancing the accuracy and efficiency of fraud detection efforts.

In addition, Nosiri et al. (2021) and Sule et al. (2019) both emphasized the importance of skilled forensic accounting professionals in identifying and responding to fraud. Their studies highlighted that while technology and procedures are essential, the human element remains a crucial factor in successful fraud detection. Lastly, the study by Olaiya and Adekola (2022) provides further support for the current findings, as they observed a similar significant effect of forensic accounting techniques, particularly those related to personnel expertise, on fraud detection.

Implications of the Study's Findings

The overall alignment of this study's findings with those of prior research highlights the growing importance of digital forensic accounting in the public sector. The significant effect of procedures, tools, and people on fraud detection demonstrates that these elements must be integrated into the operations of public sector organizations like the FIRS to combat the increasing threat of financial fraud effectively. This also implies that public sector entities should prioritize investments in both advanced forensic tools and the training of personnel to enhance their fraud detection capabilities. Moreover, the importance of adhering to well-structured forensic procedures cannot be overstated, as it ensures a systematic and consistent approach to detecting and addressing fraud.

5. CONCLUSION AND RECOMMENDATION

The study investigated the effects that digital forensic accounting has on fraud detection in public sector organisations in Nigeria using the Federal Inland Revenue Service as a case study. The study found that forensic procedures had a positive and significant effect on fraud detection of public sector organisations. The study also found that forensic tools had a positive and statistically significant effect on the fraud detection of Nigerian public sector organisations. The study also found that forensic accounting personnel had a positive and significant effect on fraud detection. It on the basis of the above findings that the study concludes that digital forensic accounting was statistically significant in affecting fraud detection of public sector organisations in Nigeria. Based on the findings and conclusions above, the study recommended that:

i. There should be increased adherence of forensic accounting procedures to laid down laws improve the fraud detection capacity of public sector organisations in Nigeria.
ii. There should be regular update of digital forensic accounting tools to latest technology to further strengthen the ability of digital forensic accounting to detect fraud in the Nigerian public sector.
iii. There should be increased training and compensation of forensic accounting staff to improve the quality of digital forensic accounting in Nigeria.

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