# The Effectiveness of Forensic Auditing on Prevention and Detection Within the Nigerian Public Sector

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## DECLARATION

I hereby declare that this dissertation with the title, “The Effectiveness of Forensic Auditing on Fraud Prevention and Detection Within the Nigerian Public Sector” has been prepared by me at the University of Gloucestershire. This has been done in partial fulfilment of the Doctor of Business Administration (DBA) degree from the University of Gloucestershire. This is an original work and adheres to the regulations stipulated by the University of Gloucestershire. The thesis neither partly nor fully has not been submitted for any other academic purpose. The viewpoints expressed in this study are entirely those of the author and does not reflect any influence from the university.

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## ABSTRACT

The confidence of stakeholders in public governance in Nigeria have continued to diminish over the years because of the increased cases of fraud and misapplications in public institutions. Most of these cases of fraud is blamed on the inability of government to equip its working process with strategic control measures that can curb fraud. This study critically investigates the effectiveness of forensic auditing techniques in fraud prevention and detection within the Nigerian public sector through an empirical qualitative study of the Nigerian National Petroleum Corporation (NNPC). The study is qualitative research that is underpinned on the ontology philosophy. The research focused on the forensic audit component of the Nigeria National Petroleum Corporation (NNPC). The sample size was selected using purposive sampling strategy. Data were soured through interviews, document review, and direct face-to-face interview sessions. Data were analysed using planned qualitative techniques involving; familiarisation, coding, and thematic analysis using NVivo software 15.0 version. The result of the NVivo aided analysis on the first theme that determined the precise conditions under which fraudulent activity may have occurred show that one of the indicators that the public sector needs forensic auditing is the revenue shortage due to revenue leaks over time. The second analysis on how forensic auditing techniques can detect and prevent fraud revealed that forensic auditors' independence is the highest advantage of forensic auditing in public sector. The third findings of the study were that the role of auditors is germane in exposing fraud revealed that participants with little or no familiarity with forensic auditing techniques played some roles even though it may lack professional skills. The fourth findings of the study show that having a functional internal control unit is the highest impact that can reduce fraud if well monitored followed by management commitment and support in terms of monitoring, reviewing of policies and administrative regulation. The fifth findings of the study are from the discussion of the theme that describes the effectiveness of forensic auditing techniques in fraud prevention. Conclusively, this study emphasised control and governance drivers as the primary elements that can affect how well forensic audits work to prevent and detect fraud.

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# CHAPTER ONE: INTRODUCTION

## 1.1 Research Introduction

Despite the abundance of resources on the African continent, many of the countries continue to struggle economically as issues of mismanagement of public resources and financial irregularities within key government establishments keep making headlines in daily newspapers (Ali & Hafidh, 2024). The instances of incessant escalation of financial crimes, corporate scandals, and heightened requests for accountability and fiscal responsibility that are lacking in public sectors have made the effective use of forensic auditing to prevent fraud grow increasingly (Boniface, 2024). Moreover, the continual corporate failures in the economies of the world are shifting the opinion of the public. The statutory audit which is the panacea for fraud control and prevention is gradually losing its value due to these shortcomings, and further control was required (Obiora et al., 2022).

A confluence of factors such as technological advancements, legal requirements, skilled professionals, and organisational transparency has rendered forensic audits indispensable in modern financial oversight frameworks. However, without proper training and competence in fraud detection, fraud cannot be easily discovered, halted, or discouraged in any setting or environment. This is because the level of sophistication that fraud portrays in recent times surpasses traditional auditing that mainly focuses on compliance and financial reporting accuracy not necessarily fraud detection (Agboare, 2021). To protect public resources, governments are always searching for more effective strategies to combat the threat of fraud in their operational framework (Micah, 2022). Given the increasing global knowledge and acceptance of forensic auditing as a means of preventing fraud and fraudulent activities, it is necessary to assess how well it works in Nigeria for both fraud prevention and detection.

The shift in the opinion of the public due to loss of confidence in government necessitate the need to explore into the forensic audit tools obtainable in Nigeria to determine their effectiveness in preventing and detecting fraud in the public sector. To achieve this aim, this study explored the use of sophisticated analytical tools, with in-depth empirical analysis and theoretical assessment to proffer solutions that best address the impending challenges. This research approach is expedient especially at this time when statutory audit seems to be losing its grip in general audit process.

## 1.2 Definition of Research Problems

Public entities are particularly vulnerable to fraud because they lack the necessary skills and experience to implement effective safeguards that can prevent and detect fraud (Ayodeji, 2024). It is observed that external interference limits the independence of many oversight responsibilities including statutory auditing. Even though over the years, there has been a focus on the auditors to do a better job in detecting and preventing fraud in the public sector, however, it suffices to say that the independence of the internal auditor is not guaranteed because he/she works as an employee of the government.

The high level of fraud experienced in public sectors in Nigeria is worrisome. Tunji and Adediran (2024) reported in daily newspaper that the Office of the Auditor-General of the Federation uncovered irregular payments totalling over ₦197.72 billion across various government entities between 2020 and 2021. Findings included payments for unexecuted contracts, violations of procurement laws, and contracts awarded without necessary approvals. The Nigerian Bulk Electricity Trading Plc was notably implicated, with ₦100 billion paid for unexecuted contracts. In addition, the probe of the Nigerian National Petroleum Corporation (NNPC) shows that there is over deduction of funds in subsidy claim to the tune of ₦28.5 billion which calls for concern (Oboh, 2012; Ayodeji, 2024).

Ogbi (2013) opined that corruption seems to have enveloped all sectors of the Nigeria economy despite various reforms and the establishment of institutional frameworks aimed at curbing financial crimes. The effectiveness of control measures specifically forensic auditing remains debatable as several cases, including those involving missing oil revenues and unaccounted subsidy funds, point to gaps in both preventive and detective mechanisms (Transparency International, 2023). This raises questions about the extent to which forensic audits are being utilized and whether they are achieving their intended objectives.

Specifically, in the Ministry of Petroleum Resources, there is limited empirical evidence on the practical outcomes of forensic audits. Do these audits effectively reduce fraud risk? Are their recommendations implemented? What are the barriers to their success? These questions form the crux of this study.

## 1.3 Research Aim and Objectives

The aim of this study is to critically investigate the effectiveness of forensic auditing techniques in fraud prevention and detection within the Nigerian public sector through an empirical qualitative study of the Nigerian National Petroleum Corporation (NNPC).

### 1.3.1 Research Objectives

To achieve this aim, the following research objectives were addressed:

i. To critically identify through the existing literature how forensic audit tools and techniques can be used to detect and prevent fraudulent activity.
ii. To critically explore the effectiveness of forensic auditing techniques in preventing and detecting fraud within the Nigerian public sector.
iii. To critically examine the organizational and operational factors influencing the effectiveness of forensic auditing practices within the Nigerian public sector.
iv. To create a conceptual model for practitioners and policy makers to use which represents how forensic auditing can be used to effectively detect and prevent fraud.

## 1.4 Significance of the Research

Fraudulent financial practices are some of the major challenges faced in most developed and emerging economies. Strategic efforts to address the public menace which has been a global problem, can help fix the adverse damage caused on image of a nation's economic creditability. The findings of the study will provide a way out to prevent fraud and help the economies to redeem their reputational damage and resuscitate the dying economic growth. The outcome of the study will provide Nigeria's policy makers with way out to correct the corruption perception of the country as the adaptation of the findings could change the accountability and transparency process of the public entities. It will also indirectly reduce the rank of the country on the chart of the 2021 Corruption Perceptions Index which indicated that Nigeria was ranked as the second most corrupt country in West Africa after Guinea (Erezi, 2022).

The result of this study will help government to address fraudulent incidents and in turn boost the confidence of foreign investors to invest in developing economy and increase the nation's capital reserves culminating in higher rate of economic development and growth. The outcome of this study can also lead to Nigeria experiencing crash in inflation rate because the economic regulatory policies of government will be less distorted if fraud rate is put to check (Okafor & Onyali, 2016).

This study is important for academics since it adds to the forensic auditing literature by emphasising the value system aspect of the existing forensic audit approaches This study raises the awareness of the necessity of developing a more robust accounting system and other associated control measures that may be implemented throughout the public sector operations to prevent and detect financial fraud. Hence, it educates public sector management on how to be cautious in their financial operations, leading to lowering the danger of employee fraud. Similarly, internal auditors will be better equipped to guard against management fraud and potential collusion with external parties if they understand how to implement robust forensic auditing practices capable of mitigating risks, promoting ethical financial behaviour, and enhancing public trust, ensuring the long-term viability of public institutions.

## 1.5 Research Context and Rationale

Financial fraud is an issue that has wide reaching consequences on firms both the private or public sector and the economy at large (Ayodeji, 2024). Some of the consequences of fraud in any establishment are reduction in stakeholders' confidence in the industry, destabilization of the economy, and loss of economic value. Based on these back drops, companies and government have continued to make efforts to reduce the incidence of fraud by applying various techniques and strategies. The incidences of fraud in recent time and cases on litigation that has flooded the public sector in Nigeria had called for the need to assess the techniques adopted in fraud examination in the public sector to determine its ability to help to achieve desired goals. The outcome of this study sheds light on the significance of the existing forensic auditing technique individually and jointly as indicators of fraud detection. The empirical analysis used in this study made the results reliable and provide avenue for government to make informed decisions regarding the forensic auditing technique that has significant effect on fraud examination. The society will benefit from the results of this study as the issues of fraud will be reduced to its minimum and the public institutions and country at large will be able to redeem their dwindling image among their counterparts in other continents.

Fraud and corruption remain critical risks in Nigeria's public sector, especially in revenue-generating agencies within the oil and gas industry (Abdullahi & Mansor, 2018). Estimates suggest Nigeria loses up to 10% of annual GDP, around ₦40 billion, to fraudulent activities which deprive critical development projects of crucial funding (Saidu, 2020). Major scandals at entities like the Nigerian National Petroleum Corporation (NNPC) showcase the massive vulnerability of the oil sector, with billions of dollars lost annually to graft and lack of transparency (Onah et al., 2022).

Nigeria's large state-run oil industry centred around the Nigerian National Petroleum Corporation and Ministry of Petroleum Resources has been plagued by endemic corruption, theft, bunkering, and transparency issues for decades according to academics, investigators, journalists, and civil society groups (Smith, 2020; Megwa, 2021). The Nigerian Ministry of Petroleum Resources handles licensing, regulation, partnership agreements, and oversight across the country's oil and gas sector.

The oil and gas sector in Nigeria is critical to the economy, accounting for approximately 90% of export earnings and 75% of government revenue (Okonjo-Iweala, 2022). However, the industry has long faced massive corruption and mismanagement challenges. The Nigerian National Petroleum Corporation (NNPC) handles upstream oil exploration and production through joint ventures with major firms like Shell, ExxonMobil, Chevron and Eni/Agip. Downstream operations including refining, distribution, and marketing are conducted by NNPC subsidiaries like the Port Harcourt Refining Company and Pipelines and Product Marketing Company (PPMC).

Within Nigeria's federal governance structure, oversight of oil and gas falls under the Ministry of Petroleum Resources. The ministry is responsible for establishing regulations, promoting transparency, managing partnerships, licensing bids and contracts, producing activity reports, and more. However, governance gaps have enabled widespread irregularities, theft, political interference, and systemic corruption across decades (Okeke & Aniche, 2020). Oil theft has been extensive, depriving Nigeria's government of tens of billions annually. The 2014 scandal involving $20 billion in missing NNPC oil revenue highlighted the sector's profound accountability issues (Uadiale et al., 2018). Also in 2014, former central bank governor Lamido Sanusi alleged that over $1 billion in fraudulent subsidy payments had been made (Okeke & Aniche, 2020). Such scandals have illuminated the need for stronger oversight and anti-fraud measures. As such, implementing priority anti-fraud and anti-corruption measures within this ministry is essential to combating systemic issues (Adebayo et al., 2022). Auditing represents one strategy that can be useful in the fight against fraud, theft, and lack of accountability. However, traditional audit approaches have limitations in uncovering sophisticated fraud schemes and complex cases of corruption (Abubakar et al., 2020). This is where forensic auditing can serve a vital role, as it incorporates specialized investigation techniques from accounting, law enforcement, and other disciplines to proactively uncover fraud as well as thoroughly investigate reported cases of malfeasance (Abdulrahman, 2019).

A survey by Ogbeide (2018) found over 70% of Nigerian CFOs viewed fraud as a major concern, especially bribery and corruption involving procurement and accounts payable. Key drivers included greed, economic hardship, and perceived low detection risk. The magnitude of losses combined with public outrage over successive scandals prompted efforts like the Nigeria Extractive Industries Transparency Initiative (NEITI) to improve reporting. However, major gaps remain in detecting and deterring fraud through auditing and oversight.

## 1.6 Research Contribution

The study further elaborates on the efficacy of the forensic auditing techniques adopted in fraud examination in the public Institutions in Nigeria. It is important especially at this period when cases of fraud continue to spring up in the public sector the conscious efforts made by the regulatory bodies, policy makers and stakeholders to combat fraud. The holistic approach of evaluating the selected forensic auditing techniques and the focus of Institutions that has engaged forensic audit would make the findings of the study robust and useful for decision making as it relates to the choice of forensic auditing techniques to be adopted in conducting fraud examination in public Institutions in Nigeria following recommendations which can be extracted for policy statements for government and management

The research reveals a profound weak governance that have enabled fraud in the public sectors which have denied the country better national development. Part of the research gap found is that only few studies has focused on NNPC after the downstream deregulation was enforced. More so, the scope of existing literature tends to be limited to certain events or domains rather than holistic assessments of vulnerabilities and controls needed in the public sector. To fill these gaps, this study engaged in further empirical research to help redefine approaches to detection and prevention of fraud as the research makes a substantial contribution to academic theory by expanding the understanding of forensic auditing techniques in public sector. Likewise, the study is supporting the forensic auditing framework by advocating that the usage of forensic audit techniques becomes proactive anti-corruption instruments in public sector rather than been a reactive instrument.

This research makes a substantial contribution to academic theory by expanding the understanding of forensic auditing techniques in public sector. It provides critical insights for policymakers, emphasizing the importance of forensic auditing especially in Nigeria system that has been tagged with corruption due to a lot of mis-appropriation cases traced to public officials. It also fosters economic growth because it will prevent fraud and incidences whereby the resources of the nation can be used to purse development.

## 1.7 Structure of the Thesis

The research is divided in the following chapters with the first chapter been the introduction and the last chapter been the conclusion. It has in total six chapters.

*Chapter one:* This chapter gives an insight of the research which includes the background of the study and its research context in which the research is carried out. It also explains the aims and objectives of the research and its significance. It explains the research problems and what contribution the research aims at.

*Chapter two:* The second chapter of the research focuses on the literature review, conceptual clarification, empirical reviews, theoretical and research frameworks relevant to the research. As the topic is to evaluate how forensic auditing has impacted the detection and prevention of fraud in the Nigeria public sector. Past research has focused on the impact in smaller institutions, and it has shown that there is significant impact since its adoption

*Chapter three:* The third chapter discusses the methodology adopted and which contains the area of study, population and sample size, the research design, sampling techniques adopted, method of data collection, data analysis as well as ethical consideration of the research.

*Chapter four:* The fourth chapter covers the demographic representation of the research, the data analysis process and its interpretations, and the accuracy of forensic auditing tools in prevention and detection of fraud in the Nigeria public sector. The software NVivo was used for the thematic analysis and the reason for its usage was justified.

*Chapter five*: The chapter five discusses the summary of findings where the results from the analysis were discussed in relation with the literature review in the chapter two. It addresses the research questions and its objectives.

*Chapter six:* The final chapter of the research discusses the conclusion and its recommendation. The evaluation of the research objectives was discussed, and the summary of the conclusion gotten from the entire research, its contributions as well as the theoretical and practical implications. It also addressed the study limitation and areas for further research.

# CHAPTER TWO: LITERATURE REVIEW

## 2.0 Introduction

The chapter contain in-depth definition and description of each concept of the study. The chapter starts with the definition and description of the concept of the study, by defining the concept of forensic auditing, fraud capabilities, types of fraud risk models, importance of forensic auditing services, forensic audit and fraud detection, auditors' responsibility in fraud detection. It then proceeded to review of literature to examine the efficacy of forensic auditing techniques and procedures specifically for preventing and detecting fraud. The chapter also showed the review of the fraud theories; fraud diamond theory and fraud triangular theory which are the underpinning theories of the study. The research also attempted to illuminate critical gaps in knowledge and implementation that can inform future research objectives and conceptual frameworks focused on improving fraud deterrence and detection in Nigeria and more specifically across Nigeria's petroleum sector. Thereafter, a summary of the chapter was outlined to give an overview of all concepts and constructs of the research that shows evidence of linkages.

## 2.1 Conceptual Review

The subsection covers the definition and description of the concept of the study, by defining the concept of forensic auditing, fraud capabilities, types of fraud risk models, importance of forensic auditing services, forensic audit and fraud detection, auditors' responsibility in fraud detection.

### 2.1.1 Concept of Forensic Auditing

Before describing forensic auditing, it is imperative to explain the concept of auditing inorder to give a fundamental overview of the underlying assumptions behind audit practice. Montgomery (2013) defined auditing is a systematic examination of the books and records of a business or the organization in order to ascertain or verify and to report upon the facts regarding the financial operation and the result thereof. From a broader perspective, Spicer and Pegler (2017) defined audit an examination of the books, accounts and vouchers of a business by an auditor to satisfy that the Balance Sheet is properly drawn up, so as to give a true and fair view of the state of affairs of the business and whether the Profit or Loss for the financial period according to the best of his information and the explanations given to him and as shown by the books, and if not, in what respect he is not satisfied.

An overview of the definition established that the core focus of audit is to conduct critical examination of a set of accounting records to authenticate its reliability and accuracy. Although audit does not cover the detection of fraud fundamentally, but it is implied that providing an assurance of accuracy and reliability of a record, require that the auditor providing this statement has evidence to substantiate the pronouncement. Making the pronouncement of accuracy of the accounting information in contemporary business times, goes beyond conducting manual audit using traditional vouching approaches. The examination and verification of records inviolve the use of analytical techniques that has the capability to meet up with the advanced level of fraud cases in perpetrated by syndicates in most establishments, especially in the public sector. The need to give audit opinion based on advance analytical techniques is the move towards forensic auditing.

Forensic auditing has increasingly become a contemporary theme of academic and business interest because of its relevance and application to audit procedures that will aid in forming verifiable audit opinion, especially in the face of litigation (Appah & Inini 2021). According to Hopwood et al. (2012), forensic auditing is the application of investigative and analytical techniques with the goal of identifying fraudulent and abusive activities that satisfy the standards of a court of law. Using forensic science to address criminal or civil law issues is referred to as forensic investigation (Okoye et al., 2020). In the report of Okoye et al. (2020), the authors advocated that the process requires using analytical and investigative skills to scrutinize fraudulent operations. The process involves the application of scientific methods to prove facts and evidence that would be used in criminal proceedings.

As stated by Dahli (2008) the term "forensic" refers to the application of knowledge to legal issues like crimes. The development of forensic auditing and its use as litigation assistance are included in this definition. Even though forensic science has been around forever, its application has rarely received attention. Due to a surge in financial scandals, it is currently receiving more attention. To obtain facts and evidence in the context of legal/financial conflicts and/or irregularities and to provide preventive counsel, forensic auditing is an activity that entails acquiring, verifying, processing, analysing, and reporting data (Ibrahim & Abdullah, 2010). The authors Akenbor and Ironkwe (2014) contend that because fraud is consistently committed in different businesses around the world, the value of forensic auditing cannot be overstated. Forensic auditing is the application of accounting concepts and procedures to legal issues (Dhar & Sarkar, 2010). It requires reporting in cases when the perpetrators of the fraud are identified, and the report is used as evidence in court or in administrative actions.

Degboro and Olofinsola (2007) pointed out that the purpose of a forensic inquiry is to ascertain and establish facts to support a case in court. In other words, using forensic procedures to discover and investigate a crime exposes all its accompanying characteristics and identifies the perpetrators. It focuses on using the accounting discipline to help resolve factual disputes in commercial litigation (Okunbor & Obaretin, 2010). To provide legal evidence, forensic auditing uses its own models and methodology for conducting investigations that look for assurance, attestation, and advisory opinions. As a practical field, forensic audit is concerned with accounting fraud, forensic auditing, compliance, due diligence, and risk assessment. It also Identifies financial misrepresentation and financial statement fraud, tax evasion, bankruptcy and valuation studies, and accounting regulation violations (Dhar & Sarkar, 2010). It also addresses the evidentiary nature of accounting data.

Furthermore, Bhasin (2017) asserted that forensic auditors are taught to see beyond the figures and deal with the situation's business realities. The profession has a strong emphasis on analysis, interpretation, summary, and presentation of complicated financial business-related issues. He added that forensic auditors' duties also include assisting with legal proceedings, including testifying in court as an expert witness and creating visual aids to support trial testimony, as well as investigating and analysing financial evidence. They also create computerized applications to aid in the analysis and presentation of financial evidence and communicate their findings through reports, exhibits, and collections of documents.

Grippo and Ibex (2013) stated that forensic audits are more thorough than standard audits and are typically carried out in a series of steps to ascertain whether claims can be proved and what kind of additional work is required. Making ensuring that any claim or complaint has merit, that there is sufficient evidence available, and that a department could investigate, or audit are crucial initial steps. When a beneficiary of a grant, donation, or other transfer payment receives funding from sources other than the department, this is especially crucial. In this regard, it is also crucial that the recipient's records enable the investigation or audit to follow the money utilized by a department.

Forensic auditing is the application of structurally calculated mechanisms to detect fraud using specified analytical techniques and tools (Ezejiofor, et al., 2022). Since fraud on the other hand is also a meticulously premeditated attempt to acquire wealth maliciously, it is usually premeditated and carried out perfectly to prevent the act from being noticed. Najih (2025) further corroborated this assertion as stated in the finding of their study as stated that the corporate sectors is becoming increasingly complex, involving financial statement manipulation, money laundering, and the use of advanced technology. As technology advances, most fraudulent actions are carried out using sophisticated tools that most of the time beats normal traditional audit process and has ability to surpass forensic audit process. This therefore imply that forensic auditing practices of companies in contemporary business times must be assessed based on their advanced capabilities. The advance forensic auditing capabilities are explored to determine their structural overview, their requirements and the techniques required to serve as bases to determine the readiness for fraud detection and prevention.

### 2.1.2 Advanced Forensic Auditing Capabilities

The research of Megwa (2019) and Oseni (2017) highlights current forensic auditing methods overly focus on reactionary investigation versus proactive detection and prevention of graft. Studies advocate new capabilities for continuous, tailored monitoring of high-risk operations using advanced analytics like machine learning to flag anomalies and emerging fraud risks. Specifically, the framework proposes integrating robotics process automation (RPA) to screen 100% of transactions in accounts payable, procurement, revenue flows and other high-risk domains versus small samples (Efiong, 2013). RPA can be programmed to identify duplicate invoices, abnormal payment patterns, invalid suppliers, and other red flags for auditors to inspect. Predictive analytics should be layered to model expected fraud patterns based on past cases, projecting future vulnerabilities (Popoola, 2014). For instance, AI (Artificial Intelligence) models can determine activity profiles of officials at risk of taking bribes based on sudden income surges or lifestyle changes (Okafor & Onyali, 2015). New contracts can be screened for projected kickback risks.

Social network analysis can map connections between vendors, ministry officials and external associates to uncover conflicts of interest invisible to manual methods (Garba, 2024). These advanced techniques implemented through an integrated framework focused on proactive integrity management versus after-the-fact probes can significantly bolster prevention. The framework further proposes increased collaboration between forensic auditors, IT specialists, and data scientists to continuously enhance monitoring capabilities attuned to the sector's evolving graft risks (Enofe et al., 2013). Auditors also need expanded training in new techniques like data analytics programming, financial crimes psychology and blockchain analytics for fraud detection (Popoola et al., 2015).

The advanced forensic auditing involves the use of more sophisticated fraud detection tools that goes beyond the normal analytical techniques. The advance forensic audit process incorporates established risk models to determine the extent of volatility, strength of control and develop deterrence models. These techniques and approaches are explained in subsequent subheadings.

#### *2.1.2.1 Tailored Fraud Risk Models*

Literature underscores need to develop customized risk models specifically profiling the ministry's licensing procedures, contract awards, oil sales meters, subsidies, partnership agreements and other fraud prone activities (Okafor & Onyali, 2015). Models should map all entities, vendors, projects, and transactions to systematically identify high-risk domains needing heightened monitoring rather than sporadic audits to prevent fraud. Comprehensive scenario matrices outlining potential warning signs related to procurement, oil theft, revenue leaks, collusion, shell companies, accounting manipulations and other common schemes can guide development of risk algorithms (Okoye et al., 2019). The tailored models are vital for guiding effective continuous monitoring.

#### *2.1.2.2 Enhanced Post-Audit Controls*

The submission of previous research demonstrates that while audits successfully recover stolen funds, lingering fraud post-audit highlights lack of follow up controls and prevention mechanisms. The framework developed by the existing research postulated measure to tackle the challenges of fraud by emphasizing expanded post-audit controls which includes: Automated red flag transaction alerts for high-risk processes like contract approvals and oil sales (Oseni, 2017); Routine surprise forensic audits every quarter focused on domains with prior graft instead of occasional probes (Abdulkareem et al., 2020); Whistle-blower protections and financial incentives to report corruption, strengthening early detection (Garba, 2020); Vendor blacklisting, license revocation, and heightened oversight for firms implicated in audits as deterrence measures (Olujobi, 2023); and Management process re-engineering to institute standardized controls, digitization, automation, and system protocols that fraud-proof vulnerable operations (Megwa, 2021). The extensive controls integration creates an ecosystem with multiple, reinforced barriers to deter, prevent and swiftly detect potential fraud across ministry activities.

#### *2.1.2.3 Comprehensive Deterrence Model*

The literature review revealed significant deterrence gaps enabling repeated fraud despite prior audits. A robust, multifaceted deterrence model is vital to curtailing corruption. This model would encompass: Increased prosecutions for corruption, misconduct and abuse of office based on audit findings. A follow through process is essential as studies found limited sanctions despite evidence implicating officials and vendors (Olujobi, 2023). Guaranteeing thorough, fair and non-partisan investigations for all credible fraud allegations can cement accountability. The deterrence model also captures extensive, routine anti-fraud education for all ministry employees, not just occasional seminars. This require that training should be embedded into onboarding and ongoing professional development tied to performance metrics, signalling a culture of integrity (Okafor & Onyali, 2015). Tailoring case studies to ministry fraud scenarios can heighten relevance.

Another deterrence measure is the public blacklisting of officials and vendors with published details of misconduct uncovered in audits. However, this requires creating centralized public repositories with compliance histories, revocations, and sanctions. Heightening reputational damage for graft demands transparency (Abdulkareem et al., 2020). In furtherance to this, is the publishing all audit reports, findings and remediation actions taken, rather than opaque corrections, to demonstrate rigorous follow through on enforcement. However, care must be taken to balance transparency with due process. The deterrence model also stipulated establishment of an independent audit/investigation committee with proper funding, no political interference, experienced professionals, subpoena powers and public reporting requirements. This can foster perceptions of impartiality and oversight. However, committee recommendations need swift implementation.

The goal of the fraud deterrence model is engendering perception of high detection risk and zero tolerance for fraud across the ministry's workforce, vendors and partners through transparency, accountability, and sanctions. However, while shaping attitudes is important, ultimately the focus must be enacting systemic deterrents tailored to ministry risks. Sustained, visible deterrence is vital to curtailing corruption. One of the measures to sustain the fraud deterrence measures of an organisation is to conceptualise forensic auditing in the organisation to assess its capability to detect fraud. Although forensic measures may be put in place in an organisation as a way of deterrence, its viability is determined by its impact on fraud detection.

### 2.1.3 Forensic Auditing and Fraud Detection

The American Institute of Certified Public Accountants – AICPA defines fraud as a wide lawful notion which differentiates from error based on whether the act is deliberate or not deliberate. It normally involves stealing and manipulating records, frequently followed by a cover-up of the stealing. It entails converting stolen properties into private properties. Among the three categories of fraud which are internal fraud, external fraud and corruption. The internal fraud is the most relevant to this study because it talks about how managers (top management, heads of government agencies) embezzle funds that are made for a particular project and also covering up of corruption in their organization.

The internal traits of these frauds and the actors of such acts, made forensic auditing have relevance in the detection of these fraudulent actions using specified analytical techniques. This is relevant because forensic auditing is an investigative method of audit used in determining if people and organizations have indulged in unlawful financial through the use of expert knowledge and special (Okoye & Gbegi 2013). In a study conducted by Adesina, et al. (2020) to determine how forensic audit Influence fraud control in the Nigerian banking sector; it was found that forensic audit is a very important requirement for effectual and well-organized control of financial frauds in the sector. From more personalised perspective, Edheku and Akpoveta (2020) obtained data from accounting officers in public and private sectors in Abuja Metropolis in Nigeria about forensic accounting and fraud detection in the Public and Private sectors. The responses from the officers revealed that they strongly agree that forensic accounting has an impact on fraud detection in the ministries and departments. Similar finding was also found by Zadeh and Ramazani (2012) when they explored how accountants perceive forensic accounting; although the study outcome shows some of the limitations of the accountants' perceptions, it still upholds the fact that forensic accounting is one of the elements of fraud prevention.

According to Klynveld Peat Marwick Goerdeler (KPMG)'s Fraud Survey (2008), more businesses are committing fraud than in previous years, taking steps to prevent it, and introducing new antifraud efforts and programs in response to the Sarbanes-Oxley Act of 2002. According to Price Waterhouse Coopers' (PWC) 2003 Global Crime Survey, there were substantial economic crimes recorded in 50 countries by 37% of respondents, with an average loss of $2,199, 930 per organization (PWC, 2003). The findings of this survey highlight the significance of forensic accounting practice and intrusion detection to access or audit the data on a digital device. A further study on the evaluation of forensic accountants to plan management fraud risk detection methods was conducted by Okoye and Gbegi (2013). The study finds that forensic accountants can improve the effectiveness of an audit plan when the risk of management fraud is high, they can modify the scope and nature of audit tests when there is a high risk of management fraud, and they can suggest special procedures that auditors do not suggest. Involving forensic accountants in the risk of management fraud assessment process also results in better results.

The submissions of previous literatures indicate that an understanding of how the defaulters carry out their fraudulent deed is necessary. Without ongoing public participation and advancements in the field of forensic accounting, fraud cases will be difficult to identify and ultimately result in greater financial fraud success, which also translates into a failure to live up to the expectations of the public, shareholders, or even other stakeholders (Albrecht, 2008). Najih (2025) further stated that internal audits with forensic auditing have proven more effective in detecting fraud, especially with the involvement of specialists and technologies such as AI, big data, and blockchain. Anti-fraud regulations play a crucial role; however, their implementation still faces challenges, including policy harmonization and limited forensic auditor resources.

Based on the outcomes of various empirical literature, it can be deduced that the functionality of forensic auditing techniques rests largely on the capabilities of the handlers of the techniques which obviously are the auditors. There is a need to explore the statutory responsibility of the auditors in readiness for fraud detection especially considering the sophistication that surrounds fraud in contemporary business times. This creates the need to explore the responsibility of auditors in fraud detection.

### 2.1.4 Auditors' Responsibility in Fraud Detention

Bunget (2009) stated expressly that the responsibility of preventing and detecting fraud rest with management of entities. Although the auditor is not and cannot be held responsible for preventing fraud and errors, they can however have a positive role in preventing fraud and errors by deterring their occurrence. The auditor is expected to plan and perform their audit with an attitude of professional skepticism, recognizing that condition or events may be found that indicate that fraud or error may exist.

The auditors' responsibility with regard to the financial statements is solely to express an opinion on the audit, which must be carried out in accordance with applicable standards, that is, the Nigerian standards on auditing, as stated in both the International standards on auditing published by the International auditing and assurance standards board of the International federation of accountants (IFAC, 2005) and the Nigerian standards on auditing published by the Institute of Chartered Accountants of Nigeria (ICAN). According to these principles, auditors must follow ethical guidelines, organize their audits carefully, and conduct them in a way that gives them a reasonable level of confidence that the financial statements are accurate.

The board of IFAC on the other hand, oversees preparing financial statements in accordance with generally accepted accounting principles and international public sector accounting standards (IFAC, 2012). Management is accountable for carrying out this duty, which includes designing, implementing and maintaining internal controls relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error; selecting and applying appropriate accounting policies, and making accounting estimates that are reasonable in the circumstances (IFAC, 2012).

The ordinary examination incident to the issuance of financial statements accompanied by a report and opinion of an independent certified public accountant is not designed to discover all defalcations because that is not its primary purpose, although the discovery of defalcation frequently results. The independent auditor would need to thoroughly investigate all transactions to exhaust all opportunities to reveal instances of dishonesty or fraud. According to Wuerges (2011) and AICPA (1939), fraud imply a prohibitive expense to most company enterprises, a cost that would exceed any realistic expectation of benefit or safeguard therefrom and impose an excessive burden on industry.

The American Institute of Certified Public Accountants has been asked by the Securities and Exchange Commission to provide additional explanation regarding the role of auditors in the fraud detection process due to public outcry (Albrecht et al., 2001). The umbrella organization of the accounting profession responded by issuing Statement of accounting Practice No. 30, which details the roles and responsibilities of the independent auditor in the examination of financial statements in 1960. Although it was not specifically stated, Statement of Auditing Practice No. 30 acknowledges that auditors should be aware of the possibility of fraud existing during an audit (Albrecht & Willingham, 1993; Scott & Frye, 1997; Wuerges, 2001).

The proposition of the statement of Auditing practice No. 30 about auditors being aware of the possibility of existence of fraud is a call to sensitization on the fraudulent possibilities in the organisations because of the pressure stipulated in the fraud related theories. To effectively combat fraud, the auditors is expected to be aware and understand the sequence and consistency of fraud in their respective organisations inorder to understand the flow and conduct proper evaluations. There is therefore need to understand the cases of fraud and corruption particularly in the study area of this research to form bases for the research questions and general research aim and objectives.

### 2.1.5 Widespread Corruption and Repeated Fraud Scandals in Nigeria's Oil Industry

Academic studies highlight the widespread corruption issues plaguing Nigeria's public sector, with oil and gas agencies exhibiting vulnerability. Nigeria's public oil corporations have been plagued by systemic corruption, financial fraud, and lack of transparency for decades (Akani & Ogbeide, 2017; Oseni, 2017). Studies estimate losses from 2010-2020 exceeded $50 billion, depriving critical development projects of funding (Emmanuel et al., 2018). High profile scandals include the disappearance of $20 billion in NNPC revenue, $1 billion in fraudulent subsidy payments, and over $800 million lost to an illegal Strategic Alliance Agreement between NNPC and Atlantic Energy Drilling Concept Limited (Imam et al., 2015; Oseni, 2017).

Successive governments have undertaken probes in response to scandals, but meaningful reforms remain lacking according to experts (Premium Times, 2022). The industry’s complex, interconnected crime networks centred around NNPC have proven resistant to change (Soniyi, 2015). For instance, the Nigerian Extractive Industries Transparency Initiative (NEITI) was established in 2004 to monitor the oil industry but has lacking enforcement power. Implementation gaps persist as agencies block transparency (Eboh, 2019). These repeated cases highlight that current oversight and controls are inadequate. Akani and Ogbeide (2018) attribute the widespread oil sector corruption to regulatory failures, lack of independent audits, obsolete infrastructure creating avenues for theft, and poor enforcement of policies. Weak internal controls also enable bribery, kickbacks, shell company schemes, and payroll fraud according to forensic analysis (Emmanuel et al., 2018; Imam et al., 2015). Efiong (2013) estimated losses up to $8 billion annually in the oil sector alone based on forensic investigations uncovering ghost workers, kickbacks, and diversion of revenues. Yet fewer than 19% of studied entities proactively utilized continuous fraud data mining essential for early detection.

The Nigerian government and oversight bodies like NEITI and EFCC have undertaken periodic forensic audits and corruption probes in response to scandals according to media reports. While these recovered billions in stolen funds, schemes frequently recurred (Premium Times, 2022). A survey by Popoola (2014) of auditors in government entities determined graft drains an estimated 20-25% of oil revenues through mechanisms like fraudulent contracts, inflated payrolls, and collusion between officials and private companies. The study also revealed over 68% of anti-graft agents in oil agencies lacked adequate training in crucial forensic auditing skills like financial reconstruction, predictive analytics, and interrogation procedures tailored to uncover complex graft. The study attributed these frauds to the agencies' lack of proper fraud risk assessments and monitoring practices to curb leakage. The existing capability gaps constrained prevention and recovery efforts.

Okafor et al. (2015) warn relying largely on after-the-fact probes enables repeated fraud. Their analysis determined holistic frameworks incorporating surveillance, risk systemization, and digitized monitoring are imperative but lacking. Bolanle (2017) reviewed fraud cases miring agencies like NNPC and PPMC, determining specialized audits successfully identified billions in illicit funds transferred overseas. However, limited domestic prosecution of corrupt officials and contractors undermined deterrence.

Contract abuse also exploited the Nation's treasury. A 2005 audit revealed $300 million in overpayments on inflated import subsidies and LNG bills (Collier, 2020). In 2012, a fuel subsidy scam cost $6.8 billion through import verification manipulation (Eboh, 2019). From 2011-2014, $20 billion in total oil revenue vanished from NNPC accounts according to former Central Bank governor Lamido Sanusi (Megwa, 2021). The financial losses and reputational damage from continuous scandals including illegal diversions, sweetheart deals, padded contracts, and budget manipulations have undermined public trust. Reports indicate just 55% of NNPC's crude oil sales revenues went to Nigeria's treasury from 2011-2014 with the rest diverted or unaccounted for (Megwa, 2021). This underfunding hinders investments in infrastructure as basic as roads, power, and water systems. Nigeria was spending over $10 billion annually subsidizing fuel imports as of 2022, more than the national budgets for education, health and defence combined according to Stearns Law (Eboh, 2022).

Experts argue reforming leakages in the oil sector is pivotal to funding development goals from infrastructure to education and health. But vested interests profiting from the status quo undermine progress. Strengthened oversight, transparency, metering of flows, and accountability are vital (Ledum et al., 2020; Oghoghomeh & Ironkwe, 2012). underscoring how massive oil revenue theft undermine Nigeria's development. An estimated 70% of Nigerians live in poverty despite sitting atop the world's eighth largest oil reserves (Megwa, 2021). Child mortality and malnutrition levels are extremely high. Yet funds lost to graft each year are estimated to be nearly six times the federal health budget without holistic reforms to governance, accountability, and strengthened oversight, the cycles of scandals seem poised to continue hindering development and legitimacy.

Instituted reforms like the establishment of the Nigerian Extractive Industries Transparency Initiative to improve monitoring. However, implementation gaps persist (Ledum et al., 2020). Contract tendering and oil sales processes remain opaque with insufficient metering enabling ongoing theft according to groups like Human Rights Watch (2013). They argue holistic reforms are lacking. The Petroleum Industry Act of 2021 sought to improve governance by replacing NNPC with new institutions including the Nigerian National Petroleum Company designed to operate on more commercial principles and have greater autonomy from political interference (KPMG, 2021). But analysts say it remains unclear if this will improve transparency and accountability without systemic reforms to enforcement, auditing, and performance management (Ajumogobia, 2021).

While highlighting the funds recovered, studies expose systemic gaps in capabilities, controls, and enforcement enabling recurrent public sector fraud. Concerted efforts to implement holistic anti-graft frameworks encompassing forensic audits, prevention-based monitoring, and accountability measures are vital to curbing systemic graft. Having explored the cases of fraud and corruption in the Nigeria oil industry, it gives a sampled reflection of the fraudulent activities in the Nigerian public sector. The administrative gap created is the reliability of the forensic audit techniques put in place when is a reflection of the effectiveness of the forensic auditing techniques adopted in preventing and detecting fraud within the Nigerian public sector

### 2.1.6 Effectiveness of Forensic Auditing Techniques to Prevent and Detect Fraud within the Nigerian Public Sector

Globally, there are increasing occurrences of fraud in corporate organisations and this has adversely affected the firms' bottom line due to its none detection and prevention by statutory audit. These high rate of fraudulent activities perpetrated by management of organisations which cannot be detected nor prevented by statutory auditors which eventually led to the collapse of many high-profile companies such as Enron, Tyco, WorldCom, Pamalat, Cadbury Nigeria, among others, necessitated the need for forensic audit for an enhanced control system (Enofe, et al., 2015). Drawing from Nigeria's inference, Ezejiofor and Okonkwo (2025) observed that despite numerous policies, reforms and anti-corruption campaigns initiated by successive governments, cases of financial improprieties continue to emerge at alarming rates. Ministries, Departments and Agencies (MDAs) of the government has consistently appeared in Auditor-General's reports for issues ranging from unretired advances, inflated contracts, unapproved expenditures, ghost workers and mismanagement of public funds.

The recurring incidents of fraud in public institutions underscore a systematic weakness in financial accountability and governance structures across public institutions. According to the office of the Auditor-General of the Federation (2023). Over N 969 billion in public fund were either mismanaged or could not be properly accounted for between 2021 and 2023 across several MDAs. Also, the failure of statutory audit to prevent, detect, and reduce the wrongful, fraudulent, or corrupt use of corporation's financial and non-financial assets and the increase in corporate crime brought about the need for professional accountants and legal practitioners to find ways of fighting this perceived threat called fraud which is digging deep into the business world and which has also put pressure on the professional accountants and legal practitioners in exposing this evil frame in the business world, using forensic audit.

Ezejiofor and Okonkwo (2025) further stated that the rising cases of procurement fraud, payroll padding, and diversion of government funds have created a strong demand for forensic audits in Nigeria's public administration. Institutions such as; the Economic and Financial Crimes Commission (EFCC), Independent Corrupt Practices Commission (ICPC), and the Auditor-General's office now rely on forensic accountants to support their investigations and prosecutions of fraud-related cases. For example, between 2021 and 2025, multiple fraud cases involving top government officials were revealed through forensic techniques such as digital forensics, data analytics, and investigative audits (EFCC Annual Report, 2024).

However, it was observed that while forensic accounting has gained visibility in anti-fraud efforts, there remains a gap in empirical literature regarding its actual impact on fraud detection and prevention in the Nigerian public sector. There is need for assessment of the ability of the fraud detection and prevention techniques put in place to actually perform these functions, which explain their effectiveness. The effectiveness of forensic audit is influenced by the orgganisational and operational factors that surrounds the process of performing the audit. There is the question of whether forensic accounting functions effectively in an environment where regulatory enforcement is weak and internal controls are poorly implemented. This is essential to establish because without a strong institutional and regulatory framework, the utility of forensic audits may be limited, and recommendations may go unheeded.

### 2.1.7 Organizational and Operational Factors Influencing the Effectiveness of Forensic Auditing Practices within the Nigerian Public Sector

Wahyuandari (2025) argued that forensic auditing that involves combining investigative techniques and accounting expertise in its process, has emerged as an effective tool to identify fraudulent activities and mitigate associated risks. To achieve a forensic audit process that is effective, there is need to explore the mechanisms and methodologies employed in forensic auditing, emphasizing its capacity to uncover complex schemes such as; embezzlement, financial statement manipulation, and asset misappropriation. Oyedokun (2020) further argued that the role of forensic auditing and emphasized that its purpose extends beyond just detecting financial mismanagement; but also, for preventing fraudulent financial reporting, creative accounting practices, and fraud in financial institutions.

The effectiveness of this process rests largely on the organizational and operational factors domiciled in the company because they directly dictate the success of forensic audits by establishing independence, dictating access to data, and shaping the ethical climate. When these factors align, they empower investigators to deter fraud and strengthen financial transparency; when the fundamental components are questionable, they severely limit the effectiveness of the forensic audit. Oyerogba (2021) investigated forensic auditing mechanisms and fraud detection in the Nigerian public sector; and emphasized the need for improved internal controls and periodic forensic audits in government corporations. The internal control here, is a reflection of the operational factors that form part of the strategic formation of the organisation.

Olaniyi et al. (2024) noted that most existing researches on forensic audit primarily focuses on isolated aspects, such as; fraud detection methods or technological tools, without exploring the integration of forensic auditing into broader governance and risk management frameworks. The integration of forensic audit into an organisation's governance and risk management framework gives more room for the organisation to record more fraud preventive successes than fraud detection. The focus of literature on the fraud detection capability of forensic audit as a one-off impact; without exploring how the forensic audit technique can be integrated into the operation of an organisation has created an administrative gap. This gap underscores the need for a deeper examination of how forensic auditing can be strategically employed to combat financial fraud effectively.

The significance of the introduction of forensic audit technique as part operational process was evident in the study of Okocha (2024) who investigated the effect of forensic accounting practices in Local Government councils. Review of Local Government Service Commission records and performance reports of 30 councils across 3 states was used and pre-post analysis of financial statement anomalies was also used as analysis. It was discovered that fraud occurrence reduced by 12% within one year after forensic accounting techniques were introduced. Furthermore, Ezejiofor and Okonkwo (2025) retracted that training and level of education have a positive impact on the effectiveness of forensic auditing. Essentially the more the auditors are trained in the field of forensics the better the quality of forensic auditing service offered. The higher the level of education possessed by an auditor the more effective the forensic audit service offered. The outline of the flow of discussion suggests that the effectiveness of a forensic auditing forensic depends on the quality of governance adhered to in the company as explained in their organisational and operational process, hence this study.

## 2.2 Fraud Theories

The section reviews the fraud triangle theory and the fraud diamond theory as theories based on their assumptions, application in other fraud related studies and their relevance to this study. A theoretical framework was explained in this subsection that shows the link between the assumptions of these theories and how they jointly underpin this study.

### 2.2.1 The Fraud Triangle Theory

The fraud triangle theory was propounded by Cressey (1953). The assumption of the theory is that persons can become trust violators when they conceive of themselves as having a financial problem and they find themselves in a position of financial trust, they are likely to secretly resolve the financial problem by violating established rules and protocols by marginalising on the trust vested on them (Cressey, 1973). It was further stated that the assumption of the theory is explained from three perspectives namely, pressure, opportunity and rationalisation. Cressey (1953) explained pressure as the incentives that could motivate an individual to be involved in fraud. These pressures were explained to range from personal problems to social and environmental addictions or pressures. It was further stated that pressure can come from unrealistic expectations of investors and other sources of finance (Gupta, 2025).

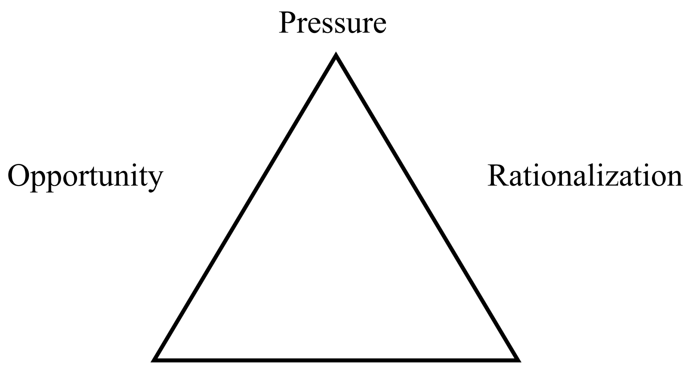
The theory further explained opportunity to have two components perceived as, general information and technical skill. General information is simply the knowledge that the employee’s position of trust could be violated. Technical skills refer to the abilities needed to commit the violation. These are usually the same abilities that the employees need to have to obtain and keep his position in the first place. The last angle of fraud triangle theory is rationalisation, which is viewed as a necessary component of the crime before it takes place; in fact, it is the part of the motivation for the crime. Because embezzler does not view himself as criminal, he must justify his misdeeds before he ever commits them. The rationalization is necessary so that the perpetrator, can make his illegal behaviour intelligible to himself and maintain his concept of himself as a trusted person.

The theory has found its root in most fraud related cases and there has been evidence that the three perspectives from which fraud was explained by the assumption of the theory. Cressey (1950) stated the investigation of embezzlement behaviour, is credited with popularizing the fraud triangle theory. According to Dorminey et al. (2012), Cressey conducts interviews with prisoners at the Illinois State Penitentiary in Joliet and notices common characteristics among offenders serving time for white collar crimes. Based on his observations, Cressey hypothesized three criteria for criminal violations of trust. These include a non-shareable financial problem, knowledge of the inner workings of a particular enterprise, the opportunity to violate a position of trust, and the capacity to modify one's self-perception such that breaching this trust does not constitute, in his or her mind, criminal behaviour (Cressey, 1950).

These criteria eventually lead to rationalization, felt pressure, and perceived opportunity. This gradually transforms into the "fraud triangle" that is recognized today (Dorminey et al., 2012). These three components of fraud were first identified by Sutherland (1949) and then developed by Cressey (1953), according to Cohen et al. (2010). Additionally, Albrecht et al. (1982) strengthened the disintegration with research of more than 1500 fraud references in their study, which adapted the criminology idea to accounting. In their study, 82 factors connected to fraud were identified, and these factors were divided into three categories: (I) situational pressures, (II) opportunities for fraud, and (III) personal integrity.

The AICPA's 2002 Statement of Auditing Standard No. 99, Consideration of Financial Statement Fraud in Auditing, outlines three conditions that must be met for fraud to occur. Which are: (1) Conditions exist where there are no controls, ineffective controls, or the ability of management to override controls - which create an opportunity for fraud to be committed; (2) Conditions exist where management or other employees have an incentive or are under pressure - which creates a reason to commit fraud; (3) Those involved can rationalize committing a fraudulent act. Prior studies have demonstrated that certain people can commit a dishonest behaviour knowingly and purposefully because of their attitude, character, or set of moral ideals (Cohen et al., 2010).

*Figure 1: THE FRAUD TRIANGLE*




Source: Cohen et al. (2010).

Research on fraud substantiate the assumptions of the fraud triangle theory as stated that the pressure to commit fraud rests on the circumstances surrounding the perpetrators (Lister, 2007). The comprise their personal lifestyle, the companies' administrative process, particularly the internal control, and lastly the corporate culture and value system. On the other hand, Vona (2008) argues that the motive to commit fraud is often associated with the pressure of the corporate entity on the individual and not the other way round as posited by Lister (20027). It was further argued that the culture and value system of an entity often influences the employees' motive to commit fraud. The basis of this argument is that it is the level of control put in place that determine the possibility of fraud in the company. This assertion gives an indication of the place of audit in fraud discourse.

Albercht et al. (2008, 2010) further reveal the significance of audit in fraud discussion as argued that when employees believe that they will be caught and punished for fraudulent practices, they rarely commit fraud. This assertion was further substantiated by Mohd-Sanusi et al. (2015), that, personnel will have the chance to engage in fraud if there are poor control environments, such as a lack of responsibility segregation and internal control flaws. The audit professionals and standard setters have widely submitted that fraud triangle theory is a relevant underpinning tool in fraud detection based on the findings of Cressey (1950) but clearly posited that fraudulent financial reporting occurs as a result of certain environmental, institutional or individual forces. It was however added that the forces and opportunities add pressure and incentives that encourages individuals and companies to engage in fraudulent financial reporting.

Furthermore, Tshikovhi et al. (2025) examined the effect of the fraud triangle theory model in the detection of financial statement fraud in South African municipalities; the study explored four fraud risk makers, to determine their correlation with financial statement fraud. The study found that there is a high correlation between, high capital expenditure, high accrual amounts, poor liquidity ratios and high leverage ratio which are the four fraud risk makers examined.

The conclusions that can be drawn from the submissions of various literature is that fraud triangle theory captures three major indicators of fraud in any establishment. Firstly, employees will be under pressure to commit fraud, secondly, the ineffectiveness of the internal control system put in place by the company management, and thirdly, the ethical culture and values of the firm. All these indicators jointly explain the level of fraud committed in companies, and the ability of control measures put in place to prevent and detection fraud.

### 2.2.2 Fraud Diamond Theory

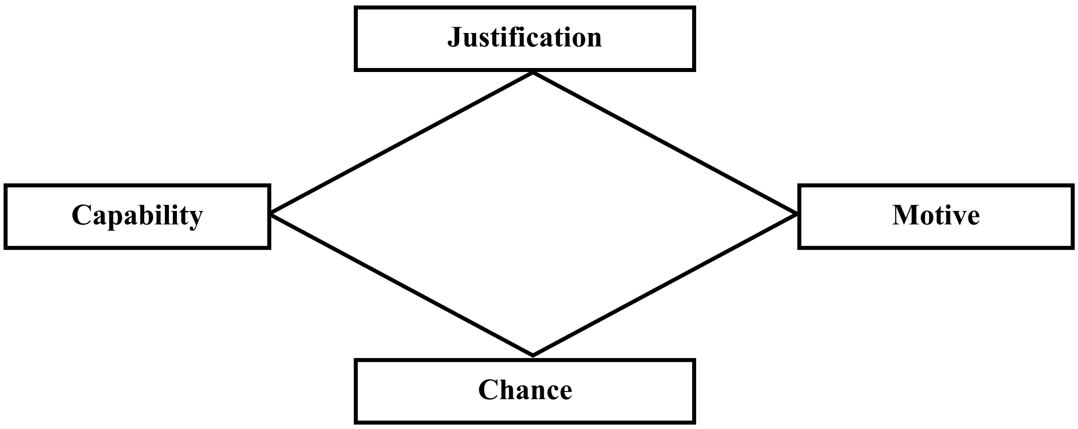
The fraud diamond theory was propounded by Wolfe and Hermanson (2004). It is generally viewed as an expanded version of the fraud triangle theory. The theory has an element termed capability that is been added to the three initial fraud elements of the fraud triangle theory. Wolfe and Hermanson (2004) argued that although perceived pressure or incentive might coexist with an opportunity to commit fraud and a rationalization for doing so, it is unlikely for fraud to take place unless the fourth element (capability) is also present. In other words, the potential perpetrator must have the skills and ability to commit fraud.

Cressy's original fraud triangle theory (1953) gained a fourth element, called capability, with the introduction of the Fraud Diamond Theory by Wolfe and Hermanson (2004). The perceived reason, presumptive chance, the capacity to act fraudulently, and the rationale of why fraud occurs are the four components of the diamond four factor fraud hypothesis. The elements that lead to fraudulent behaviour are related to perceived motive. Anyone who engages in fraud may be motivated by a specific desire to engage in dishonest behaviour (Mansor & Abdullahi, 2015). Financial or non-financial challenges may be the cause of these drives. Employees may engage in fraud behaviour if they think their impulse to act dishonestly is uncontrollable.

The Diamond four factor fraud hypothesis, according to Wolfe and Hermanson (2004), is a potent tool that helps management comprehend remarkable characteristics that can be used to distinguish honest employees from fraud perpetrators. Fraudsters frequently betray the trust placed in them and commit crimes without regard to the repercussions. Because fraudsters frequently hunt for opportunities to siphon off company resources, this could ultimately inflict irreparable harm to the corporation (Drew & Drew, 2010). Due to pressure from both internal and external influences, some personnel may justify fraud and think it is the standard in governmental organizations.

The war on fraud eradication is far from reality, even though fraud theory has regularly been updated to incorporate fresh knowledge into fraud management. Most of the enhanced theories might not completely eradicate fraud. In the context of this study, forensic accounting procedures are required to address weaknesses in the Diamond fraud model, which might be strengthened by combining fraud management technologies. Finally, a company needs to use forensic accounting abilities to incorporate crucial characteristics built into the Diamond Four Factor Fraud Model to raise knowledge of forensic accounting techniques.

*Figure 2: FRAMEWORK OF FOUR FACTOR FRUAD DIAMOND THEORY*




**Source: Wolfe and Hermanson (2004)**

The Wolfe and Hermanson (2004) fraud diamond theory argument is an advancement to the fraud triangle theory that although an individual may be motivated towards fraud due to personal pressure, inefficient internal control system, or based on the company ethical culture and values; it was however asserted that the individual may not be able to achieve the fraudulent intent if the fourth element which is capability is not present. By implication, the theory posited that the individual must first have required skill and ability to commit fraud.

Pressure, opportunity and rationalization posited as motivators of fraud according to the assumptions of the fraud triangle theory are relevant and acceptable, but capability perspective of the fraud element postulated by fraud diamond theory provides an indicator of the actualization of fraud intentions (Abdulahi et al., 2015). Mackevicius and Giriunas (2013) supported this postulation as stated that not every person who possessed motivation, opportunities, and realisation may commit fraud due to the lack of the capability to carry it out or to conceal it. Albrecht, et al. (1995) further opine that this element is particularly important when it concerns a large-scale or long-term fraud that require high level of technicalities and sophisticated tools to actualize. Albrecht et al. (1995) further stated that only the person who has an extremely high capacity will be able to understand the existing internal control, to identify its weaknesses and to use them in planning the implementation of fraud.

### 2.2.3 Theoretical Framework

The theoretical framework of this study is based on the ideologies of fraud triangle theory and fraud diamond theory jointly underpin this study because both theories recognize the presence of fraud in an organization. The theories also reveal that there are pressures that influences the intention/motives of fraud preparators which rests largely on the opportunities presented based on the deficiencies of the companies' control system. To further substantiate the facts, the theories reflect the place of capabilities as the skill and ability that empower the perpetrator to actualise the plan. The outline of studies reviewed is shown in subsequent subsections.

The submissions of these theories indicate that organizational setting plays an important role on the effectiveness of internal control as a mechanism to protect the organization against fraudulent acts by individuals. This is because before individuals can execute fraudulent intentions, they find a way to commit the fraud by analysing the organization's internal and external environment. This therefore indicate that the capability of the perpetrator is determined by the level of control put in place which in this case is the forensic audit techniques adopted by these organisations to prevent and detect frauds. Specifically, the mandate of the public sector is that of management of public funds. This makes fraud prevention a primary function of government in ensuring that the funds in their custody are safeguarded by potential perpetrator irrespective of the elements of fraud that is responsible for the intended action.

## 2.3 Empirical Review of Existing Literature

This subsection shows the interactions and connections between existing studies that relates to forensic audit and fraud prevention and detection. The study conducted the review based on the major objectives of the study. The section firstly explored literature that focussed on the correlation between forensic audit and fraud prevention and detection from various perspectives and study areas. Secondly, explore the effectiveness of forensic auditing techniques in preventing and detecting fraud within the Nigerian public sector. Thirdly, critically examine the organizational and operational factors influencing the effectiveness of forensic auditing practices within the Nigerian public sector. These reviews were conducted to give an overview of the depth of knowledge and the gaps identified therein.

### 2.3.1 Forensic Auditing and Fraud Prevention and Detection

Forensic auditing is a prevalent factor in the discussion of fraud prevention and detection because of the increased rate of fraud inspite of the statutory audit practice that is undertaken periodically by organizations. Although forensic auditing requires the use of sophisticated techniques to combat fraud, there have been diverse perspectives about the potency of the process because of other factors that spells the effectiveness of the audit process. There has been empirical literature that shows the association between forensic auditing and fraud detection from various perspectives. While some studies explore the connection of the variables from the perspective of forensic auditing detecting and preventing fraud, others consider the capability of the techniques to detect fraud. More empirical research is vital to guide reforms and quantify the effectiveness of the specific techniques adapted in this context.

Most empirical studies conducted in Nigeria public sector substantiates that forensic auditing tools have ability to influence fraud prevention and detection. In the study conducted by Ezejiofor, et al. (2022) to examine the role of forensic accounting in enhancing transparency within Nigeria's public sector, using the results of survey of 150 public sector accountants across federal MDAs, found that forensic accounting significantly improves fraud detection and financial transparency in public institutions. Similar to that is the study conducted by Eko (2022), where in this case they attempted to examine the role of forensic accounting in fraud management in Nigeria. They also found that the adoption of accounting tools enhances fraud detection and prevention. The finding was not different when Olofinlade (2021) explored the banking sector to also investigate the role of forensic audits in detecting management frauds among Nigerian deposit money banks. They survey of the study focused on the internal auditors and forensic accountants in the selected bank. It was observed that forensic audits are effective in uncovering management –level frauds, leading to improved financial integrity.

The significance of forensic auditing to varying sectors of the economy was further corroborated by Okoye et al. (2020) when exploring the growing trend of fraud in Nigeria; as revealed that the prevalence of fraud is not limited only to the government parastatals, but however show its impact in the regulated sector such as the banking sector. This submission was made when the study examined the effect of forensic accounting on Nigerian deposit money bank using survey research design and applied regression analysis. The study discovered positive relationship between forensic accounting investigation and financial fraud in Nigeria. Apart from the regulated sectors, the public sector also has its share of high volume of fraud cases because of the volume of transactions that occur in the sector. To curb fraud in this sector, there is need to explore whether the forensic audit techniques adopted can yield significant positive impact in sectors with high volume of transactions and multiple levels of administration.

As a follow up of need to explore larger transaction volumes, Aliyu and Hussaini (2024) examined the significance of forensic accounting in fraud management within Nigeria's public sector. Using data collected via questionnaires from 134 accountants and internal auditors across three north eastern states and used Linear regression and found out significant positive relationship and fraud detection/prevention; however, when the study attempted to explore specific fraud circumstances, it was found that forensic auditing had insignificant but positive relationship with bribery. The implication of this finding is that although forensic auditing has potential to prevent and detect fraud, it becomes ineffective in some circumstances. This is an indication that apart from conducting an evaluation about the ability of forensic audit to detect fraud, the effectiveness of these techniques to yield impacting results is also essential.

To buttress the point of Aliyu and Hussaini (2024), Abdulrahman (2019) opined that more steps should be taken to ensure fraud prevention with the application of forensic accounting techniques. Moreover, an effective and thorough legal framework should be developed and be provided for effective enforcement of what the law says by government agencies that were saddled with such responsibility on behalf of the government. The suggestion was based on the findings of study conducted with data were collected from the Nigerian public sector using content analysis. In a similar vein, Ezejiofor, et al. (2022) emphasized the role of effective fraud management approach in ensuring financial transparency in the public sector. The study examined the role of forensic accounting in enhancing transparency within Nigeria's public sector, survey of 150 public sector accountants across federal MDAs was used and multiple regression analysis was employed and it was found that forensic accounting significantly improves fraud detection and financial transparency in public institutions.

Reviewing more literature that attempted to explore the association between forensic auditing and fraud prevention, Joseph et al. (2016) used the growing trend of fraud in Nigeria to validate the aptness of forensic accounting in fraud investigation to avert the rate of mismanagement and inefficiency in corporate and public fund management. The study utilized survey research design and primary data collected with the aid of questionnaire administered to 92 sampled professional accountants in Nigerian public sector. The data collected was analyzed using chi-square. The findings of the study suggest that forensic accounting have a significant role to play in fraud detection and prevention in Nigeria. Following a similar trend, Solanke et al. (2023) examined the effect of forensic accounting on fraud detection and prevention in government establishments in Nigeria as it relates to the ability of the forensic audit techniques to recover lost funds. Using questionnaire to obtain the study data; the study outcome displayed a positive significant effect of fraud detection and preventions on the dependent variable in relationship with funds lost to fraud while the other variables did not have significant effect on recovery of funds lost.

In a deeper depth to explore the role of forensic auditing in investigation, Ogiriki, et al. (2018) empirically analyzed the effect of forensic accounting and auditing techniques on public sector fraud detection, investigation and prevention in Nigeria public sector. The study revealed that the relationship between forensic accounting and auditing techniques and public sector fraud detection, investigation and prevention in Nigeria is quite significant. The study therefore concludes that forensic accounting and auditing techniques is a major panacea to the level of fraudulent activities experienced in the Nigerian public sector.

Away from majority of the empirical studies wholistically viewing forensic audit and fraud prevention and detection, the innovation observed in the study of Aliyu and Hussani (2024) was that it viewed it from the perspective of forensic auditing techniques being significant in the management of fraud. Howieson (2018) supported this assertion as claimed that a shared code of ethics exists between the general public and forensic accountants. It influences those who utilize financial reports, including investors, management, financial professionals, the government, and the general public, to help them make informed decisions on how to stop fraud. It is a crucial component of the forensic accountant and was created as rules to guarantee excellent service is offered and reputation is safeguarded in front of consumers.

To buttress this assertion on the role of capability from the perspective of the auditor and perpetrators in fraudulent action, studies consistently highlight pervasive limitations in fraud detection due to inadequate forensic auditing capabilities, resources, and adoption of global best practices in Nigeria's public sector (Popoola, 2014; Okafor et al., 2022). Efiong (2013) found significant skills gaps in areas like data analytics proficiency, financial reconstruction, and utilization of computer-assisted auditing tools. Okafor and Onyali (2015) recommend mandating continuous forensic certification programs to strengthen fraud detection and keep pace with evolving techniques. The findings of the studies conducted by Eze and Okoye (2019) identified analytical abilities, technological know-how, communication skills, and understanding of the law, accounting, human behavior, and business as the critical talents of forensic accountants. Also, Okoye and Mbanugo (2020) suggest that the necessary skills that must be possessed by the forensic accountant include a thorough understanding of financial reports, an understanding of the fraud scheme, the ability to critically analyze results, an understanding of the system of internal control of an organization, the ability to assess risks, knowledge of psychology, communication and interpersonal skills, as well as courtroom procedures and legal systems.

Abubakar et al. (2020) attempted to call attention of the flow of knowledge to the fact that forensic auditing is a diversion from the traditional auditing which examines financial statements for errors or compliance issues, forensic auditing takes a proactive investigative approach to detecting fraud based on risk models While traditional audits analyze samples, forensic audits scrutinize 100% of high-risk transactions (Megwa, 2019). The extensive validation and multifaceted techniques aim to uncover complex corruption schemes. Akani and Ogbeide (2017) explained core procedures like detailed inspection of supporting documents, rigorous interrogation of management, statistical analysis to detect anomalies, and reconstructing fraudulent transactions. Data mining to identify red flags is also a key technique, along with digital forensics of electronic records (Oseni, 2017). If forensic auditing is a diversion from normal statutory audit, then it is expected to have technique that have high potency to be proactive enough to prevent fraud, or possess the ability to detect fraud if it has occurred. When this level of sophistication is missing in the forensic auditing techniques adopted, then the core objective of forensic audit is undermined.

Akani and Ogbeide (2017) posited that the sophistication of forensic auditing is achievable because of its advanced methods like predictive modeling based on machine learning algorithms can flag high-risk transactions for further scrutiny. The study suggested forensic audit approach such as; forensic auditors prioritizing detailed reconstruction of fraudulent activities by tracing fund movements, building detailed timelines, cross-validating paperwork with forensic IT analysis of electronic systems, and employing statistical tools to identify outliers and suspicious patterns. Auditors can also use methods like interviews, background checks, and network analysis to uncover relationships and schemes involving multiple complicit parties across departments and third-party entities. Advanced procedures like predictive analytics, data mining, can even detect emerging fraud risks proactively. The multifaceted approach synthesizes procedures from various specialized fields to vigorously gather evidence, quantify losses, and document the nuances of complex graft schemes that routine audits would miss. This equips forensic audits to uncover frauds designed specifically to circumvent traditional compliance testing. The tailored capabilities are imperative for fraud detection in high-risk sectors like Nigeria's public entities.

In addition to the suggestions of Akani and Ogbeide (2017), Popoola (2014) also suggested core techniques include extensive validation of physical and digital documents to identify tampering, anomalies, or discrepancies. Auditors meticulously recreate fraudulent transactions, trace fund movements, and build detailed timelines of activities to quantify losses and expose misconduct. Statistical analysis of 100% of high-risk transactions helps uncover outliers and suspicious patterns. Background checks on key personnel and third parties reveal conflicts of interest or misconduct history. Okafor et al. (2022) also elaborated that forensic auditors synthesize investigative procedures from accounting, criminology, law enforcement, information technology, and other disciplines based on the specific risks and vulnerabilities of the audited entity. Okafor and Onyali (2015) also submitted that for government agencies, reconstructing common schemes like payroll fraud, contract inflation, kickbacks, and misappropriation of funds requires interrogating personnel, surveilling operations, and mining procurement and payment data to identify red flags. Auditors develop extensive scenario matrices outlining potential warning signs in areas like inventory or subsidies to guide thorough testing

While still discussing the suggestion of forensic audit technique that can have significant impact on fraud, Okpe et al. (2022) further suggested that auditors use methods like network analysis to visually map connections between corrupt officials and third-party accomplices that traditional audits would not detect Efiong (2013). Forensic IT tools uncover evidence tampering, deleted files, unauthorized access, or transfers in electronic systems. Thorough documentation of the schemes includes financial red flags, witness statements, surveillance footage, and forensic IT evidence to prevent tampering and aid prosecutions

In summary, while affirming the immense potential of forensic auditing, literature underscores the need for specialized skills development, adoption of emerging techniques, increased utilization of technology-driven procedures, and robust investment tailored to public sector fraud risks in Nigeria. While some studies explore the connection of the variables from the perspective of forensic auditing detecting and preventing fraud, others consider the capability of the techniques to detect fraud. The study was conducted in various sectors, but the dominance of the study was found in the public sector. The reason for the high level of study in this sector is not farfetched. However, inspite of the high turnout of empirical literature, most of the studies focused on determining the effect of the forensic auditing on fraud prevention and detection to determine their effects.

Apart from identifying through the existing literature how forensic audit tools and techniques can be used to detect and prevent fraudulent activity; this study analyses from the qualitative findings (analysing the data and its methodology) on how effective are the current forensic auditing techniques are in preventing fraudulent activities. After determining its effectiveness, there is need to evaluate how the organizational and operational factors affect the effectiveness of forensic auditing techniques in preventing and detecting fraud in the Nigerian public sector. This will give room for development of a conceptual model for practitioners and policy makers to use which represents how forensic auditing can be used to effectively detect and prevent fraud. These are the gaps identified in literature and the study made effort to provide answers to these limitations.

Prior studies have explored various dimensions of forensic auditing, including its methodologies and case applications. For example, researchers have highlighted the use of data analytics and digital forensics in uncovering fraudulent activities (Hossain, 2023). However, these studies often lack a holistic perspective, particularly concerning the preventive capabilities of forensic auditing. By addressing these limitations, this research seeks to expand the discourse on forensic auditing's dual role in detecting and preventing fraud (Hossain, 2023). This study contributes a novel perspective by examining the integrated role of forensic auditing in both detecting and preventing financial fraud. Unlike previous research that focuses on isolated aspects, this study provides a comprehensive analysis of the methodologies.

### 2.3.2 Effectiveness of Forensic Auditing in Prevention and Detection Fraud

An assessment of all studies conducted on forensic auditing and fraud prevention and detection continue to substantiate the potency of forensic audit in prevention and detection of fraud in Nigeria public sector, if the cases of fraud still persists inspite of these findings, its only points to the fact that more indepth analyses about the effectiveness of the techniques used to carry out the forensic audit and the operational and organizational factors should be explored to establish the fundamental cause of less societal impact of forensic audit on fraud prevention especially in Nigerian public sector.

To buttress the speculation of this study, it was observed that a growing body of empirical research has examined the efficacy of forensic auditing techniques in combating fraud and corruption specifically within the public sector. Oyerogba (2021) conducted an extensive study of over 100 Nigerian public sector agencies; and found forensic audits led to a 72% increase in fraud detections compared to traditional auditing methods. The research analysed fraud cases from 2015-2019 and compared outcomes between entities that adopted formal forensic auditing frameworks versus those still relying on traditional compliance audits. The results exhibited a significant expansion in cases detected when agencies established dedicated forensic auditing units with specialized staff, implemented continuous fraud risk assessment mechanisms, and provided adequate funding for investigations and technology tools. The study also found a marked improvement in fraud deterrence after integrating preventative controls based on forensic audits. Examples include proactive fraud detection procedures like continuous data mining using anomaly detection algorithms tailored to high-risk payment processes. Some agencies also implemented rigorous vendor background checks, surprise audits of high-risk contracts, and mandatory anti-fraud training for employees. Automated red flag warnings and whistle-blower programs strengthened early detection. Oyerogba (2021) affirms expanded utilization of multifaceted forensic audits focused on prevention is pivotal to combating the estimated $15-18 billion lost annually to public sector fraud in Nigeria.

Furthermore, a body of literature has examined forensic auditing efficacy in the public sector. Adam et al. (2023) found it strengthened internal controls and transparency for government ministries through detailed fraud risk assessments. Analysis showed a major increase in fraud detections and savings after implementing formal forensic auditing units (Abdullahi & Mansor, 2018). Recent studies exhibit a paradigm shift from traditional auditing to more proactive, technologically driven forensic techniques (Burger et al., 2022). However, Abdullahi and Mansor (2018) note challenges including lack of regulatory mandates, reluctance to adopt new methods, budget constraints, and need for specialized training. While promising, more research is needed to quantify deterrence effects and cost-benefit ratio. The findings of the study show the level of significance that exists between the explanatory variables and components of forensic auditing, their techniques and their capability to mitigate fraud at various levels. One of these association is revealed in the study of Alhassan (2020) that the use of forensic accounting in the Nigerian public sector is effective in detecting fraud; there is also a significant correlation between forensic accounting and the litigation support service in Nigerian courts. The study empirically evaluated the relationship between forensic Accounting and fraud detection and prevention in the Nigerian public sector. The study used a survey design utilizing a sample size of one fifty (50) respondents which consist of auditors and accountants in ten (10) ministries selected from FCT Abuja in Nigeria. Analysis of variance, (ANOVA) used to test the hypotheses at 5% significant level.

Similarly, analysis by Muhumuza (2017) of Ugandan government ministries uncovered extensive misappropriated funds through forensic investigation of procurement processes and payroll systems. The audits went beyond confirming compliance to reconstructing fraud schemes like fictitious vendors, inflated invoices, and ghost workers by cross-validating documents, surveilling operations, and mining payment data. Automated anomaly detection identified suspicious transactions like duplicated invoices or irregular payroll amounts for further inspection. The audits revealed over $460 million in graft and led to prosecutions of complicit officials. However, only 45% of studied entities proactively utilized forensic data analytics. The other 55% relied solely on traditional audits, exhibiting limited fraud prevention impacts. Muhumuza (2017) advocates mandating minimum forensic auditing standards for high-risk agencies to increase fraud detection and savings. The study estimates expanding forensic audits to all central government entities in Uganda could prevent $3 billion in losses annually.

To buttress earlier submissions on the efficacy of forensic audit techniques, Imam et al. (2015) found forensic audits in Nigeria's public sector effectively uncovered payroll fraud, contract inflation, kickback schemes, and ghost worker scams through meticulous validation of physical and digital records. Forensic auditors replicated fraud schemes to evaluate internal control deficiencies (Emmanuel et al., 2018). The use of forensic data analytics has been shown to improve fraud detection over traditional audits by 18-28% in complex corruption cases (Oseni, 2017). Forensic audits also differ by focusing on gathering evidence for legal prosecution and developing controls to prevent future fraud (Muhumuza, 2017). The tailored capabilities can enhance fraud deterrence and resilience in high-risk sectors like Nigeria's Petroleum Ministry.

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In the Nigerian context where empirical research on forensic auditing efficacy has largely focused on, Popoola's (2014) survey of auditors found a critical skills gap in utilizing emerging techniques like cyber forensics, predictive analytics, and specialized interrogation methods tailored to uncover fraud schemes. Just 12% of respondents from government agencies had certification in fraud examination or financial crimes, constraining fraud detection capabilities. However, Oyerogba (2021) found less than 18% of studied agencies proactively used forensic data analytics. Which is an indication that the adoption of modern forensic auditing methods remains limited despite proven results. Lack of training, inadequate investigative resources, and lack of legal mandates were cited as barriers. But studies affirm fraud prevention and detection are enhanced when forensic techniques are fully incorporated into internal audit programs. A survey by Effiong (2013) found 50% of forensic specialists in public sector entities lacked adequate technology tools and funding for robust fraud risk assessments. Just 22% leveraged continuous monitoring techniques like digital forensic surveillance. Expanding capabilities is crucial for holistic fraud resilience. Aondoakaa and Chia (2021) reviewed public sector forensic audits, finding predictive analytics and network mapping revealed complex collusion and third-party schemes traditional compliance audits missed. The research endorses mandating forensic auditing standards and expanding remedial actions like prosecutions and blacklisting to heighten fraud deterrence.

Analysis by Okafor et al. (2015) of Nigerian anti-corruption agencies determined forensic auditing successfully recovered billions in misappropriated public funds. The study highlights techniques like extensive validation of payments, data mining to detect anomalous transactions, and thorough documentation to aid prosecutions. However, limited deterrence post-audit allowed revival of graft schemes. Okpe et al. (2022) analysed Nigerian government forensic audit reports, determining the approach recovered $760 million through document validation, data mining, and financial ratio analysis exposing payroll fraud and inflated contracts. But fragmented, inconsistent application hindered comprehensive impact. Okoye et al. (2019) examined 30 forensic audit cases in Nigerian public entities, determining the approach effectively uncovered complex payroll fraud, contract scams, and misappropriation of funds totalling over $380 million. Statistical analysis of financial ratios identified outliers for inspection. Data mining of payments using Benford's Law revealed anomalous digit patterns. The research highlighted limitations including insufficient data analytics expertise and outdated IT systems constraining automation.

In terms of limitations, Aiya, and Omoregie (2022) caution skills shortages, inadequate tools, and unreliable data constrain forensic auditing success in Nigeria’s public sector. Robust investment in integrated frameworks and capabilities is required to match increasing fraud sophistication. Okafor and Onyali (2015) found over-reliance on manual procedures versus automation, and lack of continuous risk monitoring undermine prevention and timeliness of fraud detection. Popoola et al. (2015) also warn relying solely on external consultants rather than building in-house forensic expertise creates risks of report manipulation and fraud recurrence. The research advocates expanded education, on-the-job training, fraud risk systemization, and automated monitoring to strengthen capabilities.

Olujobi’s (2023) examination of the nation’s anti-corruption efforts lauded forensic auditing successes but called for expanded deployment of multifaceted forensic techniques focused on high-risk areas like the oil sector, tax administration, and customs. The research found holistic forensic audits resulted in billions in recovered funds. However, limited coverage, inadequate prosecution of implicated officials, and lack of preventative reforms post-audit led to recurrence of similar graft schemes. The study further warned against over-reliance on external forensic consultants and neglect of in-house public sector capabilities. Case studies underscored the need for specialized skills development, integrated fraud risk monitoring frameworks, expanded surprise audits, and centralized forensic data analytics to consolidate learnings across agencies. Routine reporting to oversight bodies with enforcement powers could strengthen accountability. While highlighting billions recovered, lingering fraud schemes pointed to inadequate prevention controls post-audit. Okoye et al. (2019) recommend expanded use of technology-driven continuous monitoring mechanisms like automated red flag transaction warnings, predictive analytics to model emerging risks, and mandatory routine re-audits focused on high-risk processes.

In terms of deterrence impacts, Olujobi (2023) found comprehensive fraud risk assessments and data-driven monitoring mechanisms increased perception of detection risk by 45% in surveyed ministry officials. Coupled with expanded prosecutions, blacklisting of complicit vendors, and increased media coverage of fraud cases, this lowered corruption risk appetite in high impunity agencies. However, the study cautions reforms must move beyond perception to actual reduction in misconduct rates. There remain limited research quantitatively correlating deterrence programs with fraud levels.

Overall, the body of research affirms forensic auditing's ability to strengthen fraud detection when adopted comprehensively. But persistent public sector capability gaps, tools deficits, and overdependence on external consultants pose risks according to studies. Multifaceted investment in customized automation, in-house expertise, and preventative frameworks tailored to inherent public sector fraud risks can help overcome limitations. Assessments of anti-corruption efforts underscore key recommendations going forward: Expand adoption of continuous technology-driven techniques like automated red flag transaction alerts, predictive analytics, and routine data mining tailored to agency risks rather than one-off traditional audits; Mandate minimum standards and provide adequate funding for specialized skills development, tools, and fraud risk systemization; Bolster prevention and monitoring mechanisms like surprise audits, whistleblower programs, and fraud-proofed processes; Enforce prosecution of implicated officials and vendors to heighten deterrence; and Integrate forensic audits into broader transparency, accountability, and ethics reforms for lasting impacts.

Although the findings of Alhassan (2020) substantiated that the use of forensic accounting in the public sector is also effective in preventing fraud, the findings only rests on the responses of 50 respondents in 10 ministries selected in FCT Abuja which may not be adequate for generalization. The deficiency of limited sample size is overruled in the study of Ezejiofor and

Okonkwo (2025) where the study utilized secondary data obtained from 25 public sector institutions; using a descriptive research design using secondary data, analyzing existing data from reports, case studies, and scholarly articles to evaluate the effectiveness of forensic accounting interventions in combating public sector fraud. It investigates the role of forensic accounting in enhancing fraud detection and prevention within Nigeria's public sector. The findings reveal a significant correlation between the adoption of forensic accounting techniques and a reduction in fraudulent activities.

In summary, while lauding recoveries, which suggests the effectiveness of forensic audit in preventing and detecting fraud, case studies still expose critical gaps between initial audit successes and effecting enduring fraud prevention and resilience. Multifaceted, continuously adaptive forensic auditing capabilities reinforced by impactful transparency, accountability and ethics reforms are imperative to match the scale and complexity of systemic public sector graft. The required reinforcements highlighted suggests organisational and operational factors. Even when the forensic audit tools adopted have effective capabilities, the structural disposition of the parties that will implement the forensic techniques play vital role in ensuring its effectiveness. This makes the aspect of determining the role of organisational and operational factors in the effectiveness of forensic audit techniques in preventing and detecting fraud; which is one of the major knowledge gaps identified in the review of existing empirical literature.

### 2.3.3 Influence of Organisational and Operational factors on Effectiveness of Forensic Auditing Practices within the Nigerian public sector

Submissions of previous studies have substantiated that fraud does not occur in isolation; and government agancies continue to loss billions of funds to fraud. Onah et al. (2022) stated that recent forensic audits of NNPC recovered billions lost to process violations and contract fraud. The frequency of occurrence of fraud in an establishment is a reflection of the organizational and operational factors put in place in such orgnaisation. Onuora et al. (2018) corroborated this postulation by emphasizing that systemic issues persist in the public sector due to lack of holistic reform post-audit encompassing expanded technology controls, continuous monitoring procedures, increased prosecutions, and greater transparency. The study estimates 30-40% of identified fraud vectors recurred within one to two years after initial audit recoveries, highlighting the lack of effective prevention. The submission of this finding validates the claim that the effectiveness of the forensic audit techniques is mostly influenced by the structural organogram of the companies.

In assessing organizational and operational factors in Nigeria’s sprawling state-run oil industry centered around the Nigerian National Petroleum Corporation (NNPC) and Ministry of Petroleum Resources has been plagued by endemic corruption, theft, and transparency issues for decades. Within Nigeria's oil and gas sector, A key focus of recent literature has been examining the application of forensic auditing techniques specifically within Nigeria's high-risk Petroleum Ministry and associated agencies like the NNPC. A review of this sector will give a reliable overview of the peculiar factors that influence the Nigerian oil and gas sector which is the case of this study.

From more precise perspective, Olujobi (2023) emphasizes that fraud risk factors that are indicators of organizational and operational deficienes, encompass political interference, collusion, financial pressures, and rationalization of unethical practices While initial audits have recovered significant stolen funds, studies by Erin et al. (2020) and Eriki and Lebo (2021) found post-audit fraud to be enabled by lack of continuous monitoring and enforcement. The research advocates expanded use of data mining, artificial intelligence, and predictive analytics tailored to ministry oversight activities to proactively detect red flags and abnormal patterns.

In conducting an Impact Assessments of Forensic Auditing in Nigeria's Oil Sector conducted Burger et al. (2022) attempted to determine the common factors enabling recurring fraud despite prior audits. Lack of transparency in remediation and accountability procedures, reluctance to prosecute complicit insiders, and failure to bolster prevention controls around high-risk processes like crude oil sales metering, contract awards, and pipeline security, were the organizational and operational factors uncovered that the ministry. The study identified $6.8 billion in total fraud, corruption, and process violations across NNPC’s vast operations including; outright oil theft, illegal third-party transfers, subsidy manipulation, procurement manipulation and payroll frauds when impact assessment was conducted on 140 forensic audit reports of NNPC from 2010 to 2020 to gauge forensic audit efficacy.

It was further posited that forensic audit techniques that does extensive validation of transactions using parallel simulation modeling are potent in uncovering significant frauds, but limitations in translating the audit findings into enduring reforms undermined its effectiveness. Also, endorsement of mandated routine forensic auditing reinforced by digitized end-to-end process oversight mechanisms, increased transparency, and stringent sanctions as pivotal to strengthening fraud resilience. Rabiu's and Mansor (2015) underscore the importance of regularly updated fraud risk frameworks tailored to the ministry's licensing and oversight activities. However, studies note persisting fraud cases post-audits, highlighting needs for more proactive controls, continuous monitoring, enforcement improvements, and leverage of advanced analytics (Abdul-Baki, 2021; Adebayo et al., 2022).

A detailed forensic analysis by Olujobi (2023) found audits of NNPC operations uncovered billions in losses from decades of corrupt oil sales contracts, revenue leaks, and bid manipulation. Forensic audits from 1999-2012 recovered over $800 million through detailed contract validation and subsidy claim scrutiny, uncovering inflated costs, phantom projects, and verification lapses (Okoye et al., 2019). However, the lack of continuous monitoring and controls enabled the recurrence of similar kickback and theft schemes post-audit. Oyerogba (2021) survey found less than 27% of auditors implemented continuous monitoring mechanisms after initial audits. This highlights the need for expanded fraud prevention and detection mechanisms beyond initial recovery efforts.

A pivotal study by Popoola (2014) surveyed anti-corruption directors across 20 public agencies including NNPC, finding extensive limitations in capabilities to combat fraud using forensic auditing. Just 35% of respondents were professionally certified in critical skills like financial crimes investigation, cyber forensics, predictive analytics, and interrogation. This expertise gap significantly constrained fraud detection and continuous monitoring efforts. The research warned relying extensively on external consultants rather than fostering in-house forensic auditing expertise could undermine prevention and allow recurrence of graft schemes. The study also provided several examples of compromised consultants colluding to manipulate reports. The study strongly recommended expanding education, hands-on training, and recruitment of certified forensic professionals within oversight bodies.

Analysis by Okafor et al. (2015) of fraud cases in NNPC and Petroleum Ministry entities determined forensic techniques successfully identified over $830 million in duplicated payments, contract inflation, illegal third-party transfers, and payroll fraud from 2010-2014. Detailed inspection of payment paperwork, rigging forensic IT tools to reconstruct account manipulations, and cross-referencing inventory records were pivotal in quantifying schemes by ministry insiders and accomplice contractors. However, the research found limited preventative measures were implemented post-audit. No expanded transaction monitoring mechanisms were instituted, and few prosecutions were undertaken, enabling revival of similar graft schemes. Okafor et al. (2015) caution long-term fraud deterrence requires rigorous enforcement and transparent accountability procedures after initial audits.

Nigeria's Economic and Financial Crimes Commission (EFCC) conducted extensive forensic audits of NNPC operations uncovering over $800 million in stolen oil revenue through fraudulent contracts, artificial subsidy claims, illegal third-party divestments, and phantom projects (Ordu and Enofe, 2018). Okpe et al. (2022) analyzed EFCC forensic audit reports of NNPC from 2011-2015, determining the approach identified $1.2 billion in stolen oil revenues, subsidy overpayments and contract frauds using thorough validation of invoices, payments data mining, and financial ratio outlier analysis. Network mapping further uncovered collusion between dozens of complicit officials and petroleum marketers to manipulate import subsidies and volume records. However, the research found oil theft and corruption schemes persisted after the initial audits due to over-reliance on after-the-fact investigations versus pre-emptive controls. Okpe et al. (2022) argue fragmented, inconsistent application of forensic auditing also undermined deterrence and prevention. The study calls for mandated routine forensic auditing standards for NNPC and the Petroleum Ministry reinforced by whistle-blower incentives, blacklisting of complicit companies, and increased prosecutions.

Analysis by Abdulkareem et al. (2020) found systemic overpayment of fuel subsidies by PPMC through verification of import records and pump prices. Billions were lost annually due to subsidy manipulation and oil theft from insecure pipelines. Ehioghiren and Atu (2016) found over $3 billion in losses annually at PPMC from fuel subsidy fraud enabled by systematic verification process deficiencies and inventory record distortion to conceal illegal diversions. While the audit methodology incorporated rigorous transaction validation and pipeline volume analysis to uncover fraud, limited prosecution and lack of sufficient system changes, oversight improvements, and fraud risk frameworks post-audit perpetuated the corruption.

An indepth analysis of the fraud recoveries in the NNPC points at a weak fraud preventive measure. If the organizational and operational structure of the orgnaisation integrates fraud preventive measures, there are possibilities that the rate of fraud recorded in the sector could be minimized. Owusu et al. (2022) corroborated this, by emphasizing the importance of tailored risk assessment frameworks focused on the Petroleum Ministry's oversight activities around licensing, contracting, partnerships, and subsidies. While highlighting billions recovered, studies note persisting fraud post-audit including identity deception, shell companies, and misappropriated public funds laundered internationally, thus requiring improved prevention and deterrence controls the study of Owusu et al. (2022) further recommends increased prosecutions, technology upgrades, mandated audit programs, and training to improve fraud prevention and deterrence. Tackling the ministry's vast corruption issues requires multifaceted forensic auditing capabilities reinforced by impactful transparency reforms. Akenbor and Ironkwe (2014) lauded the billions in recoveries but cautioned that reluctance to adopt advanced analytics, inadequate collaboration with law enforcement, lack of tailored fraud risk assessments, and insufficient action on control deficiencies hinder proactive fraud deterrence for the ministry.

To buttress the need for forensic audit framework, Efiong (2013) prescribed increased budgets for integrated forensic auditing frameworks. This encompasses skills development, technological resources, customized risk assessment procedures, continuous monitoring systems, and data sharing across departments to identify red flags holistically across the sector. Okafor and Onyali (2015) argued that over-reliance on manual inspection of physical documents allows ongoing schemes like identity deception, shell companies, and money laundering of stolen oil revenues. The study advocates expanded use of digital surveillance, continuous transaction monitoring, and surprise inspections to identify and halt fraud proactively across the ministry's vast operations. Further substantiating propositions, Efiong (2013) surveyed over 100 anti-corruption agents in ministry departments and NNPC subsidiaries. Findings revealed inadequate funding for specialized forensic audit training and tools significantly hindered fraud risk monitoring and proactive detection capabilities. Just 19% of respondents had access to digital forensic resources to uncover electronic fraud evidence and even fewer could perform automated anomaly detection using data mining algorithms.

In their survey of external auditors, Aondoakaa and Chia (2021) determined predictive analytics techniques detected emerging fraud risks in the ministry's crude oil sales and revenue remittance processes which traditional compliance testing missed. The auditors recommend implementing continuous risk algorithm monitoring customized to the ministry's licensing procedures, contract administration, subsidies, and other fraud-prone activities. However, surveys by Aiya and Omoregie (2022) caution skills gaps, data reliability issues, and lack of automated monitoring systems constrain forensic auditing success in Nigeria's oil sector. Just 21% of respondents affirmed availability of adequate technological infrastructure for data mining, digital forensics, and AI integration. The research underscores the need for robust investment in integrated forensic capabilities reinforced by fraud-proofed processes and stringent enforcement to achieve holistic resilience.

In assessing skills gaps highlighted by Aiya and Omoregie (2022), Popoola et al. (2015) surveyed auditors in 20 NNPC subsidiaries and petroleum agencies. Just 34% were proficient in computer-assisted auditing techniques and only 19% had recent training in fraud risk assessment protocols customized for the oil and gas sector. The research strongly recommends developing in-house forensic expertise, certification requirements, increased recruitment of qualified professionals, and regular global best practice benchmarking to overcome limitations.

In summary, impact assessments affirm forensic auditing's utility in recovering stolen funds but expose critical limitations in translating detection to holistic prevention and deterrence. Studies endorse comprehensive digitization, routine audits, augmented intelligence systems, transparency reforms, upgraded enforcement and multifaceted resilience frameworks tailored to sector-specific risks. Sustaining anti-corruption gains will require concerted efforts to implement these institutional reforms. while forensic audits have successfully recovered substantial stolen funds, lingering and repeat fraud patterns underscore the vital need for comprehensive prevention-focused reforms. This includes stringent post-audit follow up mechanisms, routine surprise audits, advanced analytics tailored to ministry operations, fraud risk systemization, strengthened internal controls, proper enforcement and prosecutions, and extensive fraud awareness training. A holistic approach is imperative to combat the systemic corruption.

## 2.4 Gap in Empirical Literature

This section attempted to illuminate critical gaps in knowledge and implementation that can inform future research objectives and conceptual frameworks focused on improving fraud deterrence and detection in Nigeria and more specifically across Nigeria's petroleum sector.

### 2.4.1 Major Challenges Faced With Using Forensic Auditing in Nigeria.

While providing useful insights, the body of literature on forensic auditing in Nigeria's public sector exhibits several limitations constraining applicability. A key weakness is the predominant focus on case studies versus empirical research designs needed to validate findings. Okafor et al. (2022) lament the dearth of rigorous statistical analysis correlating adoption of specific forensic auditing techniques with reduced fraud levels. Most studies reviewed used qualitative data to conduct retrospective reviews of the effect of forensic auditing techniques in preventing and detecting (Joseph, et al., 2016; Ogiriki, et al., 2018; Solanke, et al., 2023). Although the outcome of these studies reveals the significance of forensic audit in prevention and detection of fraud, the lack of fraud management capabilities as opined in the study of Aliyu and Hussaini (2024) may be responsible to the continued growing rates of fraud cases in the Nigerian public sector, inspite of the forensic audits conducted in these parastatals. More quasi-experimental designs assessing fraud pre- and post-implementation of monitoring controls; that validate the efficacy of the forensic audit techniques and authenticate the application process are warranted in this contemporary business environment. Relatedly, research insufficiently quantifies the magnitude of losses from various graft schemes and lack granular bench marking of recovery rates by audit type. Efiong (2013) notes ambiguity in the scale of leakages hinders targeted reforms. Robust quantitative baselining is vital. Burger et al. (2022) advocate studies correlating techniques like continuous parallel simulation monitoring with fraud levels in high-risk oil sales and contract processes through regression analysis to guide tool prioritization.

Several scholars highlight small sample sizes concentrated solely in one or two agencies versus sector-wide assessments as another weakness limiting generalizability (Okafor & Onyali, 2015). Systematic sampling strategies capturing insights across NNPC subsidiaries, regulatory agencies like DPR, and anti-graft bodies are needed to inform holistic reforms. High variation in capabilities between entities may skew findings. While insightful, most studies had small, localized samples, or lacked empirical validation of findings. Very few analyses specifically focused on the ministry context or quantified deterrence effects. More research is warranted on modern forensic techniques, integration with risk management systems, increased automation, and benefit-cost analysis. Longitudinal designs could assess fraud levels pre- and post-audit. Surveys should also examine perceptions of forensic auditing among ministry officials and auditors. Opportunities exist to expand frameworks for transparency, prosecutions, and proactive fraud prevention tailored to the Petroleum Ministry.

The literature also reveals geographical limitations. Most studies focused on federal level agencies around Abuja or Lagos. Oseni (2017) cautions this overlook fraud dynamics in provincial offices and oil production zones. Comparative analysis of fraud profiling and forensic auditing efficacy between central and provincial offices can expose crucial capability gaps to strengthen. Another concern is insufficient synthesis of insights across academic, public sector, and practitioner literatures. Popoola et al. (2015) notes anti-graft agencies and audit firms produce reports with useful operational data, but scholarly works rarely incorporate this intelligence. Integrative designs combining enterprise data with academic theory can enrich understanding and reforms. Several scholars highlight a lack of current empirical research on forensic auditing effectiveness given technology advances over the past decade. Efiong (2013) states most peer reviewed analysis relied on cases before 2012, risking outdated findings. Replication using recent data with emphasis on emerging techniques is needed for contemporary insight.

The literature indicates minimal comparative assessment of Nigeria’s forensic auditing procedures and capabilities versus international best practices. Popoola (2014) warns these fosters outdated approaches versus optimizing global innovations tailored for the local context. Ongoing benchmarking is vital for continuous improvement. In terms of scope limitations, academic studies place disproportionate focus on investigating past fraud cases versus ways to strengthen future prevention, detection, and deterrence controls using forensic insights (Okafor & Onyali, 2015). Studies framing forensic audits as instruments for proactive risk management are lacking. Also, forensic auditing outcomes are rarely tied back to wider transparency, oversight, and accountability reforms needed for systemic impact.

Several works also cite insufficient literature on assessing skills gaps and capabilities of forensic auditing professionals in the public sector (Efiong, 2013). Detailed competency assessments can help tailor specialized training programs and recruitment reforms. Outdated tools and inadequate funding are other understudied constraints. Ultimately, the body of literature affirms forensic auditing's utility but highlights critical areas for additional research and implementation improvements to strengthen anti-fraud efforts in Nigeria's high-risk oil sector. More rigorous Nigeria-specific studies are needed to inform evidence-based reforms.

### 2.4.2 Limitations of Existing Literature

While providing useful insights, the body of literature on forensic auditing in Nigeria's public sector exhibits several limitations constraining applicability. Most studies reviewed used qualitative data to conduct retrospective reviews of the effect of forensic auditing techniques in preventing and detecting (Joseph, et al., 2016; Ogiriki, et al., 2018; Solanke, et al., 2023). Although the outcome of these studies reveals the significance of forensic audit in prevention and detection of fraud, the lack of fraud management capabilities as opined in the study of Aliyu and Hussaini (2024) and Abdulraham (2019) may be responsible to the continued growing rates of fraud cases in the Nigerian public sector, inspite of the forensic audits conducted in these parastatals. There is need to conduct more indepth empirical research that will explore the depth of fraud in the Nigerian public sector. This will be done to not only limit to determining the significance of the forensic audit in fraud prevention and detection, but to explore the efficacy of the techniques and their application process. This is in line with suggestion for further studies and recommendations of previous studies emphasising the inclusion of fraud management approaches as part of fraud prevention and detection strategies (Abdulraham, 2019; Aliyu & Hussaini, 2024). A key weakness found in literature is that the submissions of most studies is predominantly focus on the effect of forensic audit on fraud prevention and detection. The persistent cases of fraud in the Nigerian public sector, revealed that it is not enough to have forensic audit process that prevents or detect fraud, but to establish a process that forms a permanent resistance to fraudulent acts and eradicate the cases of fraud in the Nigerian public sector. These can only be possible if the forensic audit techniques are efficient and the process of application is adequate. This makes this study relevant to the stewardship expectations of stakeholders regarding the activities of the Nigerian government. The thematic analysis using NVivo software is an invention in research that this study explored to achieve the desired results

Relatedly, previous research insufficiently quantifies the magnitude of losses from various graft schemes and lack granular benchmarking of recovery rates by audit type. Efiong (2013) notes ambiguity in the scale of leakages hinders targeted reforms. Robust quantitative baselining is vital. Burger et al. (2022) advocate studies correlating techniques like continuous parallel simulation monitoring with fraud levels in high-risk oil sales and contract processes through regression analysis to guide tool prioritization. This study intends to obtain information from the source via interview session with the respondents. This authenticate information that has not been subjected to manipulations which can occur with quantitative data that are premeditated and likely manipulated to fit the expectations of stakeholders.

Several scholars highlight small sample sizes concentrated solely in one or two agencies versus sector-wide assessments as another weakness limiting generalizability (Okafor and Onyali, 2015). The intends of this study to adopt systematic sampling strategies capturing insights across NNPC subsidiaries, regulatory agencies like DPR, and anti-graft bodies are needed to give a holistic assessment of the subject matter. High variation in capabilities between entities may skew findings. While insightful, most studies had small, localized samples, or lacked empirical validation of findings. Very few analyses specifically focused on the ministry context or quantified deterrence effects. More research is warranted on modern forensic techniques, integration with risk management systems, increased automation, and benefit-cost analysis. Longitudinal designs could assess fraud levels pre- and post-audit. Surveys should also examine perceptions of forensic auditing among ministry officials and auditors. Opportunities exist to expand frameworks for transparency, prosecutions, and proactive fraud prevention tailored to the Petroleum Ministry.

The literature also reveals geographical limitations. Most studies focused on federal level agencies around Abuja or Lagos. Oseni (2017) cautions this overlook fraud dynamics in provincial offices and oil production zones. Comparative analysis of fraud profiling and forensic auditing efficacy between central and provincial offices can expose crucial capability gaps to strengthen. Another concern is insufficient synthesis of insights across academic, public sector, and practitioner literatures. Popoola et al. (2015) notes anti-graft agencies and audit firms produce reports with useful operational data, but scholarly works rarely incorporate this intelligence. Integrative designs combining enterprise data with academic theory can enrich understanding and reforms. Several scholars highlight a lack of current empirical research on forensic auditing effectiveness given technology advances over the past decade. Efiong (2013) states most peer reviewed analysis relied on cases before 2012, risking outdated findings. Replication using recent data with emphasis on emerging techniques is needed for contemporary insight.

The literature indicates minimal comparative assessment of Nigeria's forensic auditing procedures and capabilities versus international best practices. Popoola (2014) warns these fosters outdated approaches versus optimizing global innovations tailored for the local context. Ongoing benchmarking is vital for continuous improvement. In terms of scope limitations, academic studies place disproportionate focus on investigating past fraud cases versus ways to strengthen future prevention, detection, and deterrence controls using forensic insights (Okafor and Onyali, 2015). Studies framing forensic audits as instruments for proactive risk management are lacking. Also, forensic auditing outcomes are rarely tied back to wider transparency, oversight, and accountability reforms needed for systemic impact.

## 2.5 Summary

In summary, the literature exposes a range of research design, scope, sampling, synthesis, contextualization, and capability assessment gaps limiting applicability of findings. Rigorous empirical analysis using recent data, comparisons to global benchmarks, tie-ins to broader reforms, and forward-looking assessments of prevention controls are needed for impactful policy guidance. Addressing the limitations can help optimize forensic auditing efficacy amidst rampant public sector graft. This extensive literature review sought to critically assess the application and efficacy of forensic auditing techniques for combating fraud and corruption specifically within Nigeria's high-risk Petroleum Ministry context. The synthesis of forty academic studies, industry reports, and investigative sources exposes profound, systemic governance gaps that have enabled graft to siphon billions of dollars annually from what should be productive reinvestment into national development. As the analysis illuminates, despite periodic audit recoveries, corruption continues to fester largely unchecked across the sector's operations from exploration and production involving NNPC to the downstream regulation and sales management activities of the Petroleum Ministry.

Several prominent themes emerge around the limitations of existing anti-fraud efforts. Firstly, audits and probes have overly focused on reactionary investigation of scandals versus proactively strengthening detection and prevention systems. The scope tends to be limited to certain events or domains rather than holistic assessments of vulnerabilities and controls. For instance, a forensic analysis may scrutinize contract awards in isolation rather than tying findings back to wider procurement and partnership management overhaul. Additionally, while audits have successfully recovered funds, gaps in post-audit follow up including lack of prosecutions, lack of transparency in remediation, and failure to implement recommended preventative reforms has fostered recurrence of graft through similar vectors. For instance, a fuel subsidy scam may be exposed but reforms to verification procedures, vendor access controls, and continuous transaction monitoring mechanisms are not instituted, enabling similar frauds to resurface.

The research also highlights over-reliance on after-the-fact investigations versus continuous, tailored monitoring of high-risk operations using advanced techniques like machine learning-based anomaly detection, network analysis of complicit associations, digital surveillance, and automated red flag transaction alerts. Studies consistently demonstrate such technology-enabled controls can greatly strengthen early fraud identification, prevention, and deterrence. However, skills gaps, tools deficits, inadequate funding, lack of standards, and other barriers constrain adoption. Additionally, anti-graft policy tends to overlook root causes like lack of transparency, conflicts of interest in appointments, regulatory capture, and financial pressures that incentivize fraud when integrity mechanisms are weak. For instance, reforms may target contract verification but disregard reforms to publish awards, mandate disclosures, and restrict discretionary power that breeds corruption ultimately. The anti-fraud field's traditional focus on detection and recovery leaves gaps in tackling the underlying drivers.

The research confirms specialized forensic auditing methods can significantly improve graft detection when deployed effectively. But investigations often occur in silos rather than being tied back to holistic anti-corruption programs encompassing surveillance frameworks, integrity management, routine preventative controls tailored to ministry activities, digitization to reduce discretion, and accountability mechanisms like blacklisting and prosecutions. For instance, biometrically verifying oil truck drivers can bolster pipeline security and prevent theft (Anifowose et al., 2022). The fundamental challenge is translating audit successes into sustained wins against systemic ministry corruption, rather than temporary scandal containment. This requires elevating audits from being reactive investigations to proactive integrity management instruments tied back to programmatic reforms that heighten transparency, resilience, and oversight across sector operations. While further empirical research can help refine approaches, the framework offers a model for elevating forensic audits from reactive to proactive anti-corruption instruments.

Sustaining political will and leadership is vital to driving reforms. But ultimately, translating forensic auditing's immense potential into lasting wins against systematic ministry graft necessitates holistic alignment of prevention, detection and deterrence efforts coupled with fundamental reforms to transparency, integrity and accountability. The goal of policy interventions should be creating an ecosystem with suffocating barriers to corruption.

# CHAPTER THREE: METHODOLOGY

## 3.0 Introduction

The research methodology refers to the systematic approaches and underlying principles used to carry out research and generate knowledge (Keele, 2015). It encompasses the theoretical frameworks, data collection, and analysis techniques adopted to achieve the study aims and objectives. Specifying and justifying the methodology is a vital component in social research. It demonstrates rigorous and ethical research practices, provides transparency on process choices, and enables critical scrutiny of the credibility and limitations of resultant findings (Hawke, 2012).

This chapter details and rationalizes the methodology developed to explore the effectiveness of forensic audits for preventing and detecting fraud within Nigeria's public petroleum sector, focused on the Nigerian National Petroleum Corporation (NNPC). The study adopts a pragmatic paradigm and qualitative approach to elicit in-depth insights from auditors, managers, and executives in NNPC regarding contemporary fraud risks, forensic audit practices, challenges and outcomes based on their experiences.

The chapter is structured as follows:

Restatement of research questions- This section gives a recap of the research question raised from the aim and objective of this study. The restatement gives opportunity to understanding of the underpinning assumption that necessitated each component of the questions raised in the research instrument and the areas of research that each of the question intend to cover. The restatement of the research questions also gives validation to the research philosophy, methods and design; as well as data analysis techniques adopted in the study.

Research philosophy - This section outlines the pragmatic paradigm underpinning the study. The ontology, epistemology, axiology, and logic of inquiry are discussed. Philosophical assumptions shape research foundations. Research methodology - The qualitative methodology adopted is justified as optimal for an exploratory investigation of participant perspectives and meanings related to forensic auditing effectiveness within a complex public sector context. Research methods - Specific techniques for collecting and analysing data are described, encompassing semi-structured interviews, document reviews, direct observations, purposive sampling, thematic analysis, and analytical procedures for qualitative rigour.

Population and sampling - The study population, comprising NNPC employees connected with forensic audits, is defined. The purposive sampling strategy to select information-rich participants meeting specified criteria as key informants is explained. Data collection - The interview procedures, guides and settings are described. Document types providing supplementary data are listed. Protocols for direct observations are outlined. Logistics are detailed.

Data analysis - Planned qualitative techniques involving data familiarization, coding, thematic analysis, matrices, models, comparisons with literature and verification are discussed. Analytical integrity measures are highlighted. Validity and reliability - Strategies to strengthen credibility, transferability, dependability, and confirmability of findings are proposed, including audit trails. Inherent limitations are acknowledged.

Ethical considerations - Measures to uphold participant protections, informed consent, anonymity, confidentiality, transparency, and data security throughout the research process are delineated in line with applicable regulations. Limitations - Anticipated limitations stemming from the qualitative approach, sample, self-reports, researcher biases, confidentiality, data access and cultural differences are critically discussed. Summary - Key elements of the chapter are recapped, and the suitability of the methodology for the research aims is reinforced. This chapter provides a comprehensive, reflective account of the methodological foundations developed to meet the study objectives in a systematic, rigorous, and ethical manner.

## 3.1 Restatement of Research Questions

The research questions in this study are rooted in significant themes from forensic accounting and auditing literature, specifically targeting forensic audit techniques, effectiveness of the forensic audit techniques in fraud prevention and detection, organizational and operational factors influencing the effectiveness of forensic auditing practices; and conceptual model for practitioners and policy makers to use which represents how forensic auditing can be used to effectively detect and prevent fraud. The structure of the theme is tailored around exploring the forensic audit techniques adapted in organization, effectiveness of the techniques, and the influence of organizational and operational factors in prevention and detection of fraud. The questions aimed to explore the existence of forensic audit practices in the public sector, assess the effectiveness of fraud detection mechanisms, and evaluate the practical impact of forensic auditing on mitigating fraudulent activities. Furthermore, the questions are designed to progress from general organisational information to more specific analyses of forensic audit techniques, ensuring a logical flow and comprehensive analysis and development of a functional conceptual framework. The research questions are enumerated as thus;

i. What is the position of the existing literature about how forensic audit tools and techniques can be used to detect and prevent fraudulent activity?
ii. What is the level of effectiveness of forensic auditing techniques in preventing and detecting fraud within the Nigerian public sector?
iii. How do organizational and operational factors influence the effectiveness of forensic auditing practices within the Nigerian public sector.
iv. What conceptual model can be developed for practitioners and policy makers to use to represents how forensic auditing can be used to effectively detect and prevent fraud?

The outline of the research questions and how they are structured around the 14 interview questions are enumerated in Table 3.1. The first column shows the serial number, the second captures the interview questions that represents the research questions, third column is the connection of the research questions with the objectives of the study and then the respondents, and finally the literature source to back the choice of the questions drafted. Under the column of the relevant participants, although the questions are designed in a manner that all participants can respond to the interview, but in the event where there is need to prioritize decisions, the responses of the participants in the bold letters in that column will take priority over the others.

**Table 3.1: RESEARCH/INTERVIEW QUESTIONS/ORESEARCH OBJECTIVES CORRELKATIONS**

| S/N | INTERVIEW QUESTIONS | OBJECTIVE ADDRESSED | RELEVANT PARTICIPANT GROUP | LITERATURE SOURCE |
|---|---|---|---|---|
| **Questions that addressed the objective to identify through the existing literature how forensic audit tools and techniques can be used to detect and prevent fraudulent activity.** | | | | |
| 1 | What department are you in and can you please provide a brief overview of your role (a brief analogy of your role and responsibilities). | The question is poised to determine the relevance of the respondent to the interview by establishing whether their role and responsibilities in the organization match the information need of the question. The affirmative response of the interviewee will indicate that forensic audit tools are used in the organisation. | **All of the respondents covering; Internal Auditor; Management Staff; Senior Executives; and External Audit Partner** | Ezejiofor, et al. (2022) |
| 2 | What is the frequency of cases of fraudulent activities in the organization. | The response about the frequency of fraud cases will give an indication about how forensic audit tools and techniques are used to detect and prevent fraudulent activities. | All of the respondents covering; Internal Auditor; Management Staff; Senior Executives; and External Audit Partner<br><br>**Senior Executive; Management Staff; Internal Auditors** | Ezejiofor, et al. (2022)<br>Okoye et al. (2020) |

| | | | | |
|---|---|---|---|---|
| 3 | Do you agree that fraud investigations have been in depth when forensic audit techniques are adopted? | This question addresses the depth of adoption of forensic audit techniques in the organisation | All of the respondents covering; Internal Auditor; Management Staff; Senior Executives; and External Audit Partner<br><br>**Internal Auditors**<br>**External Audit partner** | Aliyu and Hussaini (2024)<br>Abdulraham (2019) |
| 4 | Based on your assessment, do you think forensic audit techniques can work independently of each other or are dependable on the other. | This question attempt to assess the viability of the forensic audit techniques adopted in the organisation to determine the extent to which they can prevent and detect fraud | All of the respondents covering; Internal Auditor; Management Staff; Senior Executives; and External Audit Partner<br><br>**External Audit Partner**<br>**Internal Auditor** | Aliyu and Hussaini (2024)<br>Olonifinlade (2021) |
| 5 | Has the organization recorded a reduction in the cases of fraud since the adoption of forensic audit and can an analogy be done on the reduction indication with a margin or percentage on this reduction. | The response about the frequency of fraud cases will give an indication about how forensic audit tools and techniques are used to detect and prevent fraudulent activities. A reduction in the rate of cases of fraud is an indication of functional forensic audit techniques in the organisation | All of the respondents covering; Internal Auditor; Management Staff; Senior Executives; and External Audit Partner<br><br>**Senior Executives;**<br>**External Audit Partner;**<br>**Internal Auditor** | Ezejiofor, et al. (2022)<br>Aliyu and Hussaini (2024)<br>Abdulraham (2019) |

| | | | | |
|---|---|---|---|---|
| **Questions that addressed the objective to explore the effectiveness of forensic auditing techniques in preventing and detecting fraud within the Nigerian public sector.** | | | | |
| 6 | What is your perspective about the adequacy and effectiveness of statutory audit and fraud detection measures in the detection of fraudulent activities? | The respondents have opportunity to assess the fraud detection measures put in place to determine whether they are effective were addressed in this question. | All of the respondents covering; Internal Auditor; Management Staff; Senior Executives; and External Audit Partner<br><br>**External Audit Partner** | (Abdul-Baki, 2021; Adebayo et al., 2022).<br><br>Adams et al. (2023) |
| 7 | What is your assessment of forensic audit techniques used in your organization and can a ranking be done in order of their effectiveness? | This question attempt to obtain information about the effectiveness of the forensic audit techniques adopted by the organisation | All of the respondents covering; Internal Auditor; Management Staff; Senior Executives; and External Audit Partner<br><br>**Internal Auditor; Management Staff; Senior Executives** | Aiya and Omorege (2022); Oyerogbe (2021) |
| 8 | How accurate are the findings of fraudulent activities investigations using forensic auditing techniques. | Beyond the existence of forensic audit techniques, the accuracy of the results obtained using these techniques points to their effectiveness. These are the fact that were inquired in this question. | All of the respondents covering; Internal Auditor; Management Staff; Senior Executives; and External Audit Partner<br><br>**Internal Auditor; External Audit Partner** | Oyerogba (2021); Okpe et al. (2022) |

| | | | | |
|---|---|---|---|---|
| 9 | Which of the forensic techniques adopted have been mostly useful in fraud prevention and detection and which technique is mostly adopted? Indicate the most effective. | This question clearly addresses the effectiveness of the fraud preventive measure put in place. The question give room for presentation in order of hierarchy depending on their level of effectiveness. | All of the respondents covering; Internal Auditor; Management Staff; Senior Executives; and External Audit Partner<br><br>**Internal Auditor; Senior Executives; and External Audit Partner** | Alhassan (2020); Aiya and Omorege (2022); |
| **Questions that addressed the objective to examine the organizational and operational factors influencing the effectiveness of forensic auditing practices within the Nigerian public sector.** | | | | |
| 10 | Is there a functional forensic audit unit in the organization and does the organization have existing policies such as an internal control department? | This question attempt to explore the structure of the organization to determine whether there are internal organizational structures in place that can integrate forensic audit. | All of the respondents covering; Internal Auditor; Management Staff; Senior Executives; and External Audit Partner<br><br>**Senior Executives; and External Audit Partner** | Onuora et al. (2018); Burger et al. (2022) |
| 11 | Does the organization have established procedures, rules, and regulations guiding discharge of duties. Additionally, what forensic accounting methodology are adopted in the organization to detect potential fraud? | This question explores into the operational component of the organization to determine whether the operational structure of the organization provide opportunity for fraud prevention and detection | All of the respondents covering; Internal Auditor; Management Staff; Senior Executives; and External Audit Partner<br><br>**Management Staff; Senior Executives.** | (Abdul-Baki, 2021; Adebayo et al., 2022).<br><br>Aondoakaa and Chia (2021) |

| | | | | |
|---|---|---|---|---|
| 12 | What factors do you think impact the effectiveness of fraud detection activities. | This question gives the interviewee the opportunity to enumerate peculiar factors that impede the effectiveness of their fraud detection activities. | All of the respondents covering; Internal Auditor; Management Staff; Senior Executives; and External Audit Partner<br><br>**Internal Auditor; Management Staff; and External Audit Partner** | Aiya and Omorege (2022) |
| 13 | Does the forensic audit techniques have the potential to identify red flags in business transactions and does the technique adopted can identify abnormal transaction. | The question explores the effectiveness of the forensic audit techniques adapted in the organization to determine whether they are can spot abnormal transactions as a preventive measure instead of detection capability. | All of the respondents covering; Internal Auditor; Management Staff; Senior Executives; and External Audit Partner<br><br>**Internal Auditor; External Audit Partner** | Adams et al. (2023) |
| **Questions that addressed the objective to develop a conceptual model for practitioners and policy makers to use to represents how forensic auditing can be used to effectively detect and prevent fraud** | | | | |
| 14 | What recommendations you may offer to other organizations that aim to enhance their fraud detection and prevention ability. | This question enquires into the on-the-job experience of the interviewee that they can share as a form of recommendation on the possible ways to detect and prevent fraud. | All of the respondents covering; Internal Auditor; Management Staff; Senior Executives; and External Audit Partner | |

| | | | | |
|---|---|---|---|---|
| | All questions 1 to 15 form base questions | The aggregate of the responses of the interviewee was used as bases to develop the conceptual framework to will be made available to practitioners and policy makers to use to represents how forensic auditing can be used to effectively detect and prevent fraud | **Internal Auditor; Management Staff; Senior Executives; and External Audit Partner** | |

**Source: Researcher's Compilation (2025)**

## 3.2 Research Philosophy

The research philosophy refers to the system of beliefs and assumptions about the development of knowledge (Saunders et al., 2019). The philosophy adopted in research informs the methodology and methods chosen as part of the research design. This section discusses the research philosophy guiding this study on the effectiveness of forensic audits for fraud prevention and detection in the Nigerian public petroleum sector.

Ontology, epistemology, and axiology constitute the core facets of a research paradigm (Scotland, 2012). Ontology relates to assumptions about the nature of reality and what constitutes acceptable knowledge. Epistemology examines the relationship between the researcher and reality and assumptions about knowledge acquisition. Axiology focuses on the role of researcher biases and values in the research process (Ylonen, 2023). This study adopts a pragmatic paradigm that allows the incorporation of multiple philosophical positions to best achieve the research objectives (Kaushik & Walsh, 2019). Pragmatism advocates practical applied research grounded in real-world practice and focused on problem-solving within social, historical, and political contexts (Goldkuhl, 2012). In this study, pragmatism enables examining forensic audit effectiveness using multiple data sources and perspectives to derive practical implications.

Ontologically, pragmatism rejects traditional dualisms between realism and relativism (Kaushik & Walsh, 2019). Realism holds that a mind-independent reality exists, while relativism posits that realities are subjective social constructions (Scotland, 2012). Pragmatism asserts that elements of both stances may be relevant, allowing researchers to examine objective realities and subjective meanings (Kaushik & Walsh, 2019). This study adopts a critical realist ontological position aligned with pragmatism. Critical realism holds that an objective reality exists but is subjectively interpreted based on social contexts and individual experiences (Fletcher, 2017). Our knowledge of reality is filtered through human perceptions, beliefs, and perspectives. This stance is consistent with the study's aims to explore the socially constructed meanings and interpretations of forensic audit effectiveness among stakeholders, while also identifying the objective impacts on fraud prevention and detection.

Epistemology deals with assumptions about knowledge acquisition and the relationship between the researcher and research subjects (Scotland, 2012). Positivism assumes an objective, value-free dispassionate researcher while interpretivism focuses on subjective meanings and close interaction between the researcher and subjects (Kaushik & Walsh, 2019).

This study takes an interactive epistemological position, where the researcher interacts with the field and subjects while maintaining critical objectivity (Fletcher, 2017). Data is collected from participants' experiences and meanings, while the researcher's interpretations of the data are based on analytical skills and field expertise. This approach is appropriate to gain in-depth insights on sensitive issues like fraud and corruption from organizational actors while objectively critiquing and analysing their viewpoints.

Axiology involves the role of researcher values and biases in shaping the research process (Kaushik & Walsh, 2019). Positivism presumes value-neutrality while constructivism regards values as inherent and should be openly acknowledged (Scotland, 2012). This study embraces an axiological position where the researcher's values and prior knowledge may enable perceptive and critical analysis, while potential biases are managed through reflexivity and transparency in methods and analysis.

The pragmatic paradigm is best suited for this research as it prioritizes problem-centred, real-world practice focused research to derive practical solutions (Goldkuhl, 2012). The emphasis is on integrating different perspectives to thoroughly understand the research problem in its contextual complexity (Kaushik & Walsh, 2019). Pragmatism offers paradigmatic pluralism and methodological eclecticism to gain comprehensive insights on forensic audit effectiveness for fraud control in Nigeria (Scotland, 2012).

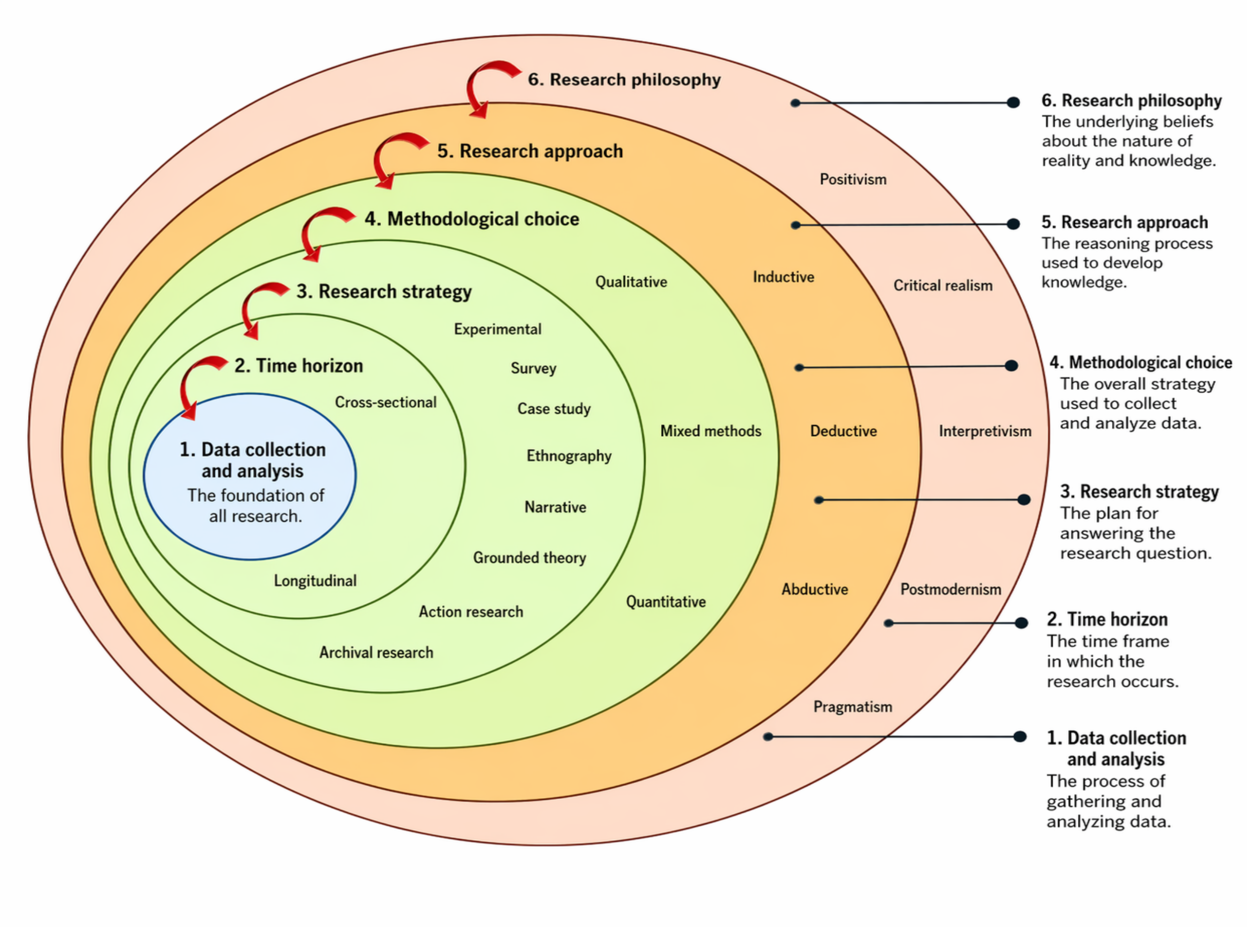
The critical realist ontology adopted enables identifying the objective impacts of forensic audits based on evidence while also examining how organizational actors construct meanings and perceptions of effectiveness based on their experiences, motivations, and values (Fletcher, 2017). The interactive subjective-objective epistemology allows gathering data grounded in human interpretations but subjected to critical analysis by the researcher based on theory and context (Kaushik & Walsh, 2019).

Pragmatism supports drawing from both positivist and interpretivist philosophical concepts to comprehensively address the research problem. This study utilizes established theory on forensic auditing and fraud detection to critically analyse and interpret participant experiences. The axiological emphasis on reflexivity and objectivity also provides credibility (Kaushik & Walsh, 2019). Overall, the pragmatic paradigm provides the optimal scaffolding for this study's objectives. The research approach refers to the logic and process guiding knowledge development, linked to philosophical assumptions (Saunders et al., 2019). Key research approaches include deduction, induction, and abduction.

Deductive research applies existing theory to develop hypotheses to be tested and confirmed empirically through observations (Saunders et al., 2019). It moves from the general to the specific. The researcher uses prior theory to deduce logically testable propositions, collects data to test them, and revises the theory accordingly. Inductive research on one hand develops theory based on observations of empirical data (Gabriel, 2013). Relevant data is collected and analysed to detect patterns and relationships from which theories are generalized. The process flows from specific observations to broad generalizations; while Abductive reasoning combines both deductive and inductive logic to iteratively move between theory and data (Saunders et al., 2019). Existing theories are examined considering novel empirical findings, from which new hypotheses are formed, tested based on further data, and used to modify theory. The researcher moves back and forth between deductions and inductions.

The purpose of an inductive analysis is to: conform raw textual data to a concise, summarised format; establish clear connections between evaluation or research goals and the summarized findings derived from raw data; Develop a framework for the fundamental structure of experiences/processes that are apparent in raw data. The generic inductive approach gives an easy-to-use and systematic framework for qualitative data analysis that produces robust and credible findings. While the generic inductive approach is not as robust as some other analytical strategies for theory/model development, it provides a straightforward, easy-to-understand approach to deriving findings within the context of specific evaluation questions. Most evaluators will find using a generic inductive approach much less complex than using other qualitative data analysis approaches. In answering this, the research methodology known as the research onion can be used to answer and it is illustrated below. This is important has it shows the approaches adopted in carrying out investigations for the research. Saunders et al. (2019) developed methodological processes of research into a form of an onion to show the research process.

*Figure 3: Research Onion*




*Source Saunders, N. K., Lewis, P., and Thornhill, A (2019). Research Methods for Business Students, 8th Edition.*

Saunders et al. (2019) notes that the research onion is divided into 3 major categories, in which the first and the second outer layers indicate the research philosophy and research approach, the third layer which is the research design, which is made up of the research strategy methodological choice and time horizon and the inner most layer states the data collection and analysis. Gaps between observed outcomes and theoretical propositions leads to new interpretations being abducted and evaluated deductively to expand theoretical insights on utilizing forensic audits for public sector fraud mitigation in the Nigerian context.

The abductive logic enables dynamically developing theoretical knowledge of forensic audit effectiveness grounded in practical empirical evidence. The abductive approach is appropriate because there are established theories on forensic auditing and fraud detection, but limited application to Nigerian public sector contexts (Haruna, 2021). Abduction facilitates interpreting the problem through existing theoretical lenses while modifying understanding based on new context-specific empirical insights (Saunders et al., 2019). This pragmatic and flexible approach aligns with the study's objectives.

In conclusion, the study outlines and justifiess the pragmatic paradigm guiding the research philosophy. Critical realist ontology, interactive epistemology and values-aware axiology are adopted in abductive reasoning between theory and data to investigate forensic audit effectiveness for public sector fraud control in Nigeria. These positions acknowledge both objective and subjective facets of knowledge and emphasize practical applied research, focused on the research problem and context. The philosophy provides an optimal framework for achieving the study objectives through integrated perspectives and balanced deductions and inductions. To achieve this, the study intends to use an interpretivist approach to gather the experiences of the participants, as well understand if they have successfully been able to detect and prevent fraud using forensic audit.

The profile of the participants involved drawing on potential interviewees from the Nigerian national petroleum corporation and other public sector organisations due to tightness of schedule and unavailability of seniors in NNPC, auditors in public sector form part of the participants. Other participants are the employees and departmental heads who are working in the accounts, internal control, and audit departments of the public organisation and are directly involved in using forensic auditing tools to detect and prevent fraud in Nigeria public sector. The study collected data using interview. The interview method is adopted in this study to improve on the questionnaire majorly used by existing studies but affirming the reliability of the data. When the interview was conducted, the researcher was be able to effectively assess the extent of knowledge of the interviewee and it is observed that they have a full grasp of the subject matter.

## 3.3 Research Methodology

The research methodology refers to the systematic process and procedures adopted to conduct research and generate knowledge (Saunders et al., 2019). This section discusses and justifies the qualitative methodology chosen to examine the effectiveness of forensic audits for fraud prevention and detection in Nigeria's public petroleum sector. This study adopts a qualitative methodology which is optimal for an in-depth investigation of participant experiences, perspectives, and meanings within a complex contextual phenomenon (Yin, 2016). Qualitative research collects and analyses non-numerical data using flexible methods to discover themes and extract rich, descriptive insights on real-world contextual phenomena (Rutberg &

Bouikidis, 2018). A qualitative approach is appropriate for this study as numerical data or statistics cannot sufficiently capture the nuanced perceptions, interpretations, and beliefs of auditors, managers, and other stakeholders regarding forensic audit processes and outcomes within Nigerian public sector dynamics. Qualitative techniques such as interviews and thematic analysis of textual data are required to obtain detailed accounts and derive explanatory inferences (Alase, 2017).

This study produced several forms of qualitative data, including interview transcripts and literature, making theme analysis especially appropriate for integrating these diverse data sources into a cohesive analytical framework. Furthermore, thematic analysis allows for the dissection of extensive qualitative data into significant categories or themes without the limitations of a formal theoretical framework, hence enhancing flexibility and facilitating the reflection of both common patterns and variances in participants' experiences.

The exploratory nature of the research problem warrants a qualitative approach. There is limited prior research on forensic audit effectiveness specifically within the Nigerian public sector context (Haruna, 2021). Qualitative techniques are optimal for investigating new phenomena and developing cogent explanations for real-world issues where existing theory may be inadequate (Yin, 2018). The emphasis is on learning from participant experiences within their natural settings (Rutberg & Bouikidis, 2018). Additionally, the complexity of fraud and corruption necessitates inductively developing nuanced perspectives based on stakeholder interpretations and meanings, rather than imposing fixed theories or variables deductively (Alase, 2017). Qualitative research embraces varied subjective realities to uncover deeper motivations, beliefs, and contextual factors shaping the phenomenon (Yin, 2018). This empowers generating holistic, valid explanations.

Furthermore, the sensitive nature of fraud and corruption requires building trust and rapport with participants to uncover their candid experiences and observations. Qualitative methods facilitate in-depth, empathetic explorations of participants' inner perceptions, emotions, and reasoning (Rutberg & Bouikidis, 2018). Quantitative surveys and closed-ended questions cannot capture such subjective richness. Finally, pragmatism and abductive reasoning underpinning this study's philosophy endorse qualitative techniques to dynamically develop theoretical insights grounded in practical empirical evidence (Yin, 2018). Qualitative data provides the contextualized, experience-based content needed to expand forensic audit theory.

This study utilizes an exploratory descriptive qualitative research design to develop detailed accounts and interpretations of forensic audit effectiveness based on practitioner experiences within the research context (Yin, 2018). Descriptive designs seek to meticulously document the nature and dimensions of a phenomenon within its real-life environment. The exploratory orientation enables flexibility in data collection and analysis to inductively expand insights where current knowledge is limited, as in this case. Multiple methods of data collection were used to strengthen insights and explanations. Semi-structured interviews are the primary data source, supplemented by document reviews of audit reports and field observations. Thematic analysis will systematically identify key patterns and relationships within textual data to derive explanatory conclusions. This rigorous qualitative design aligns with the research objectives and philosophy.

Alternative Methodologies considered for this study include: an adoption of Quantitative methods using surveys, questionnaires, and statistical analysis were considered but deemed inappropriate. They cannot sufficiently capture the range, complexity and contextual meanings within experiences and behaviours related to forensic auditing and fraud (Alase, 2017). The subjective, relativist facets of the topic require qualitative inquiry and Mixed methods combining qualitative and quantitative techniques could provide complementary strengths. However, the exploratory nature favours initial in-depth qualitative research to reveal contextual nuances and develop propositions (Yin 2018). Therefore, an exclusive qualitative methodology is most suitable at this stage.

The qualitative methodology provides an optimal framework to explore the application and effectiveness of forensic audits for combating fraud in Nigeria's public petroleum sector. It empowers rich, contextual insights based on the perspectives of auditors and stakeholders within their real-world environments.

## 3.4 Research Methods

Research methods refer to the specific procedures and techniques adopted to collect and analyse data relevant to the research questions and objectives (Yin, 2018). This section outlines and justifies the methods chosen to explore the effectiveness of forensic audits for fraud prevention and detection within Nigeria's public petroleum sector. The research is located within Nigeria’s petroleum industry, focusing on the Nigerian National Petroleum Corporation Limited (NNPC Ltd) which is the state-owned national oil company. NNPC manages the country’s oil and gas resources and operational joint ventures with multinational firms. It has been plagued by fraud scandals despite increased adoption of forensic audits (Enofe et al., 2013). Exploring forensic audit outcomes in NNPC will provide contextual insights. The study intends to collect data using interviews. The interview method is adopted in this study to improve on the questionnaire majorly used by existing study but affirming the reliability of the data. When the interviews are conducted, the researcher was able to effectively assess the extent of knowledge of the interviewees and determine whether they have a full grasp of the subject matter. The interview also gives a room for interactions that lead to the revelation of new outcomes that will be useful for forming opinion on the study.

Data Collection for this study involved methodological gathering data through interviews, documentation, and direct observations (Yin, 2018). Using multiple methods improves the depth, breadth, and credibility of qualitative findings. Semi-structured in-depth interviews will be the primary data source. 20 key informants comprising; internal auditors, management staff, senior executives, and external audit partners in NNPC was interviewed to share their experiences and perspectives on forensic auditing within the organization.

Relevant documents including forensic audit reports on NNPC over recent years was reviewed to understand the audits' scope, findings, and outcomes. This supplements interview data with actual evidence from completed audits. Data from financial records and anti-corruption agencies also inform analyses. Attention was given to group dynamics, organizational culture, and operational issues elucidated through observations. The study interviewed 5 internal auditors, 5 management staff, 5 senior executives, and 5 external audit partners. The study specifically focuses on these components of the organisation because of the participatory roles that they play in ensuring the synergy of strategy plan and operational structuring of the organisation. The criteria for selection of the respondents of the study are based on the officers that have direct operational link with the adaptation and implementation of forensic audit technique in the organisation. The rationale behind that selection and serve as justification is because, while, the senior executives play the role of enacting the policies, the management committee perform the implementation, while the internal auditors and the external audit partner are saddled with the responsibility of evaluation and assessment to ensure compliance with the policies. The joint effort of these parties has possibility of providing information that reliably show the status of forensic audit technique in the Nigerian public sector especially as it relates to NNPC specifically.

The interview was conducted using a one-to-one semi-structured interview strategy, so enabling the interviewees to disclose personal information without the fear of third parties knowing what was said, particularly as the focus is to investigate their methodologies to detect fraudulent activity (Ruslin et al., 2022). The interviews was conducted in English, as English is seen as the universal language in Nigeria as there are over 200 other local dialects (Aboh, 2022). The interview data were then transcribed, then interpreted through reviewing constantly the interviewees perspectives through adopting a content analysis approach before the findings are grouped based on emerging thematic themes.  A pilot study was not conducted because the study have purposively carefully selected a group of officers in the organisation that has fundamental expertise in the area of this study. It is expected that they have full knowledge of the concepts of the study since it is within their daily job routine. The quality of response of the interviewee validates this speculation. A pilot study is usually conducted if this researcher is in doubt about the rate of expertise and knowledge that the respondents may have about the concepts of the study or if they have a good grasp of the concept. In the case of this study the assumptions are not applicable because the targeted respondents are at managerial level in the organisation which nullify the assumption of doubt about their level of understanding. The thematic approach is found suitable for this study because it gives room for flexibility by allowing for arrangement of the responses in groups and giving room to perform analytical trend analysis and descriptions of the outcome of the data collected from the respondents. To assist the process, the study used NVivo to thematically code the data (Jackson & Bazeley, 2019).

The textual data from interviews, field notes, and documents were organized and managed using QSR NVivo software. Thematic analysis that was conducted to identify major patterns and relationships between ideas within the dataset (Nowell et al., 2017). Data familiarization, initial coding, theme development, refinement and write-up constitute the iterative analysis process. Analysis followed abductive logic, examining findings against forensic audit theory to deduce explanations which are then refined based on additional data interpretations (Yin, 2018). Case descriptions, conceptual models, and explanatory frameworks will be developed to present insights on forensic audit effectiveness.

The study is limited to one public sector organization, inhibiting broad generalizability. Researcher biases were mitigated but may still influence subjective interpretations. Access and openness challenges are expected given the sensitivity of fraud issues. Time and resource constraints may limit data richness. Interviews, documentation, and observation will facilitate methodological process while rigorous thematic analysis was conducted to derive contextual insights on forensic audit effectiveness. Reliability and validity measures boosts findings’ trustworthiness. Ethical obligations regarding participants will be honoured. Limitations were noted.

## 3.5 Population and Sampling

The population of a study encompasses the total collection of cases relevant to the research problem while the sample constitutes the specific participants from whom data is collected (Asiamah, et al., 2017). Defining an appropriate population and drawing a representative sample are crucial elements of research design. This section discusses the population and sampling approach for this study on forensic audit effectiveness in Nigeria's public petroleum sector.

The broad research population encompasses auditors, managers, executives, and other staff in Nigerian public sector organizations that undergo forensic audits. However, feasibility constraints require narrowing the population focus. This study concentrates on the Nigerian National Petroleum Corporation (NNPC), which is the state-owned national oil company responsible for Nigeria's petroleum resources. NNPC is a strategic public agency that has faced serious corruption allegations and undertaken several forensic audits in recent years (Enofe et al., 2013). Specifically, the target population comprises internal and external auditors, senior management, and executives in NNPC who are involved in or familiar with forensic audit activities within the organization. These groups collectively provide insider perspectives from parties engaged in oversight, decision-making and implementation aspects of forensic audits. Their experiences offered relevant insights on audit processes, outcomes, benefits, and challenges in NNPC's real-life context.

Purposive sampling technique was utilized to select suitable participants from the population who can provide information-rich accounts to address the research questions (Etikan et al., 2016). The positions, experience, availability, and capacity to furnish comprehensive and pertinent information regarding the subject of inquiry constitute the foundation for the number of interviewees who participated. However, during data collection, saturation was reached, which occurred around the 17th interview and three additional interviews were conducted to confirm consistency and ensure robustness of the findings as subsequent interviews mostly reaffirmed already established themes without introducing new information. Therefore, the final sample of 20 participants was considered adequate.

## 3.6 Data Collection

Data collection involves gathering relevant empirical evidence to address the research objectives and questions (Yin, 2018). This section discusses how data were collected to assess the effectiveness of forensic audits for preventing and detecting fraud in Nigeria's public petroleum sector, specifically within the Nigerian National Petroleum Corporation (NNPC). This study employed a methodological process that used semi-structured interviews, and documentation review for comprehensive data gathering (Guion et al., 2011).

The interviews done followed a guide covering key themes while allowing discussions to explore emerging perspectives. Face-to-face interviews were conducted where possible and majorly others were done via telephone with the participant consent, conversations which were audio-recorded and later transcribed. All interviews adhered to a standardised procedure. Each participant was first provided with the study overview before the interview questions were asked one after another. Responses were not timed, allowing participants to express themselves fully based on their roles in the public sector and their individual capabilities. Questions were repeated if the ideas conveyed were unclear or deviated from the central research objective. The duration of each interview ranged from twenty to thirty minutes, which seemed to provide participants with ample time to offer detailed responses. This timeframe appeared to prevent fatigue and ensured that their work commitments were not disrupted. All the recordings were transcribed verbatim and reviewed alongside notes to retain data accuracy and completeness and the interviews was conducted in English.

The interview

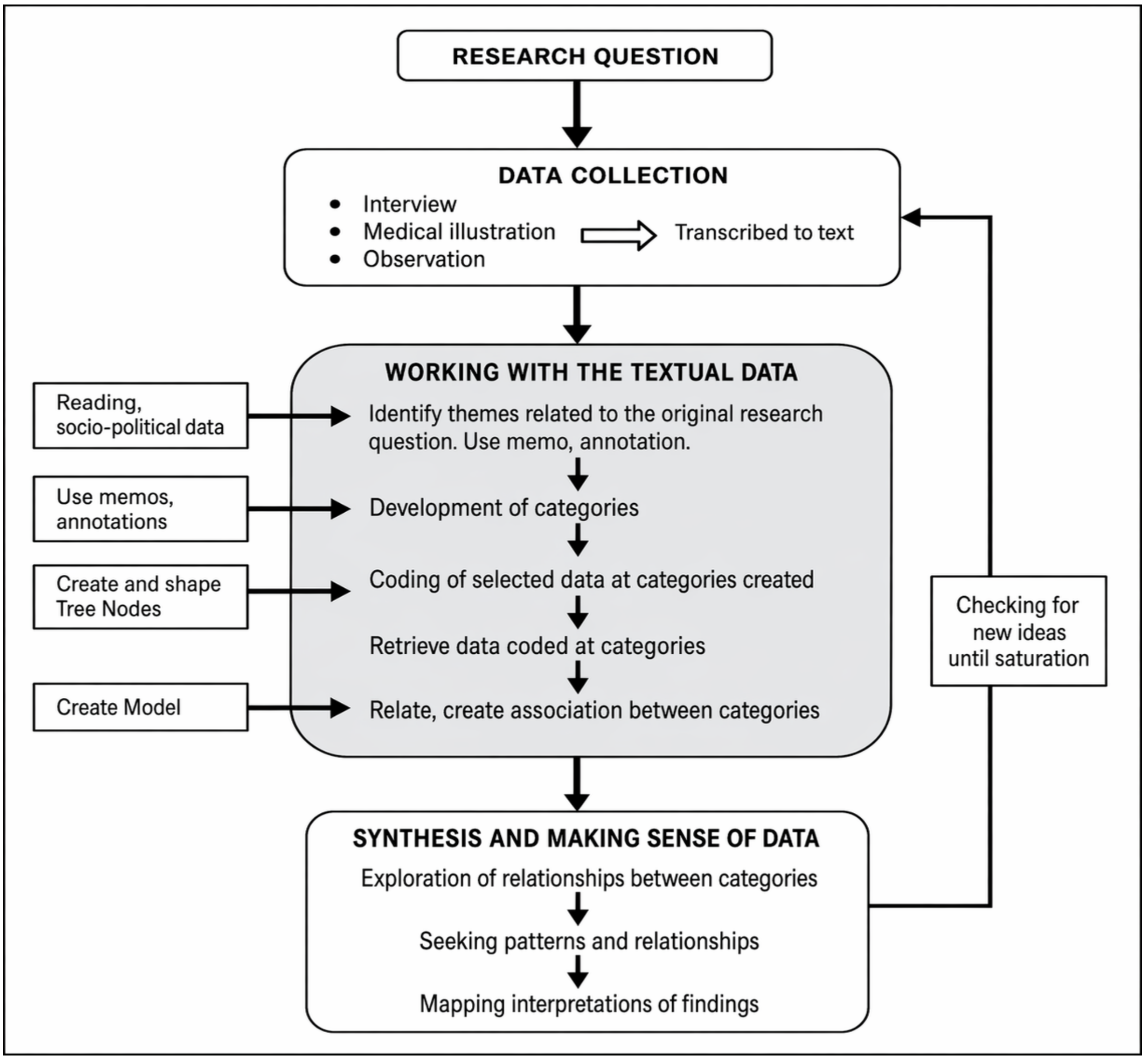
To answer the first specific objective, relevant documents such as published audited financial statements are analysed to garner additional insights on the research objectives, including Forensic audit reports from NNPC within the past 5 years - to assess fraud risks identified, techniques used, recommendations made and management responses., NNPC annual financial statements - to review reported cases of fraud, mismanagement, or ethical breaches, Relevant reports from anti-corruption watchdogs like the Economic and Financial Crimes Commission (EFCC) - to examine alleged or prosecuted cases of corruption in NNPC and role of audits, internal audit manuals, policies and forensic audit engagement records - to assess formal procedures and scope and Academic and practitioner literature on public sector fraud in Nigeria - to contextualize findings. Document reviews uncovered objective evidence to complement and corroborate data from interviews. The document reviewed served as support to the interviews conducted to get a conclusive and definite answers to the questions.

The researcher also employed non-participant observations of relevant meetings and audit activities within NNPC with necessary permissions. Observing interactions and events in context helps discern nuances associated with the phenomenon being investigated (Yin, 2018). For this study, direct observations enable understanding group dynamics, organizational culture issues, operational processes, and audit behaviour patterns relevant to forensic auditing and fraud mitigation efforts within NNPC's real-life setting. Key aspects include communication modes, conflicts, power hierarchies, collaborative or compliant behaviours, procedural irregularities, and ethical transgressions. The data provides additional perspectives to triangulate emerging findings.

Data analysis was conducted concurrently with collection using Miles, Huberman and Saldaña's (2014) interactive model of qualitative data analysis. This iterative process encompasses Data condensation - selecting, organizing, and coding data from transcripts, notes and documents using QSR NVivo software. Coding labels were inductively derived from raw data contents, Data display coded data was systematically arranged in matrices and networks to assess connections between categories and derive explanations and Conclusion drawing and verification - preliminary conclusions were verified by assessing findings across sources, member checking with participants, peer debriefing, and reflexivity to enhance validity before deriving final meta-inferences to address the research objectives.

Thematic analysis was used to identify major patterns and relationships between condensed codes and categories across the dataset. Analysis followed the abductive logic to deduce theoretical explanations that are now refined based on additional empirical evidence (Yin, 2018). Descriptive accounts, conceptual frameworks and models was developed to present the findings. In summary, different method was applied during data collection to garner multi-faceted, credible evidence addressing the research objectives. Systematic and iterative techniques was utilized to rigorously condense and analyse qualitative data. Ethical obligations were fulfilled while limitations are acknowledged. The qualitative data analysis is illustrated below.

*Figure 4: Qualitative data Analysis Flow Chart*




Source: Author's Design

## 3.7 Data Analysis

Data analysis involves systematically examining, categorizing, tabulating, testing, and consolidating evidence to address the research objectives (Yin, 2018). This section outlines the data analysis process that was applied to assess the effectiveness of forensic audits for fraud prevention and detection within Nigeria's public petroleum sector, focusing on the Nigerian National Petroleum Corporation (NNPC). This study utilizes thematic analysis, which is an inductive approach for identifying, analysing, and reporting themes or patterns within qualitative data by organizing it into meaningful categories (Nowell et al., 2017). Thematic analysis moves beyond surface descriptions to interpret and explain social phenomena, aligned with this study's objectives. It is apt for analysing in-depth interview transcripts, documents, field notes and reflective journals which comprise the study's data.

Clarke and Braun (2018) outline a six-phase framework for thematic analysis which guided this study's analysis: Familiarization - The researcher immerses in the data through repeated review of transcripts, notes, and documents to gain intimate familiarity. Initial impressions are recorded. Granular codes are systematically created to label relevant features of the raw data. Codes identify key elements that relate to the research objectives. Inductive, data-driven codes are preferred. Generating themes - Broader semantic themes are developed by grouping similar coded data extracts. Themes represent patterned meanings, behaviours, relationships, and theoretical concepts. Reviewing themes - Themes are refined by checking aligned coded extracts and the overall data set. The thematic map is revised with the use of NVivo. Defining and naming themes - The essence of each theme is specified, and themes are named concisely. Definitions sharpen the focus of analysis. Writing up - Themes are woven into a coherent narrative supported by data extracts. Arguments relate back to research objectives and questions.

This iterative, reflective process enables a rigorous interpretation of qualitative data to derive explanatory conclusions. As outlined earlier, data were collected through interviews and documentation regarding forensic audit processes, fraud risks, effectiveness assessments, and mitigation recommendations at NNPC. QSR NVivo software will be utilized to store, organize, categorised and sources compiled in textual formats such as interview transcripts, audit reports, policy documents and field notes.

Initial coding captured basic topics, while focused coding identified central categories that represent broader concepts (Yin, 2018). A codebook was developed to define codes and categories, annotate inclusion/exclusion criteria, and log code revisions for consistency. Some a priori codes may be provisionally derived from forensic audit theory, while allowing predominantly for data-driven inductive coding (Williams & Moser, 2019). Comparative methods were used to discern conceptual similarities and variations across data fragments during coding with the use of QSR NVivo. Coded data were entered into matrices to assess connections between categories, determine patterns and relationships, and extract explanatory conclusions. Thematic matrices enhance data integration and organization. Potential spatial maps, process flowcharts, causal models and typologies was developed based on coded data configurations to depict logical interlinkages.

Basic codes are collated into broader potential themes that represent theoretical constructs, relationships, behaviours, perceptual patterns, contextual factors, or conclusions relating to the study objectives (Braun & Clarke, 2006). Themes move beyond surface descriptions to provide contextualized interpretations and explanations of the phenomenon under study.

Candidate themes were reviewed for internal coherence between constituent data extracts and external consistency with the full dataset. Data extracts may be reallocated to different themes to strengthen representativeness. The final themes distil cogent patterns in the dataset relevant to assessing forensic audit effectiveness and developing recommendations. Different methodological approach was applied to enhance credibility of findings (Abdalla et al., 2018). Results from the thematic analysis of interviews were compared against insights from documents to corroborate and validate interpretations, and areas of divergence were examined.

Emergent themes and relationships were compared against existing forensic audit literature to note corroboration, contrasts, and conceptual contributions (Williams & Moser, 2019). The abductive analysis approach enables interpreting findings through theoretical frameworks which are refined based on contextual empirical evidence and vice versa. This fosters richer theoretical insights on utilizing forensic audits for mitigating public sector fraud in Nigeria.

Results were presented through detailed descriptive narratives substantiated by data extracts to illustrate thematic interpretations and conclusions relating to the research objectives. Models, frameworks, logic maps, process flows and typologies visually demonstrate significant patterns, relationships, and interactions. Rival explanations was addressed. Policy recommendations were outlined. Implications for theory and practice was discussed.

Several procedures were adopted to strengthen validity and reliability in the data analysis process (Williams & Moser, 2019): Member checking - sharing interpretations with participants to verify accuracy; Audit trail - documenting the data analysis procedures comprehensively; corroborating findings across data sources; Peer scrutiny - reviewing data coding and themes with other researchers; Negative case analysis - revising hypotheses based on disconfirming cases; Reflexivity - critical self-reflection regarding researcher biases These strategies enhanced analytical rigor and trustworthiness of findings.

Researcher subjectivity may influence qualitative analytical interpretations despite safeguards (Williams & Moser, 2019). Sample size from one organization restricts generalizability of findings. Self-reported data has inherent biases. Insufficient approach may limit perspectives. Confirmation bias may arise where evidence contradicting expectations or hypotheses is overlooked. Participants may withhold sensitive information despite rapport building. Identifying causality is challenging. Logistical constraints may apply.

Systematic inductive thematic analysis was utilized to code raw data into explanatory themes and glean meaningful findings grounded in empirical evidence. Different approach in addition to case review and member checking boosts validity. Results was cogently presented with implications discussed. Analytical limitations are acknowledged. Overall, a rigorous data analysis process informed insightful conclusions on the effectiveness of forensic audits for fraud prevention and detection in Nigeria's public petroleum sector.

## 3.8 Validity and Reliability

Validity and reliability are key criteria for evaluating the quality and rigor of research (Cypress, 2017). Validity refers to the accuracy and truthfulness of findings, while reliability relates to the consistency and reproducibility of results (Mohajan, 2017). This section discusses the strategies that was adopted to strengthen validity and reliability in this study exploring the effectiveness of forensic audits for fraud prevention and detection in Nigeria's public petroleum sector. Validity signifies the extent to which research findings authentically represent the phenomenon under study as opposed to measurement errors or biases (Leung, 2015). Strategies to enhance validity include:

Credibility, this establishes that findings are accurate and believable from the perspective of participants and readers (Polit & Beck, 2021). This was improved through Member checking - sharing data interpretations with participants to verify plausibility, Multivocality - capturing diverse viewpoints of participants, corroborating evidence across interviews, documents and observations, Peer scrutiny - reviewing findings with other researchers, Negative case analysis - revising hypotheses based on contradictory evidencee, Reflexivity - critically self-examining bias and Thick description - providing a detailed account of the phenomenon in context.

Transferability, this refers to the potential for qualitative findings to be relevant or applied to other settings or groups (Moon, 2021). The researcher enabled transferability judgment by readers via: Purposeful sampling - selecting information-rich cases and Dense contextual description - comprehensively describing the research process, setting, participants, transactions, and interrelationships. Dependability, this involves consistency and transparency in the research processes and methods applied (Moon, 2021). Strategies to improve dependability include Audit trail - maintaining extensive documentation covering research activities, decisions, and analysis., Code-recode procedure - comparing results across two cycles of data coding and thematic analysis, Stepwise replication - enabling future researchers to replicate the study procedures and Inquiry audit - getting an external auditor to examine research processes.

Confirmability, this encompasses objectivity and ensuring interpretations are substantiated by the data rather than researcher bias (Korstjens & Moser, 2018). Confirmability was promoted through: Audit trail - documenting each analytical step, Reflexivity - critically examining personal assumptions and predispositions - reducing researcher bias by gathering data from diverse sources. Reliability denotes the consistency and reproducibility of research procedures and findings over time, researchers, contexts, and analysis methods (Leung, 2015). Reliability techniques include Case study protocol - outlining data collection and analysis procedures, Database creation - organizing and documenting data in a retrievable form and Audit trail - detailed documentation enabling audit of research process and conclusions.

Several strategies were used to strengthen the reliability and validity of findings (Cypress, 2017). Credibility was established through different approaches to data collection across participant groups, prolonged engagement with the field for richer data, peer scrutiny of data analysis, and member-checking with participants. Transferability was improved by providing thick descriptions of the context and phenomenon. Dependability was promoted by creating an audit trail documenting the research process. Confirmability is reinforced through reflexivity on researcher biases and transparency in methods and analysis. Voluntary informed consent will be obtained from all participants. Confidentiality is ensured through anonymization and restricted access to research data. Participants can withdraw from the study at any time. Local research approvals and permits will be secured. Data collection and handling complied with Nigeria’s research ethics regulations. Confidentiality was ensured through anonymity, data encryption and restricted access. Participants can withdraw from the research at any point. Local approvals from NNPC and Nigerian research authorities is secured prior to fieldwork. Data collection and handling complied with Nigeria's research ethics regulations.

In all, numerous strategies were employed to strengthen credibility, transferability, dependability, and confirmability of findings. The audit trail and reflexivity boosts validity and reliability. However, inherent qualitative research limitations persist (see section 3.10). These mitigated as far as possible and transparently acknowledged. Overall, the measures adopted maximized the trustworthiness and rigor of the study's findings on forensic audit effectiveness for fraud prevention and detection.

## 3.9 Ethical Considerations

Conducting valid, rigorous research involves ethical obligations that span the entire process from conception to completion. Ethics pertain to moral principles, values and beliefs that drive behaviour and decision-making (Orb, Eisenhauer & Wynaden, 2000). For research, core ethical aspects centre on promoting integrity, minimizing harm, and safeguarding the rights of participants and others impacted by the process. This section provides an in-depth discussion of key ethical issues and responsibilities that must be addressed at each stage when undertaking research exploring the effectiveness of forensic audits for fraud prevention and detection in Nigeria's public petroleum sector. Relevant regulations, guidelines and best practices are highlighted.

The research planning phase is foundational for embedding ethics from the outset. Key considerations include Formal ethical review - Research proposals for studies involving humans require review and approval by a research ethics committee before commencing (NHREC, 2007). This ensures independent, expert evaluation from an ethics standpoint. Approval was sought from the National Health Research Ethics Committee of Nigeria (NHREC) which oversees all disciplines. Participant risk assessment - The researcher is obligated to proactively identify reasonably foreseeable risks that may arise for participants from the study methodology and topic (Denison & Stillman, 2012). This enables developing appropriate risk mitigation and informed consent procedures. Potential risks here include organizational unease with fraud discussions, confidentiality breaches, power pressures, and distress recalling adverse experiences. Vulnerable group protocols - Extra protections may be needed for vulnerable participant groups like minors, prisoners, pregnant women, and mentally disabled persons (Fisher, 2009). This study avoids recruiting such groups directly. However, relevant protocols were followed if they are incidentally encountered during organizational observations.

Confidentiality and data security provisions - Data privacy, access control and storage measures must be planned upfront as part of the research design (Allen, 2020). This study utilized pseudonymization, encryption, multi-factor authentication and physical security to protect participant data. Transparency about funding and conflicts of interest - Any funding sources, commercial interests or organizational affiliations that may influence the research must be declared openly so participants can assess risks objectively (Resnik, 2015). This study has no major external funding or conflicts of interest to report.

Meticulous preparations are necessary prior to fieldwork to ensure adherence to ethics. Key aspects include:

Institutional permissions – The researcher must obtain formal letters of approval for data access and fieldwork from sites where the study occurred that is, the NNPC in this case (Israel, 2020). This legitimizes the researcher's presence and activities.

Comprehensive informed consent procedures - Participants must receive relevant details about the research purpose, potential risks and benefits, confidentiality measures, and withdrawal rights in an understandable manner before consenting (Ulrich et al., 2010). Consent must be voluntary without coercion. Signed forms evidencing consent was secured.

Assurances of anonymity and confidentiality - Participants was assured their identities and disclosures remained completely anonymous in public outputs from the study (Kaiser, 2009). Pseudonyms, data encryption and restricted access to records provide credible confidentiality protections.

Avoidance of deception - No elements of deception was used in participant engagement or data collection. The study's purpose, methods, data usage and dissemination plans was accurately disclosed (Allmark et al., 2009). This upholds an ethic of honesty.

Ongoing vigilance is imperative during data gathering to prevent ethical infringements. Principles to uphold are Avoidance of harm - Discussion topics that may distress participants emotionally or psychologically must be managed carefully (Fontes, 2018). Questions steered clear of traumatic experiences. Participants can skip sensitive questions or withdraw anytime. Check-ins assessed if extended counselling assistance is needed. Respect for privacy – Public or intrusive questioning that disregards reasonable expectations of privacy is unethical (Bullock, 2019). Here, interviews occurred in settings chosen by participants and not infringe on matters they consider private unless voluntarily disclosed. Confidentiality of disclosures – Participant responses must remain confidential where promised, even if information revealed may be incriminating or require mandatory reporting if known outside research privileges (Sieber & Tolich, 2013). Anonymity and secure data handling uphold confidentiality.

Fidelity to protocols – Any deviation from approved data collection protocols requires ethical committee approval to maintain oversight (Fisher & Anushko, 2008). The researcher adhered strictly to the reviewed fieldwork methodology without unauthorized changes. Avoidance of bias – While perfect neutrality is impossible, the researcher must minimize leading questions, selective recording and other biases that could shape participant responses or behaviours to match researcher expectations (Smith & Noble, 2014). Analytical ethics revolve around upholding integrity and objectivity. Relevant principles encompass: Accurate representation – Data presented as evidence for findings, arguments or conclusions must not misconstrue the meaning of actual participant statements or observed behaviours (Ferguson, Yonge & Myrick, 2005). Partial quotes or observations that distort the truth breach fundamental research ethics.

Fairness across perspectives – Analyses must represent participant viewpoints, experiences and observed phenomena accurately without cherry-picking data selectively to favour certain narratives over others (Eisner, 2017). Researchers must check personal biases that inhibit fair representation. Avoiding errors – Factual accuracy, algebraic precision, statistical correctness, and logical rigor are critical in analysis to avoid erroneous conclusions that can affect lives once publicized (Resnik, 2015). This demands meticulousness and transparency facilitating review of computations. Transparent limitations – Honesty requires openly acknowledging analytical limitations like small samples, instrumental errors, questionable assumptions, or ambiguity in interpretations that complicate result validity and reliability (Allen, 2018).

Confidentiality in presentation – Anonymity extends to avoiding details during results dissemination that may inadvertently reveal identities based on unique characteristics or contexts, even if pseudonyms are used (Kaiser, 2009). Broad descriptions promote confidentiality. Public reporting and sharing necessitate continuing ethics observance through: Respectful engagement with participants – Plain language and considerate interactions must be used to communicate findings accurately and sensitively back to participants (Fassinger & Morrow, 2013). They should have opportunities to review results and provide feedback. Consent for publication – Participants must explicitly permit use of any direct quotes or attributed information from them that appear in research publications, presentations, or teaching materials (Namey & Lantz, 2021). This respects authorship rights.

Adherence to institutional ethical pre-publication review policies - Beyond personal ethical checks, researchers must comply with institutional requirements like IRB assessment of results to clear ethically sensitive content before external dissemination, as applicable (Antes et al., 2018). Truthful representation - Public descriptions of the research methodology, context, data, findings, and implications must not intentionally or inadvertently misconstrue facts or mislead audiences (Resnik, 2015). Calls for research integrity preclude fabrication, falsification, and plagiarism. Balancing confidentiality with transparency norms - Reporting sufficient contextual details for reader comprehension often conflicts with protecting participant anonymity (Kaiser, 2009). Researchers must strike an appropriate balance depending on risks involved.

Anonymity and confidentiality of participants were protected. Local data privacy regulations will be adhered to. Analysis and reporting were free from misrepresentations, omissions, or falsifications. The study will follow the ethical guidelines set out by the University of Gloucestershire, together with the Data Protection requirements of the GDPR (University of Gloucestershire, 2022). All participants were over the age of 18. Participation will be voluntary, and permission will be obtained from the individuals prior to the interview commencing and they have the right to withdraw at any stage during the study (Wiles, 2012). The data will be stored safely, used for research purposes only, with the data anonymized; therefore, the names and identities of the participants was kept confidential. All participants were asked to provide informed consent. With the focus group, the study will ensure that all the participants can speak, that their perspectives are respected and there were no repercussions for any individual who is involved in this research activity (Bell, Bryman, & Harley, 2022). Participants were reviewed and consent to results dissemination.

In summary, ethical research conduct must be ensured holistically across planning, preparation, fieldwork, analysis, and dissemination stages. From risk management and informed consent to confidentiality and analytical objectivity, upholding key ethical principles consistently through the process safeguards participant rights and welfare while fostering research integrity.

## 3.10 Limitations of the Study

No research is free from limitations, defined as restrictions, shortcomings or conditions that may weaken the credibility and applicability of findings (Theofanidis & Fountouki, 2018). Acknowledging and describing limitations transparently is an ethical obligation that demonstrates scholarly rigor and maturity (Leung, 2015). This section provides an in-depth critical discussion of key limitations anticipated in this study on the effectiveness of forensic audits for fraud prevention and detection within Nigeria's public petroleum sector.

The study's sample is restricted to employees from a single public sector organization, the Nigerian National Petroleum Corporation (NNPC). While purposeful sampling focuses on information-rich cases, findings from one organizational setting have restricted transferability and generalizability compared to larger and more diverse samples (Polit & Beck, 2021). Each organization has unique cultures, processes, and fraud risk profiles. Larger multi-site studies generate more externally valid conclusions. However, feasibility constraints limit sample size and variety, especially for qualitative research which prioritizes depth over breadth.

Additionally, the exclusion of external stakeholders like government oversight agencies, audit clients and anti-corruption groups inhibits triangulating organizational employee perspectives. Their insights could strengthen the needs assessment, highlight additional contextual factors, and bolster recommendations. Furthermore, the modest qualitative sample (around 20 participants) also restricts gender, ethnic and socioeconomic diversity which may shape perceptions. Participant opinions cannot be presumed representative of all internal and external groups impacted by NNPC's forensic auditing policies.

Participants may consciously or subconsciously misreport experiences, conceal unfavourable information, or exaggerate successes. Social desirability and recall biases are common in self-reported data (Latkin et al., 2017). Triangulating interviews with documentation help verify claims, but inconsistencies may still arise. People's limited awareness and inaccurate memories regarding forensic audit processes undertaken, fraud uncovered, and actions taken also reduce reliability of historical accounts. Access limitations may arise given the sensitive nature of fraud inquiries. Researcher subjectivity and biases may influence data interpretations despite mitigation efforts. The sample is limited to one organization, inhibiting broad generalizability. Self-reported data from interviews relies on participant honesty and accuracy of recollections. Time, cost, and data accessibility constraints may also apply.

The researcher's closeness to the data during fieldwork followed by interpretive latitude in analysis opens risks of selective perceptions and confirmation bias where findings converge towards existing expectations or predetermined conclusions (Berger, 2015). While methodological rigor, audit trails and critical self-reflection countered researcher biases, they cannot be fully eliminated when dealing with qualitative data. Unconscious perspectives and cognitive inclinations inherently shape human analytical judgments. Complete objectivity remains an aspirational ideal rather than practical reality in social research.

Relatedly, deliberately seeking contrasting interpretations and negative cases to refine conclusions is resource-intensive, so may remain superficial (Modell, 2015). While interview data was assessed against available documents and observations, deeper investigation of discrepant perceptions was restricted. The limited sample also constricts identifying deviant cases. This creates potential validity threats where outlier perspectives are overlooked, resulting in overly homogeneous findings. However, participant anonymity prevented expansive probing of sensitive contrarian viewpoints that could improve theoretical understanding.

Promises of confidentiality and anonymity can build rapport and participation but ethically prevent probing deceptions, omissions, or evasions by individual respondents (Lahman, 2018). Fabrications cannot be directly challenged when identities are protected. The small, specialized sample also increases risks of deductive disclosure where readers familiar with the setting may recognize participants from contextual descriptions despite pseudonymization (Kaiser, 2009). However, extensive anonymization could undermine data richness. Managing these confidentiality tensions appropriately remains challenging.

Qualitative research has inherent validity, and reliability concerns due to subjectivity, researcher biases, lack of standardized methods and focus on contextual meaning (Moon, 2021). Further limitations in this study include:

Self-reported data may be intentionally or unintentionally misreported by participants. Researcher positionality and reflexivity may remain imperfect despite efforts. Data sourced differently have their own biases e.g. documents reflect organizational priorities. Resource constraints may inhibit extensive member checks, inquiry audits and data comparisons; and Context-specific findings from one public sector organization have limited transferability.

The Nigerian cultural environment and institutional dynamics differ considerably from Western contexts where forensic auditing theories originated. Native values, behaviours, motivations, and organizational norms may not wholly align with academic assumptions and models guiding analysis. Adapting and contextualizing findings is complicated by the external researcher positionality. Study implications and recommendations stemming from foreign knowledge systems and models are thus potentially limited in transferability for the Nigerian context unless effectively localized.

Bureaucratic delays and restricted access to audit reports beyond summarized published versions could inhibit stronger verification. The limited period for fieldwork could also prevent immersive organisational observation. Time and resource limitations could hinder extensive member checking of interpretations with participants as well. Such constraints could underline the practical challenges of upholding ideal validity, reliability, and transparency standards in real-world research.

In summary, limitations stem from the exploratory qualitative approach prioritizing subjective insider perspectives within a single public sector organization. Concerns around self-reporting biases, researcher proximity, confidentiality, cross-cultural differences, data access barriers and time constraints also persist. While mitigated through methodological rigor where possible, these inherent conditions indicate judicious interpretation and localisation of findings is necessary when evaluating the transferable implications.

## 3.11 Summary of the Chapter

This chapter has detailed the research methodology adopted for this study exploring the effectiveness of forensic audits for preventing and detecting fraud within Nigeria's public petroleum sector, focused on the Nigerian National Petroleum Corporation (NNPC). The choices made regarding philosophical assumptions, approach, methods, and ethical considerations that guided the research process have been critically discussed and justified in relation to the study context and aims.

A pragmatic paradigm incorporating critical realist ontology, interactive subjectivist-objectivist epistemology and values-aware axiology was adopted. This philosophical framework recognizes that knowledge encompasses both objective and subjective dimensions. The abductive logic of inquiry enables iteratively moving between existing theories and new empirical evidence to expand insights on utilizing forensic audits for public sector anti-corruption efforts in Nigeria.

A qualitative methodology was chosen as optimal for an in-depth investigation of participant experiences, perspectives and socially constructed meanings within the complex, relatively underexplored phenomenon of interest. Open-ended semi-structured interviews are the primary method to collect rich, contextualized data from auditors, managers, and executives in NNPC regarding forensic audit processes and outcomes. Document analysis and non-participant observations served different method approach.

20 participants were purposively sampled based on established criteria to recruit information-rich key informants with requisite experiences and expertise from NNPC's internal audit department, management, and leadership. Snowball sampling leveraging professional networks aided recruitment. Thematic analysis techniques were applied to identify patterns and

explanatory relationships within collected data. Several strategies have been proposed to strengthen validity and reliability of findings including member checks and reflexivity.

Numerous ethical obligations spanning informed consent, fair representation, respectful engagement, and assurances of confidentiality and anonymity was fulfilled to protect participant rights and welfare at all research stages, guided by applicable Nigerian regulations. Anticipated limitations include the study's exploratory qualitative nature, biases inherent in self-reported data, researcher subjectivity, confidentiality-richness trade-offs, cross-cultural differences, and data access barriers. In summary, the chosen philosophical foundations and methodological approaches aim to provide a rigorous framework suited for an exploratory investigation of real-world forensic auditing issues grounded in the empirical experiences and meanings of organizational actors within Nigeria's public sector petroleum context. The methodology aligns with calls for greater contextualization in forensic auditing research highlighted in the literature review.

The flexibility enabled garnered multi-faceted insights on contemporary fraud risks, audit practices, challenges, and outcomes through stakeholder narratives. This can expand theoretical understanding of how forensic audits may be applied and optimized as an anti-corruption tool tailored for the Nigerian public sector environment. The richness of qualitative findings can better inform practitioner decision-making and policy reforms around forensic audits to combat the persistent governance malaise of corruption.

# CHAPTER FOUR: DATA ANALYSIS AND FINDINGS

## 4.0 Introduction

The chapter provides a thorough explanation of the themes and patterns found in the data analysis. The interview data gathered throughout the research process served as the basis for the study's qualitative data analysis. With the aid of NVivo software, a thematic analysis that embedded comprehensive themes which are relatable to the study objectives was carried out in this chapter, enabling the researcher to provide insights into the connections among the many components that have been examined. The several themes and subthemes that have emerged because of the NVivo analysis are traversed in this chapter. These themes then enable us to respond to the research questions and achieve the research aim that was established at the outset of the investigation.

The qualitative data analysis entails the utilization of thematic analysis to explore the reasons for the forensic audit in Nigeria public sector and the factors that impact effectiveness of fraud detection and prevention, the effectiveness of forensic auditing techniques in fraud prevention and detection. The thematic analysis including the codes, sub-themes and themes which have been arrived at based on which the research question of the study could be addressed (See Table in Appendix). The qualitative data analysis offers a comprehensive knowledge on the given subject matter surrounding the topic area and detailed through the research question.

The chapter herein integrates the literatures and relevant documents to achieve the study specific objective 1 and study objective 2. Also, interview data and interpretation of it on qualitative dimensions. The study helps in exploring the research question and offers knowledge on the surrounding topic area based on which the researcher could arrive at the analysis, interpretations and the implications of research which were dealt in the coming chapters.

The chapter is structured as follows:

Data Analysis Process – it provided the step by step taken in analysing the data using thematic analysis and provides a pictorial representation of the process involved in the data analysis. Demographic presentation - this section provides the background information of the participant in the study interviewee.

Reasons for Forensic Auditing in Nigeria Public Sector - This section outlines the underline issues that birth forensic audit in the public-sector especially in NNPC. How forensic audit tools and techniques can be used to detect and prevent fraudulent activity in Nigeria public sector – the theme exposes the perceived means by which forensic audit is more effective in detecting and preventing fraud specifically in NNPC that is the case study as implied in literatures. Role of auditors in the public sector on fraud prevention and detection – this describes the interviewee's role in the public establishment where they work.

Determining the factors that impact the effectiveness of fraud detection activities in the Nigeria public sector – It itemise factors that already exist in the structure of public sector which aid fraud detection in the sector. Effectiveness of Forensic Auditing Techniques in Identifying Fraudulent Activity in the Nigerian Public Sector- the theme discussed while forensic audit is considered more effective in detecting and preventing fraud.

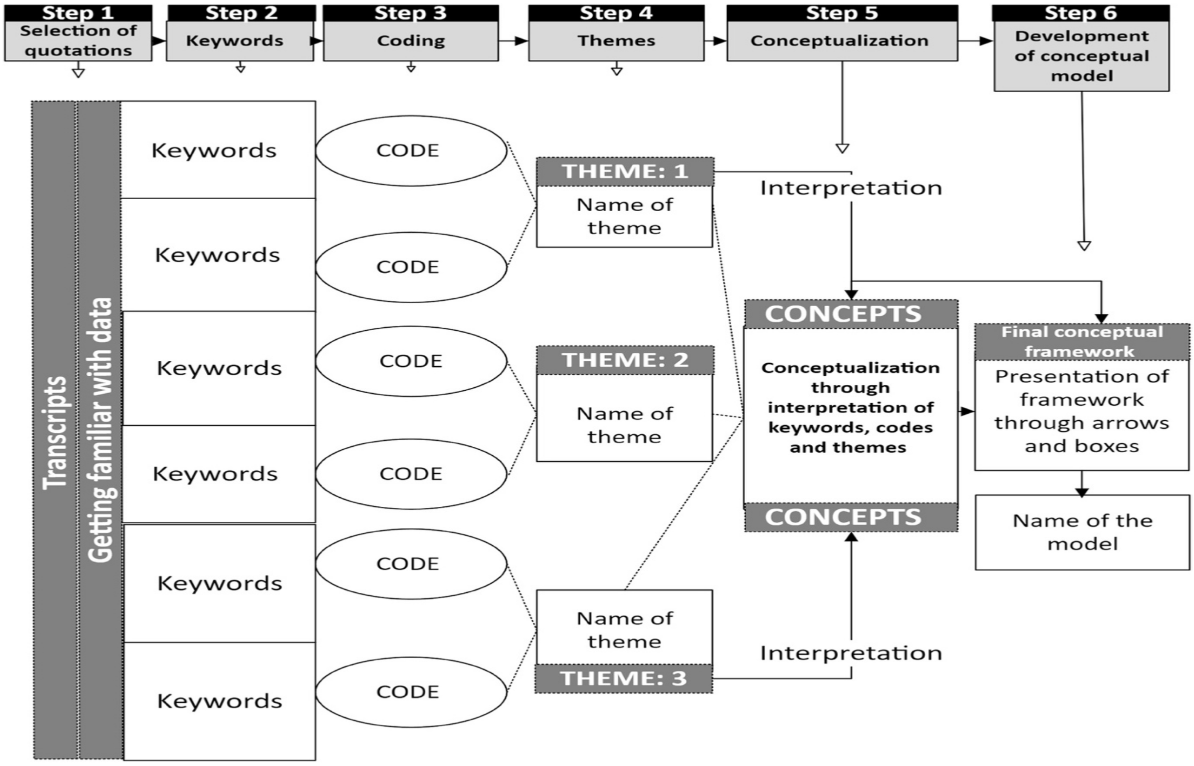
## 4.1 Data Analysis Process

The thematic analysis as discussed has been conducted in the study for which NVivo software version 15.0 was used. NVivo software is highly recommended software to analyse qualitative data because it helps in conducting the thematic analysis in a way that it enhances the objectivity and reduce the researcher bias associated with the thematic analysis (Limna, 2023). The data for the study was collected through audio interviews. The audio recordings were transcribed to text with the help of the application known as "transcribe me software" and once the transcripts were ready, they were proofread to ensure their correctness. The transcribe texts were then uploaded into NVivo 15 interface.

Magnusson & Marecek (2015) discussed that the qualitative analysis involved data organizing which is very difficult when conducted manually. However, adoption of the software has helped in organizing the data effectively and arriving at the themes and the codes. Each interview notes were firstly familiarized and then coded to organize them under specific themes developed. Under the themes all the codes which suggest similar meanings are initially grouped. The themes were then explored to produce graphical presentation of results and tables to make meaning of the data, and they were interpreted accordingly in the report.

Figure 5:

A systematic thematic analysis process; a novel six process for conception model development in qualitative research




*.Source: Researcher's Design*

In this study, the pre-determined interview questions in alignment with the aim of the study were used to identify the initial codes which are the themes and later based on the data the sub-themes have been developed under each theme by the researcher with the aid of the software. The various themes and subthemes which have been developed for the given study could be observed in the table under each study objectives as the chapter are arranged based on the order of the specific objectives

## 4.2 Demographic Presentation

20 public servants which their jobs rotate around auditing and accounting participated were interviewed as it was expected that they have the expertise and knowledge about the subject matter being discussed. Other publications of government authorities regarding forensic audit, especially those related to the case study Nigerian National Petroleum Corporation (NNPC), were also considered to reinforce and validate the opinion of the interviewees. The job roles and experience of the participants in addition to their familiarity with forensic auditing have been elaborated in detail in the table below.

The context of familiarity with forensic auditing techniques is based on working environment where there is established forensic audit unit or presence of forensic auditor in the organization. The extent of familiarity with forensic auditing techniques is confirmed by 9 interviewees which represent 45 percent of the total participants. The implication is that the adoption of forensic auditing in the public sector is still very low, and usage of its techniques as not really gained wide range. This aligns with the observation from literature which shows scanty discussion of forensic auditing in the Nigeria public sector with a minute of the literatures focusing on Nigerian National Petroleum Corporation (NNPC) an important organization owned by government.

*Figure 6: Participant Extent of Familiarity with Forensic Auditing*

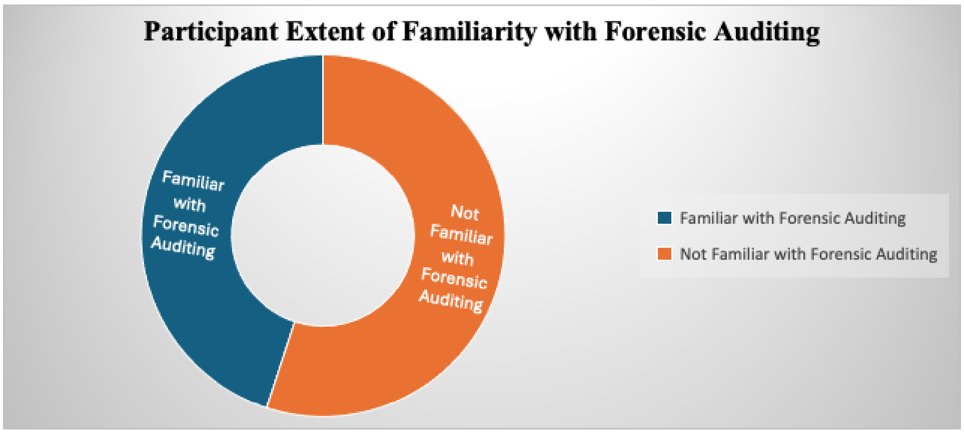



Table 2:

*Participants Related Information*

| Participants | Job Role | Familiarity with Forensic Auditing Techniques |
|---|---|---|
| Participant 1 | Tax Manager | Yes |
| Participant 2 | Forensic Auditor | Yes |
| Participant 3 | Auditor | Yes |
| Participant 4 | Auditor | No |
| Participant 5 | Auditor | No |
| Participant 6 | Accountant | No |
| Participant 7 | Accountant | Yes |
| Participant 8 | Auditor | No |
| Participant 9 | AIG | No |
| Participant 10 | Forensic Accountant | No |

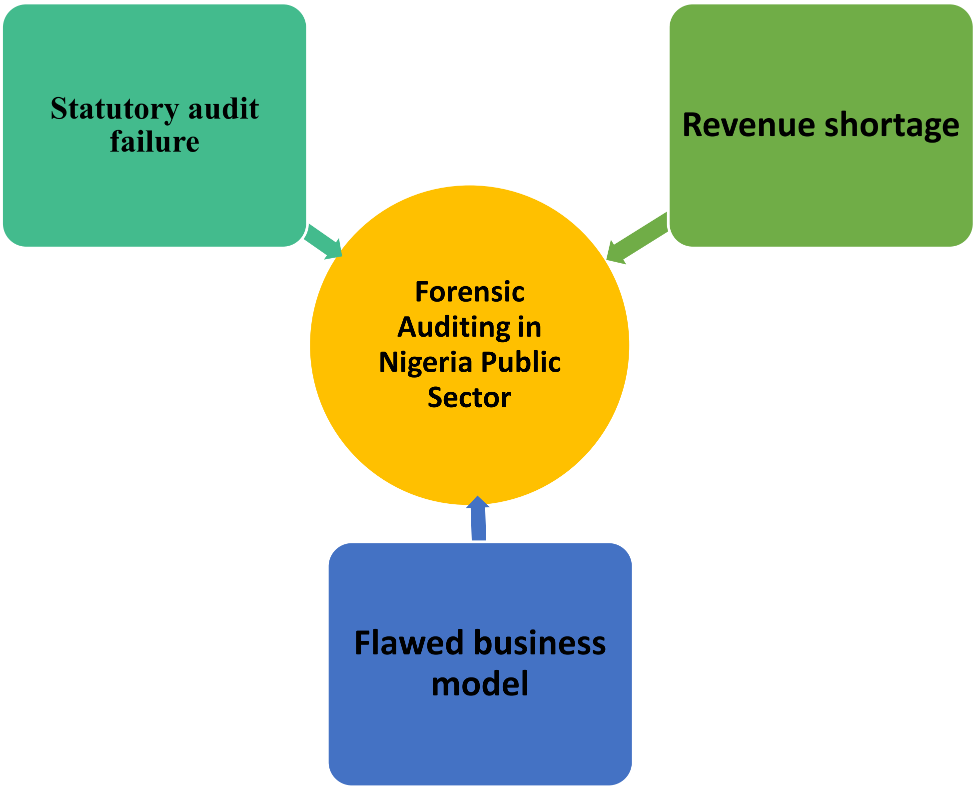
| | | |
|---|---|---|
| Participant 11 | Accountant | No |
| Participant 12 | Auditor | No |
| Participant 13 | Auditor | No |
| Participant 14 | Auditor | Yes |
| Participant 15 | Internal Auditor | Yes |
| Participant 16 | AIG | No |
| Participant 17 | Auditor | Yes |
| Participant 18 | Auditor | Yes |
| Participant 19 | Forensic Auditor | Yes |
| Participant 20 | Forensic Auditor | Yes |

*Source: Developed by Researcher (2025)*

## 4.3 Reasons for Forensic Auditing in Nigeria Public Sector: Case Study of NNPC

This section discussed the themes that was well established in literature that has to do with the reasons for forensic auditing in the public sector. Reasons for forensic auditing in Nigeria public sector and specifically the NNPC is needed to provide a background to how the tools and techniques of forensic accounting can solve the menace of fraud in Nigeria public sector. The study findings indicates that failure to identify when there is dire need for auditing made the fraudulent activities to degenerate that only forensic auditing can come to the rescue. Some of the subthemes which emerged from the literature that is profound in this context is revenue shortage, statutory audit failure and flawed business model.

*Figure 7: Diagrammatic Representation of the Reasons for Forensic Auditing*




Source: Author's Compilation

The codebook for three subthemes is discussed in the table below. The subthemes are from the theme of that explains the details on the reasons for forensic auditing. The code examples column gives instances in the literature that depicts the sub-theme under discussion.

*Table 3: Codebook for Reasons for Forensic Auditing in Nigeria Public Sector*

| Theme | Subtheme | Code examples | Codes |
|---|---|---|---|
| | Revenue Shortage | • *we call on all citizens, civil society organizations and the media to ensure that the report of this audit does not go the way of previous ones in line with the impunity and* | The expectation gap in revenue account due to shortfall in NNPC remittances |

| | | | |
|---|---|---|---|
| Reasons for Forensic Auditing | | ***waste of public resources*** *that has characterized this administration*<br>• *Remittance shortfalls from NNPC into the Federation Account* | |
| | Flawed Business Model | • *Weak and Inefficient Accounting System*<br>• *NNPC business model is flawed* | Government failure to establish proper channels for NNPC to deliver effectively on the mandate given. |
| | Statutory Audit Failure | • *Another reason for the growing forensic audits is more intensive than regular audits and thus stands a better chance of success* | Deviation of auditors from the applicable professional standards that gives room for erroneous audit report. |

Source: Author's Compilation (2024)

### 4.3.1. Revenue Shortage

Findings from reviewed literatures affirmed that shortage in revenue overtime is one of the signs that indicates the need for forensic auditing of an organization but been overlooked in the public sector because the organizations are not profit oriented. However, in the case of the NNPC, it has a mandate of what it should deliver to the covers of the government since it manages the major source of revenue of the government of the country (Oil Revenue). The inadequacy of the agency to help grow the economy as required exposes more of the economic and financial crimes in NNPC. According to Ossisioma (2021), *"potentials of forensic audit was realized if it is effectively deployed in the Public sector of the Nigerian economy where economic and financial crimes, in addition to political corruption, have constrained economic growth and development".* The aftermath of the revenue shortage has made the economic growth stunted and impedes development. Hence, serves a major reason while civil societies including stakeholders to be clamouring for forensic auditing of the organization.

Likewise, reviewing the forensic audit report of NNPC, Chukwunedu (2018) found out that there is shortage in reported revenue as the study explained that; "*Highlights of the report included the fact that between 2007 and 2009, over-deducted funds in subsidy claims was ₦28.5billion Naira. This sum had not been accounted for ever since. There were over-deductions from its remittance to the Federation Account for 2010 and 2011 which was believed to run into billions of Naira. However, the 2010 and 2011 over- deductions were not captured in the report. The Corporation's system of providing for subsidy claims was flawed in that it was based on a random guess which often resulted in over-deductions from proceeds of domestic crude sales"*. Chukwunedu (2018) is also of the opinion that the inability of NNPC to maintain monthly payments to the Federation Account Allocation Committee (FAAC) and to cover all its operating expenses from domestic crude oil receipts forced the corporation to take on third-party obligations to make up the difference in funding. Many of the acts carried out to rescue their failure of obligated duty deepened the fraudulent crime resulting to continuous shortage despite experiencing oil boom seasons.

### 4.3.2. Flawed Business Model

The re-occurring rate of fraud and speed of the declining of revenue of the NNPC has been attributed to the flawed business model been used in the organization (Adelabu, 2012; Ambituuni et al., 2014; Osuala, 2013) and mentioned by interviewee 10. The flaws are more pronounced in the flow of administrative power and the power vested in the organization by the act that establishes the organization. In the study of Chukwunedu (2018), it is expressly posited that *"Weak and Inefficient Accounting System"* is the major factor that promotes the fraudulent activities. The reports show that the officers at the helm of affairs in the organization was given too much power which made it easy to override checks and balance (Chukwunedu 2018). Also, the literature opined that the work environment does not favour whistleblowing making many fraudulent activities passed with no one speaking out.

"*Government was aware of the incidents of fraud and embezzlement in NNPC over these years. It was not government's intension in the first place to carry out forensic audit if not for whistle blowing by the former CBN governor. The government decided to commission the forensic audit to avoid public criticism. There was so much politically motivated public interest. Those who* *would have implemented the result of the forensic audit were the people who perpetrated the act".*

In the opinion of Osisioma (2021), "*NNPC business model is flawed".* The corporation is unable to determine accurately and report completely the crude oil and gas revenues accruing to the NNPC. More so, the records were not properly document and kept for audit reasons as the data needed for the forensic auditing exercise sometimes were not available. Recent reports on NNPC performance by the world bank group submitted that the federal government and sub-nationals have been systematically underpaid for decades due to the NNPC financial reporting methods, which are essentially incomprehensible, vague, and misleading. More so, the flawed business model extends to the failure of the corporate to have a reliable data base which can give accurate insight to the activities in the organization. "*Availability of data was even a bigger problem in the PWC 2014 forensic audit of NNPC as information was again hard to come by from NNPC. The paucity of information from NNPC and its subsidiaries made PWC to downgrade the forensic audit to a forensic review citing inability to obtain information from NPDC, a subsidiary of NNPC.*

### 4.3.3 Statutory Audit Failure

The analysed literatures agreed that the regular statutory audit is not sufficient to expose fraud and raise awareness of its existence in a system, especially in the public sector where the independence of the auditors is not guaranteed and the ability to investigate thoroughly a fraud is lacking except the service of forensic auditing is engaged. The literatures considered shows that the failure of statutory audit to meet the expectation of concerned users of the audit report has created an expectation gap. "*Another reason for the growing influence of forensic audit is that forensic audits are more intensive than regular audits and thus stands a better chance of success".* This opinion in literature validates the fact that most statutory audit in public sector have not been able to achieve many results because after the auditors must have stated that the financial position and financial performance declared by the organization portray the true and fair view, there was escalation of the fraudulent behaviour. Afterwards, the report of the auditors could not stand being used in the court of law of which forensic audit could pass the test of been admissible in the court of law.

The examples of forensic audit carried out in the Nigeria stock exchange expose more about the audit failure and the advantage of forensic auditing over it because after the forensic auditing of the Cadbury Plc, there is no longer such escalated cases in the system as it can reduce the recurring fraud pattern. *"Forensic audits of Cadbury (Nig) Plc and the Nigerian Stock Exchange have shown the immense potential of such audits in curbing and deterring fraudulent behaviour in Nigeria* (Chukwunedu, 2018).

Since literatures as established that the statutory audit could not achieve the same result of the forensic auditing, government can consider making forensic auditing statutory even though not frequent exercise due to cost implication but to make the in-depth of statutory audit to improve and as well prevent fraudulent activities that characterized most of the public sector.

### 4.4 How Forensic Audit Tools and Techniques Can Be Used to Detect and Prevent Fraudulent Activity in Nigeria Public Sector

To achieve the second objective of the study which seeks to identify how forensic audit tools is used in detecting and preventing fraudulent activity especially in the Nigeria public sector, thematic analysis was carried out on the content of reports of existing literatures that have considered the usage of forensic accounting in Nigeria public sector and a study using NNPC as a case study. The findings from literature imply that the use of forensic auditing in preventing fraudulent activities in Nigeria public sector is more successful because of the edge it has over internal audit and other forms of audit.

Forensic auditing can prevent fraudulent activities because of the themes identified in the literatures are the legal repercussion, the special audit mandate it uses and specialized professional knowledge that it entails in the process. The second column titled file shows the number of reports considered for coding and the references imply the number of comments that relates to the subtheme in the reports. Figure 3 shows the graphical representation of the themes that emerged from the existing literature, and it indicates that forensic audit independence has the highest rate because the mandate made them more independent and the fear that they will be objective as no bias is entertained.  Other theme has the same representation.

*Table 4:  How forensic Auditing prevents Fraud*

| Prevention of Fraudulent Activity | Files | References |
|---|---|---|
| Auditors Independence | 2 | 4 |
| Legal Repercussion | 2 | 2 |
| Popularized Audit Mandate | 2 | 2 |
| Specialized professional knowledge | 2 | 2 |

Source: Authors Compilation from NVivo 15 (2024)

*Figure 8: Forensic Auditing is able to Prevent and Detect Fraud*

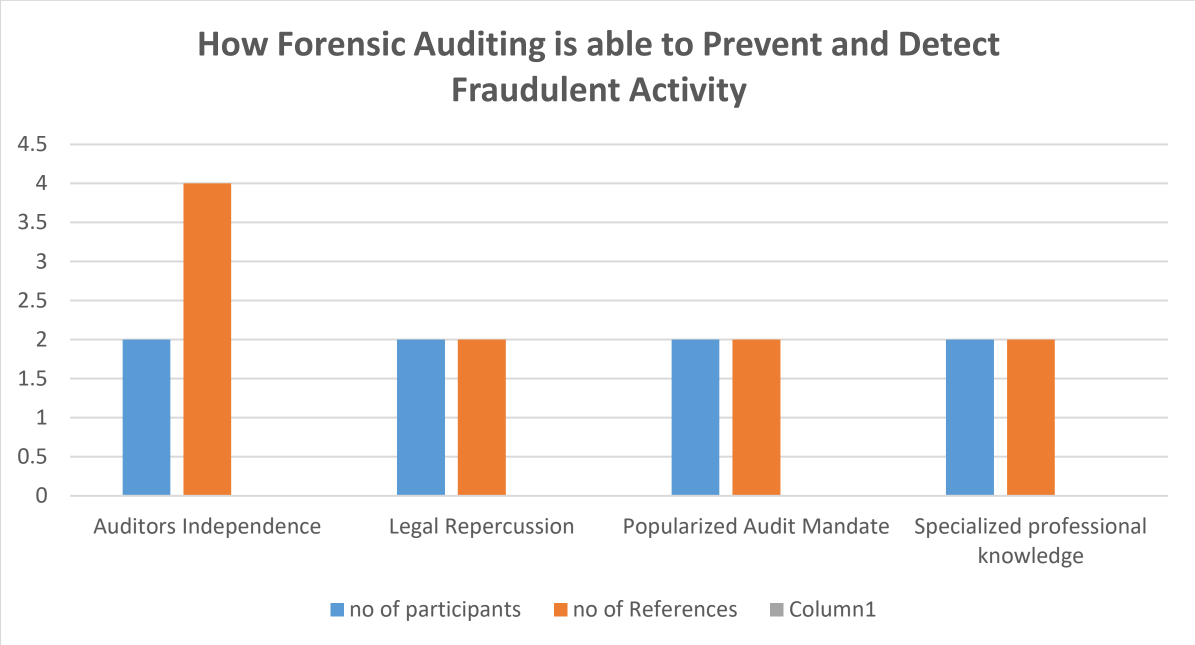



*Table 5 codebook for How Forensic Auditing Prevents and Detects Fraud in Nigeria Public Sector*

| Theme | Subtheme | Code examples | Codes |
|---|---|---|---|
| | Forensic Auditors Independence | • *The most important issue in forensic audit outcome is the independence of the auditor. Independence is the cornerstone of auditing* | It refers to freedom from bias and control or influence that ensures internal auditors are impartial making judgement based on evidence |
| | Legal Repercussion | • *Interpreting and communicating findings whether in the court rooms, board rooms or other legal/administrative platform* | Admissible evidence on the court of law for prosecution |

| | | | |
|---|---|---|---|
| How Forensic Auditing Prevents and Detect Fraud in Nigeria Public | Popularized Audit Mandate | • *consideration must be given to the following: A clear definition of whose responsibility it is to appoint the forensic auditor; A clear definition of who receives the report; The purpose for which the forensic audit is being conducted.* | Clear cut objective for the forensic audit. |
| | Specialized professional knowledge | • *forensic auditing services generally involve the application of specialized knowledge and investigative skills of independent forensic auditors.* | specialized knowledge and investigative skills |

Source: Authors Compilation (2024)

### 4.4.1 Forensic Auditors Independence

The findings from literatures established that the independence of the forensic auditors is more than that of regular audit because when forensic auditing is engaged in public sector, many stakeholders were aware and the eyes of all citizens and international bodies is on the outcome, so to protect the integrity of the government. Higher level of independence is accorded to the forensic auditors. According to Osisioma (2021). "*The most important issue in forensic audit outcome is the independence of the auditor. Independence is the cornerstone of auditing",* "*investigative independence and reporting independence*"

Once the independence is guaranteed, the specific aim to detect fraud was actualized. The consistent outcome that forensic audit rarely fails, and this deter fraudulent officers to minimize their intention of engaging in fraud and this could be inferred to as fraud prevention. Since the group carrying out the forensic accounting are not internal staffs nor have business with government functions, it minimizes their level of compromise. Chukwunedu (2018) opined that *"the independence of the forensic auditor to avoid conflicts of interest that could compromise the assignment is a top priority".*

### 4.4.2. Legal Repercussion

The admissibility of forensic audit report in the court of law can restrain officers in government establishment to stop been fraudulent. If government seeks legal redress, sound and information were presented to resolves disputes then judgement will sure be served and the reputation of the culprit was damaged. Isisioma (2021) and Chukwunedu (2018) established that *"Interpreting and communicating findings whether in the court rooms, board rooms or other legal/administrative platform"* is an edge for forensic auditing which enables it to prevent and detect fraud in the public sector. According to Boyelayefa (2021), forensic auditing is usually embraced to give testimony of experts and explain evidence gathered during fraudulent operations as forensic auditing professionals are crucial in court procedures. This involves applying accounting knowledge and judicial function expertise to the inquiry, since forensic evidence is usually used to prosecute criminal cases such as fraud or embezzlement. Findings from the study revealed that litigation support services by forensic auditing have significant relationship with fraud detection and prevention. Furthermore, the attorney's judgement in Nigeria relates with forensic audit evidence of related fraud cases presented by forensic auditors and this is the result of the study that examined the influence of forensic accounting on litigation support and engagement in Nigeria.

### 4.4.3 Popularized Audit Mandate

This step is deemed critical to successful forensic auditing assignments meeting with the client to determine the scope of the assignments and obtain an engagement letter. The popularization of the mandate make room for clear objectives. For instance, "*In June 2014 an engagement letter was issued by the Auditor-General for the Federation to PricewaterhouseCoopers (PWC), a leading firm of Accountants to, among others - analyse remittance shortfalls from NNPC into the Federation Account and analyse submissions made by key stakeholders in relation to alleged shortfalls" (PWC 2015)* Following the scope of forensic auditing, the literatures considered that giving an audit mandate, is a critical step to forensic auditing assignment. The PricewaterhouseCoopers (PWC) met with the government to determine the scope of the assignments and obtain an engagement letter for the forensic audits carried out in NNPC.

### 4.4.4 Specialized Professional Knowledge

The findings indicates that forensic auditing was able to detect fraud because of the specialized professional knowledge that is deployed in uncovering the fraud. The method of sampling is allowed in regular audit especially when the data to be reviewed is voluminous but forensic auditing engage the use of technical inquiry and artificial intelligence to check through the records. "*Although forensic auditing is wide in its coverage, forensic accounting/auditing services generally involve the application of specialized knowledge and investigative skills of accountants"* stated by interviewee 10.

Likewise, since forensic auditing is usually a special task, a group of experts with backgrounds in both forensics and accounting conduct forensic auditing. Their areas of expertise include tracking down a money trail, monitoring both fraudulent and legitimate balance sheets, and looking for errors in comprehensive and thorough records of income or expenses (ACFE 2022). Only enhanced skill could make forensic auditor function optimally as financial world is highly prone to changes and it means they need updated professional knowledge to exceed beyond interna and statutory audit. Hence, it is only through the application of specialized knowledge and investigative skills of accountants that the feat of detection and prevention of fraud in the public sector could be achieved.

## 4.5 The Role of Auditors in the Public Sector on Fraud Prevention and Detection

The role of the auditors in ensuring public sector prevents fraud and detects fraud is one of the themes established by the participants in the interview. The discussion of this theme is to achieve objective three of the study that aims at examining the role of auditors in fraud prevention and detection activities in the public sector. The study findings indicate that good number of the participants have specific role that centers on inspection, checking vouchers and other books of record in line with regulations to ensure accuracy and better management. The word map in figure 4 shows many words used by the interviewees to describe their roles. It is also established that the role for the participants is statutory which means the responsibility is on them to see to it that fraud is prevented and detected.

Interviewee 12 says "*my roles and responsibility in the units is to check the books of accounts, the accuracy of the books of accounts, and the internal management to see that they are working the way it's supposed to work according to the rules and regulations*". It is also noted that beyond regulations, most of their engagements are documented and given letter that specifically dictates the roles. Interviewee 14 declared that he does "general inspection of capital projects carried out in the year specifically stated in the letter of the audit exercise. In addition, interviewee 4 expresses that he has loaded work to compliment the effort of management to instil compliance and prevent fraud. "*Conducting internal audit, creating reports, and monitoring the regulation of the organization to determine the effectiveness"*.

A germane observation from the response of the interviewee as regard their role is the monotonous way at which they perform their duty, and this may hamper the effectiveness in their role because many of the roles lack specialized skills. Interviewee 5 stated that "*our main role is just to collate and ensure that, all the revenue and expenditure incurred by the state government are fully accounted for"* and interviewee 6 alike stated that *"Role of the treasury is to examine and to ensure appropriateness in the financial management of the office".* The role of interviewee 7 is not too different because all it is done is examination of books and documents "*I used to examine payments vouchers, and other cash book".*

Furthermore, checking and verification is paramount and key in the role of auditors as interviewee 8 stated that *"check all there records particularly the past one's just to help us to know whether they in line with the laid down rules and regulations of the organization, we go to them to verify their books and records*" same for interviewee 9 except that beyond verification, they can whistle blow any abnormalities "we check the records of accounting under the custodian of the records, or we see that these people are not take proper care of the records we raise alarm".

## 4.6 To Determine the Factors that Impact the Effectiveness of Fraud Detection Activities in The Nigeria Public Sector

The discussions of the interviewees shows that there are embedded factors in the institutions that positively impact the means to fraud detection activities. Sub-themes that summarize the codes raised were developed. Overall, the factors are categorized under management support and organizational structure, and these factors were identified by the participants, and they discussed their opinion on how these factors aided fraud prevention and detection. It should be noted that some of these factors were borne out of recommendation to ensure the menace of fraud is eradicated from the system. The discussion on how management support and organizational structure impact fraud detection and prevention was further coded to four sub-themes which are established procedures and policies, functional internal control, duty segregation and regular audit

### 4.6.1 Established Procedures and Policies

Discussion of the participants revealed that public sectors have been trying to manage issues of fraud and devising means to prevent it in several ways and large percentage of the participants mentioned that there is established procedure and policies to guide the conduct of staffs and handling of financial transactions. Interviewee 10 explained that the management was very keen about policies and explained that *"We have our rules and regulation that guides the operation of our organization*" and interviewee 13 also mentioned that "*Yes. We have established procedures and rules guiding our discharge of duties within the organization*". The same response was given by interviewee 17 as the participant mentioned that "*there are rules and regulation that guides us"*.

The discussion further reveals that many of the procedures and policies were precise for clarity to ensure that no staff play foul of the procedure and given legal backing because defiling the provision of the policies would attract legal consequence if government chose to prosecute. When it comes to financial matters, interviewee 14 mentioned that "*of course, we have the procedures, we have rules, we have processes, we have the regulations that guides us and the main regulation that guides us in the financial regulations, you know, for accountants and auditors. That is what guide us and we must not do anything aside this regulation that is guiding us and everything we are going to do were in accordance with these financial regulations"*.

The financial regulations been referred to is an act of parliament the gives procedures on financial mater in the Nigeria public sector. Interviewee 16 elaborates on this while responding to query on whether the organization have established procedures by saying "*There is of course, this section I mean a statutory section of the law that government recognizes very well because they see it as a means of keeping the financial matter in a straightway and to see that the asset, asset of the organization was kept and utilized in the normal procedure"*. Interviewee 2 clarifies further that many of the procedures and policies were enacted by act of parliament "*Well, actually based on the Nigeria constitution, maybe according to section maybe 560, There's rule and regulation that established this department under that Act"* The fact that many of the procedures are enacted to make it more pronounced. The explanation of interviewee 2 was further reiterated by interviewee 9 and the participant mentioned that "*There is a section that government recognizes very well because they see it as a means of keeping the financial matter in the straightway and to see that the asset of the organization was kept and were utilized in the normal procedure"*.

The established procedures too maybe from the management, serving as internal measures from the top management to create check. Interviewee 7 explained that *"There's an established procedure, laid down by the organization, and there's a rules and regulation"*. The result further shows that the rules and procedure is a backbone to a well functional interna audit and the organization. Interviewee 18 said, "*Yes. We have rules and regulation, guiding discharge of the duty because, without, rules and regulation, there's not how the department can be a functioning one. So, we must rule and regulation guiding to discharge all our duties here as an auditor in the organization"*.

Hence, it can be observed that both management and government have the responsibility of establishing procedures and policies as these helped in culturizing the accepted way and manner which financial processes be maintained to forestall any attempt of fraud. It is suggested that the policies and procedures be operationalized as necessary by incorporating them into current risk management strategies, operational activities, or plans for strategic management. The public sector will then be able to tackle fraud with a comprehensive and cohesive strategy. Evidence from the study conducted by Gbegi and Olabisi (2015) corroborate the findings of the study that management policies and procedures is a strategy employed in public sector for fraud prevention and detection.

### 4.6.2 Functional Internal Control

The participants which are majorly an auditor has observed and explained that there is a functional internal control that is effective and has been helping in one way or the other to achieve the target of fraud prevention and detection. Interviewee 1 explained that *"In terms of internal control, yes, we have internal controls. We have laid down policies and procedures for, professional staffs to follow. And part of it is, we usually have, I think, biannual, every 2 years, we usually have what we call, an IPR review that's, practice review such that we have, people from our head office to review our files and our working papers to ensure that, our practice has been in line with, lay down processes and procedures"*. The essence of internal control is to ensure that there is order in the workplace and if there is abnormality it can be quickly identified and corrected because there is an order and when the order is defiled, it can be traced with ease. Interviewee 14 explained that "*of course, there is internal control because if there are no internal controls, there won't be decorum, there won't be sanity in an organization. Of course, internal control has to do with the controls that puts in place so that policies will not be flaunted, policies will not be understated in the organization"*.

The synergy between every department of the organization has been monitored by the internal control unit because when orders are flaunted with no restrain, the system will likely fail. Interviewee 5 said "*As you rightly said in the other question you asked, we have internal control here as a department because in fact, we call it the department that even regulate the activity or all other department? All these is in place. I'm sure it's in place"*. Every other unit's process and decision has been ratified and approved by the internal control unit. An instance where the unit is bypassed in decision making, it makes room for error and eventually fraud.

The discussion further shows that a functional internal control undergoes review to ensure that the current control is free from bias and in tandem with current best practices both nationally and internationally. Interviewee 2 shared this position as he mentioned that *"in the case of internal control, we have it because take for example, whenever we went for audits Okay. Our HOD must observe our assessment of it. So, by assessing our observations of the evidence of the audit and affirm that it is in line with our mode of internal control system"*. In the same vein, interviewee 10 mentioned that "*internal control system must be followed to the letter and should be reviewed consistently"*.

More so, it is mentioned in the discussion that functioning internal control will help to reduce audit cost. Interviewee 10 stated that "*When your internal control system works very well, effectively and efficiently, there won't be need for fraud investigation or there won't be need for forensic audit. But if you don't have a robust and sound internal control system, then there are some kinds of loopholes that, a lot of people will take advantage off, so that means if you have an internal control system, understand, you cut costs by not having a forensic audit unit. But you don't have a robust, internal control system. That means you are going to be running internal control system with a cost which is not very good for the organization"*. Hence, from the above discussion, it is evident that functioning internal control unit as a distinct role to play in prevention and detection of fraud

### 4.6.3 Management Commitment and Support

Findings from the discussion indicates that management commitment and support for goal of fraud prevention is expedient. Having established procedure and policies is not enough, neither is the functioning internal control can do all the magic once the management does not play their role. Some of the participants explained that it is expected that management give a huge support to any structure put in place to curb fraud. Interviewee 10 explained that *"you should have the support of the management. The management must see it as a priority that internal control* *system must work.* One of the roles assigned to management in showcasing commitment and prevent fraud occurrence is the monitoring role. Interviewee 17 mentioned that there is need for *"proper monitoring of the book of account"*. When asked about the factors that can impact the effectiveness of fraud detection, interviewee 5 said "*Management support too. If management support and then the internal control put in place by the management of the organization. These are the keyways of preventing fraud in all circumstances"*

This position is also supported by interviewee 1 with the emphasis that monitoring ensures compliance. The participant explained that "*I think monitoring and then, I would say, processes and procedures. Right? Yeah. So, if you don't have so in terms of monitoring, if you have a process in place, but you don't have people who monitor compliance with that process, it will, it could be a factor that would result in not detecting a fraud within an organization. So, yes, you can have a process. That is one thing, but human beings or employees complying with that process is another thing. So, if you don't have my perspective is if you don't have a monitoring system, people can tend to do what they like and not follow the laid down procedures and rules".*

Based on the discussions, the results demonstrate that the relationship between fraud prevention and the internal control system is mediated by managerial commitment and support since managerial commitment establishes if employees are carrying out designed and implemented rules and procedures in an efficient manner.

### 4.6.4 Regular Audit

Another factor that impacts effectiveness in preventing and detecting fraud is regular audit in the department and agencies to put the workers on their toes and send warnings against sharp practices. The continuous effort in auditing helps in flushing out the bad eggs in the system. Interviewee 4 mentioned that *"one of the factors that can make the effectiveness of fraud detection activities is continuous auditing. At least by checking the record continuously without giving the workers a gap at all. Because when you continue to examine their record all the time, checking them time to time, they will seat tight"*. Rather of depending exclusively on periodical audits, government ought to establish a system of ongoing observation. This entails tracking financial operations in immediate detail to spot any irregularities or questionable trends. Regular audit cannot be undermined because it is basic function to minimize the possibility of fraud. Interviewee 14 explained that *"Statutory audit scene is very key because statutorily, when you check the financial statement of any establishments, you know, you start* *to observe a lot of inadequacy, inefficiency, you know, and in order to prevent fraudulent activities, you tend to minimize it".*

Other advantage of regular audit is to enforce ethical compliance of employees. Spread of fraud occurrence is a matter that must lack of ethics or non-compliance to it. Interviewee 1 corroborate this fact when the participant explained that "*you can have a process. That is one thing, but human beings or employees complying with that process is another thing"*. During regular audit, staffs that lacks integrity can be pinpointed and restructuring that will put the system could be fixed. Interviewee 10 is of the opinion that after reviewing of policies, the internal control should be manned by people of integrity to ensure ethical codes are maintained.

### 4.6.5 Duty Segregation

The discussion of the interviewees expatiates more about the situation whereby there are turnkey transactions, and the aftermath of such setting is that fraud is more prosperous when there is no segregation of duties. A keyway of making public workers more responsible is discouraging turnkey process and engage different people in different responsibilities. Interviewee 1 opined that "*1 person or 2 persons should not have, undue power or authority over a process. So, it's good to have a segregated process, a robust process where you have different peoples with different roles, what do I call it now, different responsibilities"*. The segregation should be based on cogent duty in the financial processing system in the department and a form of double check for failed control that have been passed unknowingly. Interviewee 5 mentioned that *"all our activities are segregated based on the duty of each department"*. Interviewee 10 explained further that "*We have, control system whereby one department is a kind of complement the other department. And the work of one department can be checked by other departments. So also, we have a kind of seniority checks for most of our records*"**.** Other essence of duty segregation is to regulate administrative power so that an individual does not wield too much power that is in their disposal. Interviewee 1 mentioned that "*Nobody should be too powerful. Nobody should be seen as a secret cow. Rather, the system and the process are within the organization should be paramount above every other person in that organization"*

## 4.7 Effectiveness of Forensic Auditing Techniques in Identifying Fraudulent Activity in the Nigerian Public Sector.

To achieve the fifth objective of the study, themes that describe the effectiveness of forensic auditing were developed. Overall, the accuracy and adequacy of the forensic techniques has been identified by the participants as the major determinants of effectiveness of forensic auditing tools and they discussed their knowledge and opinion on effectiveness in terms of accuracy and adequacy of forensic auditing techniques. The discussion on the effectiveness is divided into two sub themes, and it revolves around adequacy and accuracy which were further coded to identify factors that influences them. Accuracy of forensic auditing techniques has three codes while adequacy of forensic auditing techniques has four codes to explain it.

In summary of the findings as regard accuracy and adequacy of forensic of effectiveness shows that there are more references for adequacy of forensic auditing techniques than accuracy of forensic auditing techniques. In total, about 85 percent of the interviewees have opinion on how effective forensic auditing techniques is in detecting and preventing of fraud in the public sector. The no of references for each theme and the code book is presented below in Table 6 and Table 7.

*Table 6: Effectiveness of Forensic Auditing and Adequacy of Forensic Auditing*

| **Accuracy of Forensic Auditing** | **No of References** |
|---|---|
| Independence | 7 |
| Precision of Auditing Techniques | 9 |
| Training and Development | 4 |
| **TOTAL** | **20** |
| **Adequacy of Forensic Auditing** | **No of References** |
| Availability of Forensic Audit Unit | 8 |
| Exceptional Results | 9 |
| Minimization of Fraud Occurrence | 11 |
| Satisfactory of detection measures | 7 |
| **TOTAL** | **35** |

*Table 7: Codebook for Accuracy of Forensic Auditing in Public Sector*

| Theme | Subtheme | Codes | Code examples |
|---|---|---|---|
| Effectiveness of Forensic Auditing Techniques in Public Sector | Accuracy of Forensic Auditing Techniques in Public Sector | • Independence | "*the forensic policies implement in an organization. I think it should be able to work independently without depending on other, the works of others*". |
| | | • Precision of Auditing Techniques | "*Yeah. I think so based off of what I know that our forensic team does their outcome or their results are close to accurate*". |
| | | • Training and Development | "*They should train their staff into not just on principle of audit, but also forensic audit and investigation*". |
| | Adequacy of Forensic Auditing Techniques in Public Sector | • Availability of Forensic Audit Unit | "*You know, since we deal with forensic, you know, it helps us in such a way to curtails those fraudulent activities in such a way that it will not happening again. So, forensic auditing has helped us in order to, like, curtail it*". |
| | | • Exceptional Results | "*I can say to a larger extent that forensic audit techniques, they are very effective and very efficient understand, in ensuring that fraudulent activities, errors, mistakes are quickly avoided in our organization*". |
| | | • Minimization of Fraud Occurrence | "*The organization has recorded a very, very large, record reduction in the cases of fraud since the adoption of the forensic audits*" |

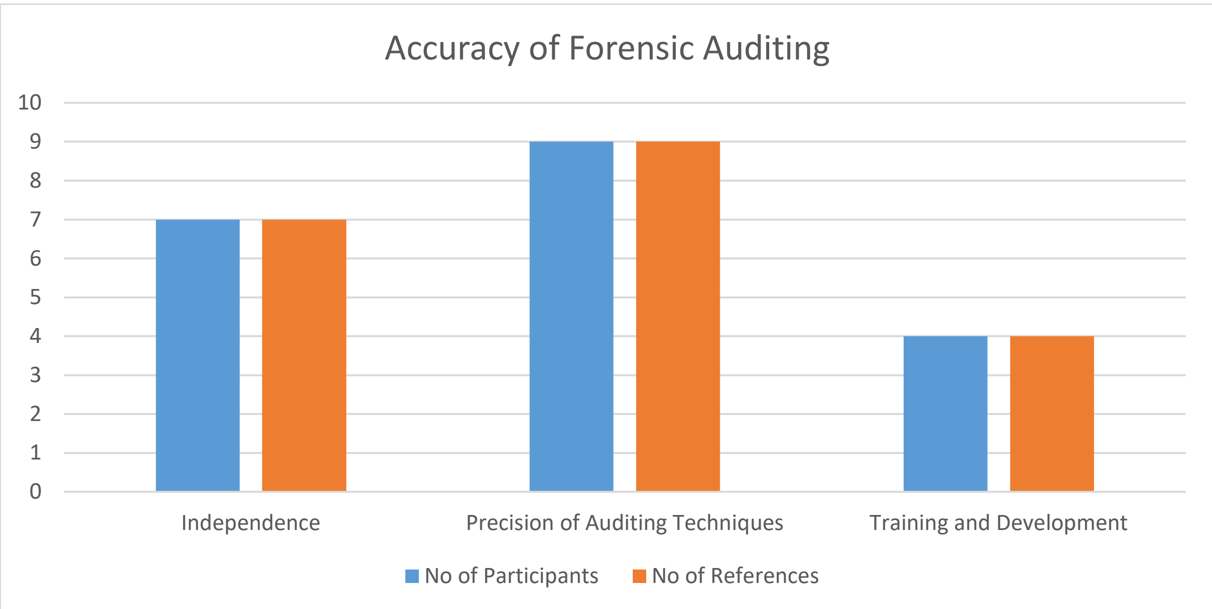
| | | |
|---|---|---|
| | • Satisfactory of detection measures | *"in my organization we can say it is that it's very robust, very strong. Like I said, it's actually very difficult for anyone to perpetrate fraud within".* |

**Source: Authors Compilation (2024)**

### 4.7.1 Accuracy of Forensic Auditing in prevention and detection of Fraud in Public Sector

The first theme that has been carved out in the discussion that revolves round the effectiveness of forensic auditing in identifying fraudulent activity in Nigerian public sector is the accuracy of the forensic auditing. The NVivo results in table 5 suggest that accuracy of the forensic auditing is one of the factors that dictates the effectiveness of forensic auditing in fraud detection and prevention. When the reports meet the need of the stakeholders through its accurate dissection of the information, the fraud detection aim was achieved effectively. The interviewees discussed extensively about how they perceived the extent of accuracy of forensic auditing in the public sector. Accuracy of forensic auditing is usually instigated by the independence of forensic techniques, precision of auditing techniques, training and development. The graphical representation of the contributors to accuracy of forensic Auditing is shown in Figure 9

*Figure 9 Accuracy of Forensic Auditing*



#### 4.7.1.1 *Independence of Forensic Tools and Techniques*

The findings showed that the independence of forensic tools and techniques is one of the reasons that forensic auditing can achieve accuracy. Many of the interviewees is of the opinion that the tools and techniques do not accommodate interference from outsiders nor give preference to data that can influence the objectiveness of the process. 7 of the interviewees agreed that it is possible for forensic auditing techniques to work independently and achieve good result. Among the interviewees, interviewee 12 indicates that "*the forensic policies implement in an organization. I think it should be able to work independently without depending on other, the works of others. Since it has been implemented, they will be using them directly in that organization. So, I think you should be able to work independently.* The opinion is corroborated by the fact that the tools and techniques engaged in forensic auditing is different from regular audit and has more science and technological method to unravel the fraud that is been investigated. In this regard, Interviewee 14 stated that "*Forensic auditing is very independent. It is very independent because it has its own ways or its own methods of unravelling possible frauds. It is not dependable on anything. It is independent of any opinion"*. This implies that forensic audit does not depend on internal audit for its results or dependable on internal control for its opinion but rather engage scientific means of analysing data available and make meaning of any inconsistency and disjointed flow in operation.

Howbeit, interviewee 18 aired his view which is a contrary opinion about the independency of forensic auditing techniques. The participant mentioned that *"we're saying that a tree can't stand alone. So, there are other factors that should be add to it or some other department that they need to work hand in hand order to make this forensic audit to be successful one"*. Therefore, the study indicates that f the techniques can work independently without external influence and subjective opinion of insiders but solely on the outcome of the data analytics, forensic auditing is more effective.

#### *4.7.1.2. Precision of Forensic Tools and Techniques*

The precision of forensic auditing tools and technique has been discussed by many of the participants. They explained that forensic auditing tools is effective and precise in identifying fraudulent activities. Also, the forensic expert knows how to accurately deploy them in which most of the interviewees feel like forensic auditing tools is enough and adequate in unravelling fraud in the public sector. The precision is close to 100 percent in most case and interviewee 7 indicates that "forensic auditing is very accurate in finding the fraudulent activities" and interviewee 1 agreed that forensic auditing has high precision stating that "*Yeah. I think so based off what I know that our forensic team does their outcome, or their results are close to accurate. Personally, I don't think anything is accurate, 100%, but at least close enough to accurate, and they are usually helpful. Yeah. They are usually quite helpful*".

The precision of forensic auditing is not only known to the forensic experts even the clients that enjoyed the service are also aware of its ability to solve issues that are fraudulent in nature. The feedback gotten shows that the techniques are effective because it puts everyone on alert that fraud may not go unnoticed if forensic auditing techniques are engaged. A participant expressed the fact that "*Even for the client that we audit. Yes. Let me try and elaborate. So, the forensic units that we have that provide services to clients, to the extent that I know they have had positive feedback on how good their work is to the point that they've had referrals. At least I'm aware that recently the forensic team made a presentation that felt there were fraudulent activities going on within their organization, and they thought it's wise to get a forensic team to come and look at, their records. So, I would say that yeah, it's been, it helps reduce the incidence of fraud, especially when, organizations are aware that forensic auditors can be called upon to come and carry out audit. I think that helps puts every employee on alert to ensure that they are not found wanting".*

Furthermore, it can be observed some participant viewed the precision to be the ability of the forensic team to use a technique in identifying and solving many problems as far as satisfactory results are gotten. Interviewee 10 said "*I will say that they are effective, and they are efficient, and the forensic audit is well developed and deployed to meet its stated objectives. That means so many techniques can be used for so many different problems. So that means it's not that specific to a particular problem. It can be used for different and many problems. So, the techniques that we use in our office, understand our forensic is effective and is also efficient"*. In that line as well, interviewee 5 mentioned that "*I'm also a forensic auditor, and I know if it is adopted it will expose and flag off any fraud or, irregular, or misappropriate activities"*. Hence, it can be submitted that the precision of forensic technique extends to any other problem that has to do with fraud identification.

Moreso, interviewee 2 mentioned that *"It's yes. Yes. Since its effective. We can use it to identify a new red flag in the business"*. This imply that there are potential fraud cases that forensic auditing techniques can help to identify. How be it, some of the participant still believe that the accuracy does not give high precision. As regard that, Interviewee 3 said *"For now, forensic techniques that we use give us certain level of accuracy.*

#### *4.7.1.3 Training and Development*

The findings corroborate the submission in literatures that posit the fact that forensic auditing's success hinges significantly on the skills and expertise of the auditors. Auditors with extensive training in data analysis and forensic techniques are better equipped to interpret complex data sets and identify subtle signs of fraud. The participants agreed that training and development of forensic auditors in the organization will be quite helpful for the effectiveness of forensic auditing techniques in terms of detection and prevention of fraud. Training is a tactical approach that helps the forensic experts to learn skills that directly impact their performance and compliance obligation.

Interviewee 16 recommended that "*you must be giving them accurate training. Training upon training. So that they will not be misbehaving"*. This is considered needful because of invention in technology and emergence in accounting profession will requires that forensic experts are trained and enabled to develop capacities that will make the auditing exercise effective. Findings from the interviewees also imply that for auditors to maintain forensic auditing effectiveness, ongoing training and professional development are essential. The most recent advancements in data analytics tools, forensic technologies, and new fraud schemes should be the main topics of training programs.

The result further shows that maintaining forensic auditing effectiveness can be achieved by keeping auditors abreast of technological developments and existing best practices. As regard this, interviewee 5 said "*Yeah. It's by training their workers, I mean, their staff, their auditors. Apart from that one, they should ensure that their workers are professional qualified, and they now work and tailor their mind toward the current training auditing, which we call forensic audit in question"*. And existing best practice could not be attained by untrained and unprofessional auditors making it a germane factor to be considered. Also, the interviewees are also of the opinion that the training should extend beyond forensic audit and investigation and includes principle of audit. Interviewee 3 said that government are duty bound to train their staff *"They should train their staff into not just on principle of audit, but also forensic audit and investigation"*.

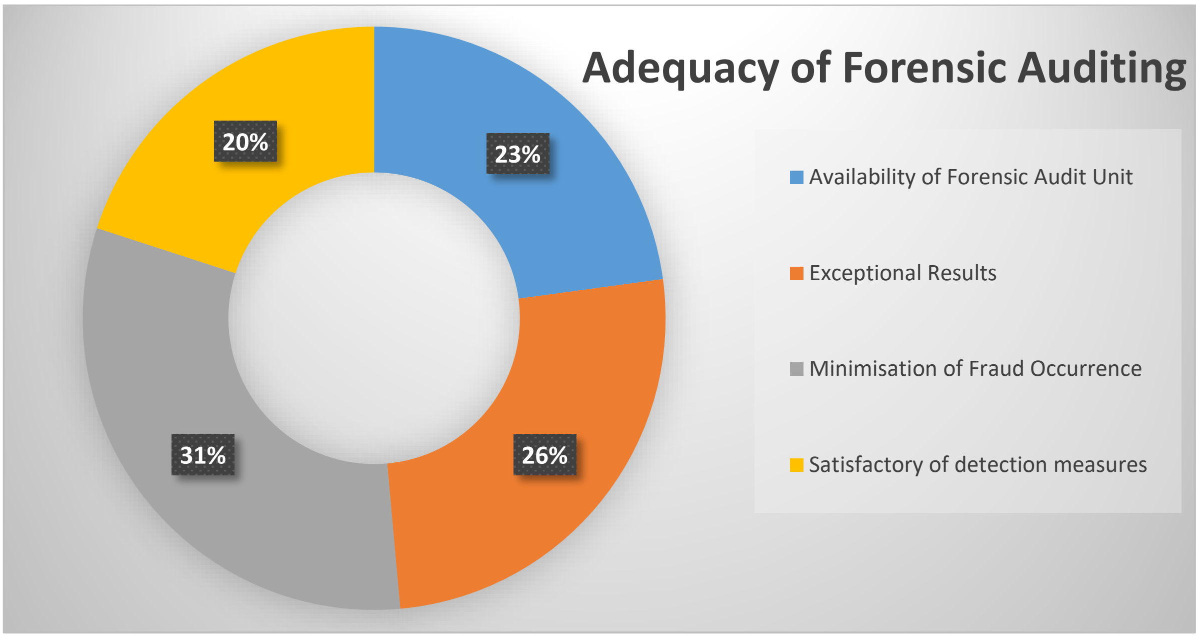
The opinions of the participants now showcased that the effectiveness of forensic audit depends on the auditors' abilities and the application scenario. To maximize the advantages of forensic auditing, auditors must get ongoing training and modify their methods to suit the organizational setting.

### 4.7.2 Adequacy of Forensic Auditing in prevention and detection of Fraud in Public Sector

The second theme that has been carved out in the discussion that revolves round the effectiveness of forensic auditing in Identifying fraudulent activity in Nigerian public sector is the adequacy of the forensic auditing. The NVivo results in table 5 suggest that adequacy of the forensic auditing is one of the factors that dictates the effectiveness of forensic auditing in fraud detection and prevention. When the reports are adequate, the goal of preventing and detecting of fraud can be achieved. The interviewees discussed extensively about how they perceived the adequacy of forensic auditing in the public sector. Adequacy of forensic auditing is judged by the satisfaction of the detection measures, minimization of fraud occurrence, availability of forensic audit tools and exceptional results.

The graphical representation of the factors that determines adequacy of forensic Auditing is shown in Figure 10

*Figure 10: Adequacy of Forensic Auditing*




#### *4.7.2.1 Availability of Forensic Audit Unit*

The findings of the study suggests that in Nigeria public sector, there is no forensic audit unit. The existence of the unit is lacking in many public organizations, and this has given room for increase in fraud rate in the public sector. However, the interviewees made it known that the few that are available has contributed to the effectiveness of forensic auditing in curbing fraud because its existence creates check and balance in the system and makes that application of forensic auditing techniques easy to achieve effective result. Interviewee 1 stated that "*Yes. There's a forensic audits unit in the organization since our work here is an auditor there is automatically a functioning forensic unit in the organization*". The interviewee further claimed that there is adequacy of the forensic auditing based on its availability by saying "*Yeah. My perspective on it in my organization is that it's very robust, very strong. Like I said, it's actually very difficult for anyone to perpetrate fraud within, my organization. So, my perspective on it is that it's very strong, and there are checks and balances in place. They are not repressive, but it helps us maintain integrity and honesty in the in the working place".* The adequacy of the techniques and tools made the unit very effective and achieve the target as he further claimed that the presence of the unit has made the effectiveness of forensic audit highly possible. He said "*You know, since we deal with forensic, you know, it helps us in such a way to curtails those fraudulent activities in such a way that it will not happening again. So, forensic auditing has helped us to, like, curtail it and giving us the right way handling those kinds of matters".* Interviewee 7 is of the same opinion, after the confirmation that there is functional forensic audit unit in the agency where the participant work as he said *"Yes. There's functional forensic audit departments and it's very functional".* The interviewee further responded to how adequate and effective the forensic audit is by saying *"There's adequacy and effectiveness of a detection of fraud by forensic audit".*

Likewise, findings from the study shows that even though the forensic audit unit doesn't exist in some parastatals, there is presence of some forensic auditors making the auditors familiar with forensic auditing, the techniques involved, and the tools used. Interviewee 2 said "*Currently, we have some forensic auditors here, but we don't have the units*". And when further questioned on the adequacy of forensic auditing, he mentioned that "*It's very effective here because we have some experts, and we have different departments here that normally carry out the statutory audit in this office here. So, as I said that we have some forensic auditors. They normally perform their duties. Take for example, maybe through the system, we normally gather their data and assess it*". The response shows that availability and familiarity of the system to forensic auditing made the process more effective and thrive better in a setting where there is a structure that can drum for support for the exercise whenever the need arises.

There are some of the participants that have opinion of less effectiveness of the process even with the presence of forensic audit unit in the department of parastatals where they work. The response of Interviewee 3 when asked of his perspective of the adequacy of forensic auditing, the interviewee sated that

"*I can't say that it has improve the business. It has brought opinion that gave rise to reports that also subsequently gave rise to restructuring of the organization. If that is what you think is, that makes the questions you ask its fine, but nobody has been in prison or convicted of any fine. But I know that reduction of the fraud cases has been done due to the audit report that emanated from the process".*

To further buttress the good side of availability of forensic audit unit, the statutory audit unit has been adjudged to be partially adequate in cases where there is no forensic audit unit. The result shows that once there is no existence of forensic unit, the statutory audit will be inadequate, because the familiarization will deny the auditors to import the practicable ideas of forensic audit unit to statutory audit and use it to achieve the goal of preventing and detection of fraud. After interviewee 4 claimed there is no forensic audit unit in the agency he works, his response on the adequacy of statutory audit shows that once there is little that auditors can do to achieve adequacy. The interviewee gave an example "*There are some cases. Let me just cite all the cases. Even the one that we are still, working on it now. Okay. There are some there are some items procure in the in our organization. And those items we have some suppliers that supply us and those people that make sales of it, like some months we detect that 5,000,000, 11,000,000 every month are diminishing from the sales. Which really affect the revenue of the organization and when we conduct the audit test, we going through the report we can identify the areas where there are loopholes, where there are sharp practices, and those areas we are able to stop to minimize the fraud even till now, so there are still some little things that we still have by because of our examination and detection of some areas where there is loopholes. So, and it's really work. Like now, for the past 2, 3 months now, it is minimal. Before, like, 7,000,000, 5,000,000, but now it now reducing to, like, at least maybe last month is 800,000".*

#### *4.7.2.2 Exceptional Results*

Results from the analysis shows that exceptional result has 26 percent of the evidence of adequacy of the forensic auditing techniques in public sector. The outcome of forensic auditing was always making anyone with the intent of fraud to consider their decision because of the less failure rate such an exercise experience. The exceptional findings always prevent fraud that may be in the pipeline. Interviewee 1 talked about the exceptional result and said "*So, even the mere mention of a forensic audit to be carried out, I think, usually puts people on their toes* *and ensures that they try to comply as much as possible with, internal process and procedures so that they are not found wanting. So, yes, forensic audits usually help reduce the incidents of fraud. And in the case of the one that I earlier alluded to that in my 6 years, at least I've witnessed a situation where fraud had happened, and the culprit were identified, and appropriate measures were taken since that time. I have not heard a case of such a case happen again because mean, everybody was aware of the outcome, and everybody had to sit up and make sure they were not found wanting as well".*

Interviewee 10 also shared opinion about the exceptional result gotten from forensic auditing and commented that "*I can say to a larger extent that forensic audit techniques, they are very effective and very efficient understand, in ensuring that fraudulent activities, errors, mistakes are quickly avoided in our organization.* Interviewee 16 is of the same opinion as the participants mentioned that "*The use I mean, they use of this forensic, is a way of getting out of fraud. I think it's good than just a manual one that we are using".* Based on the assessment on the effectiveness of forensic auditing, interviewee 18 stated with assurance that forensic auditing has the highest rank among other available option in detecting and prevention of fraud. The interviewee said "*Yes, the assessment of the forensic audit techniques in our organization are so much effective. So, in terms of ranking, you know we can even say like over 10, we can give it like 10 over 10 because of how effective it has been. So, I think I can rank it like 10 over 10".*

An essential part of the exceptional result delivered by forensic auditing is the identification of red flag. Even though the fraud is yet to be perpetrated, it can easily pinpoint potential fraud and expose and red flag that can endanger the reputation of any organization. The result shows that half of the participants representing 50 percent of the interviewee established their confidence in the exceptional result that forensic audit can achieve. Interviewee 6 said that "*Very much well applying forensic techniques. One can easily identify the red flags in the transaction, and the technique also capable of identifying abnormal transaction"* and the response of interviewee 7 to the capacity of forensic techniques in identifying abnormal transaction, the participant responded that "*Yes. It can. The forensic techniques can identify the abnormal transaction. It can identify the abnormal transaction".* Another interviewee said "*Majorly, applying forensic audit techniques in our department, I believe it reduce more problem of fraud in the sense that the measure we are using in the office, almost all our transaction is cashless basis."*

#### *4.7.2.3. Minimization of Fraud Occurrence*

The highest evidence of adequacy of forensic auditing is the minimization of fraud occurrence after the adoption of forensic auditing. The largest percentage of the interviewees totalled 11 in number submitted that forensic auditing has the capacity of minimizing fraud occurrence in public sector. Interviewee 15 mentioned that "*Well, it's very minimal, very minimal because we have our standards"* when asked about the frequency of fraudulent cases. Forensic techniques were adjudged to be adequate once it can minimize fraud occurrence. Interviewee 1 stated that "*yes, forensic audits usually help reduce the incidents of fraud. And in the case of the one that I earlier alluded to that in my 6 years, at least I've witnessed a situation where fraud had happened, and the culprit were identified, and appropriate measures were taken since that time. I have not heard a case of such a case happen again because mean, everybody was aware of the outcome, and everybody had to sit up and make sure they were not found wanting as well.* Interviewee 7 also indicates that "*Yes. The organization recorded a reduction"* when asked if the organization recorded a reduction in the cases of fraud since the adoptions of the forensic audit and can analog be done in the reduction's indication with a margin or percentage on these reductions.

The testimony of interviewee 18 is not different but further showed that the percentage can be adjudged to be of high percentage. The participant stated that forensic techniques has made a landmark success in minimization of fraud occurrence by stating that "*Yeah. The organization has recorded a very, very large, record reduction in the cases of fraud since the adoption of the forensic audits. We've so much seen a change, you know, in the reduction of, all these fraudulent activities going on and the forensic audit has been able to help us. So far, we recorded a large percentage of success in using forensic audit techniques"*.

Furthermore, when asked about minimization of fraud occurrence after adoption of forensic auditing techniques and tool, some interviewees believed that forensic auditing detect less of fraud. Interviewee 8 said "*at times we do detect fraud but it's not as frequent as we people expect it to be, at times anytime we detect fraud we go there and make sure all those who are involves are brought to book"*. This mean that the minimization may not be total, but it is a milestone that cannot be achieved without forensic techniques. Likewise, interviewee 8 said "*I will say yes because it's, as years go by with application of forensic audit processes, we find out that we can confidently say we'll reduce those uncertain issues to just to keep it safe to 50% of occurrence"*. The evidence in the responses suggest that minimization of fraud is a goal and achieving it imply effectiveness of forensic techniques. However, some participant that does not have functional forensic unit no have familiarization with the techniques or any forensic experts still longed for its existence in their organization so that they can achieve better results when it comes to fraud preventing and detection in the public sector.

#### *4.7.2.4. Satisfactory Detection Measures*

Findings showed that the lowest factor that contributed to the adequacy of forensic auditing techniques and tolls in fraud prevention is the satisfaction in the detection measures. The satisfaction of the effect is embedded in the application of professional skills and knowledge with sufficient expertise to meet the standard for forensic auditing. Response from the participants imply that the users and end users are satisfied because the process and results are usually robust. Interviewee 1 stated that "*in my organization we can say it is that it's very robust, very strong. Like I said, it's actually very difficult for anyone to perpetrate fraud within*". The findings further shows that satisfaction of some of the interview is based on the easiness of the job on the internal auditors as the major and larger detection has been done by forensic auditing. Interviewee 12 said "*It is very effective because the audit, exercise is being carried out regularly. So, it makes the work of auditor, to be very effective in detecting fraud in the organization*". This is so because the forensic auditing will have already given a template for the organization to guide against future occurrence.

## 4.8 Summary of Chapter Four

The chapter 4 discussed the findings which have been presented in the study. The thematic analysis has been conducted with the help of the NVivo based on which the about five codes that helped solve each study objectives have identified which are also called as the themes for the study. These themes have been pre-determined and developed based on the literature review, however based on the discussion and data obtained from interviews, certain sub-themes have been identified under each of the theme. A total of 18 sub-themes have been developed from the study which is grouped under five themes which are reasons for forensic audit in Nigeria Public Sector; how forensic audit tools and techniques can be used to detect and prevent fraudulent activity; role of forensic experts in the public sector; factors that impact the effectiveness of fraud detection activities and effectiveness of forensic auditing techniques.

On the first theme discussed, the study findings established three main the reasons for forensic auditing in Nigeria public sector with focus on Nigeria National Petroleum corporation (NNPC). It is the combination of identified sub-themes that propel the push for forensic exercise to solve the national problem. Howbeit, there is more emphasis on revenue shortage declared by the oil corporation.

The second findings that was observed on how forensic auditing techniques can detect and prevent fraud revealed that forensic auditors' independence is the highest advantage of forensic auditing in public sector. This was noticed by many of the participants and established in literatures. Many of the interviewees mentioned that the independence of forensic auditors makes the goal more achievable. They also explained that the statutory audit failure is because there is no independence for the auditors and lack of special professional skills to unravel the kind of cartel sponsored fraud in NNPC.

The third findings of the study were that the role of auditors is germane in exposing fraud. As they were the first contact to get the hint of any wrong mode to defraud the system because their job description is investigative in nature ranging from checking, regulating and examining financial operation process. Even participants with little or no familiarity with forensic auditing techniques played some roles even though it may lack professional skills.

Furthermore, it has also been established that there are other factors in the system that impact fraud detection and prevention in the public sector of which if high attention and cognizance is paid to them, they can reduce fraud with lesser cost of engaging in forensic auditing and can fight fraud that have eaten deep to the system. The fourth findings of the study show that having a functional internal control unit is the highest impact that can reduce fraud if well monitored followed by management commitment and support in terms of monitoring, reviewing of policies and administrative regulation. Having established procedure and policy is another prominent factor that can impact fraud prevention in public sector. However, the study findings demonstrated that control in whatever form is paramount in official setting to prevent and detect fraud.

The fifth findings of the study are from the discussion of the theme that describes the effectiveness of forensic auditing techniques in fraud prevention. The findings give factors that described the accuracy of forensic auditing and the adequacy of forensic auditing techniques and tools. It is further established that adequacy of forensic auditing techniques means a lot to how effective the auditing will be as many of the interviewees emphasize more on the factors that dictates the adequacy of forensic auditing techniques implying that adequacy of forensic auditing tools is the most predominant description of effectiveness of forensic auditing techniques and tools.

# CHAPTER FIVE – DISCUSSION OF FINDINGS

## 5.0 Introduction

This chapter offers information and interpretations of the findings after the investigation of the effectiveness of forensic auditing in preventing and detecting fraud in the Nigerian public sector that is done in chapter four. It also provides answers to the questions of how effectively forensic auditing works in Nigeria's public sector to ensure fraud detection and prevention. Also, the chapter discusses the implications of the findings with the attempts to give a thorough grasp of the effectiveness of forensic auditing in the Nigerian public sector by connecting the findings to research questions and results of reviewed related extant literatures.

This chapter further validates the findings of the study by comparing with existing literatures both in the country of research and other developed nations. The researcher can ascertain what has been done in the past to address the problems in a different setting and whether this can be applied in the current context by further comparing with previous investigations. Furthermore, it enables the researcher to determine the implications of the study. Overall, the chapter aids in the development of freshly discovered knowledge.

## 5.1 Reasons for Forensic Auditing in Nigeria Public Sector

Generally, organisations that have engaged in financial crimes may require a forensic audit, which can be crucial in determining the precise conditions under which fraudulent activity may have occurred. This in line with the results of the study which show that the most significant reason for forensic auditing in Nigeria public sector that is uncovered in the investigation is revenue shortage or leakages, which caused the fraudulent operations to deteriorate to the point where only forensic auditing could rescue them. Reasons which are discussed under this theme are as follows.

### 5.1.1. Revenue Shortage

A widespread occurrence of revenue leakage has eaten deep at the profit margins of transaction- and service-based organisation. The revenues leakage is at the heart of all systemic problems with insufficient funding and poses a grave threat to the survival of some important government parastatals. According to this study's findings, one of the indicators that the public sector needs forensic auditing is the revenue shortage due to revenue leaks over time. This is because, despite the abundance of oil resources, the government was unable to meet its obligations despite the high expectation from oil revenue as budgeted. From a theoretical standpoint, the findings support agency theory, indicating that public officials may not act in the best interests of citizens due to inadequate oversight, leading to revenue leakages and financial distress. Additionally, it aligns with fraud triangle theory, which states that fraud occurs when pressure, opportunity, and rationalisation converge; this reveals that weaknesses in financial systems create opportunities, and pressures from revenue shortages may promote unethical practices.

The observed reason of revenue shortage is supported by the study of Iheme (2024) which conducted a review of policy implementation of forensic accounting in Nigeria's revenue leakage and it discovered that operational inefficiencies and missing transactions are the main causes of government revenue leakage and if there will be a solution, it is recommended that all ministries, departments, and agencies must use and deploy forensic auditing and forensic accountants. This align with the facts presented by Eme et al. (2015), positing that Nigeria is the most resource-rich African nation that loses a significant amount of its income due to corruption. And it also showed that the government has kept releasing numbers for unreported income. Among these is N3.8 trillion that the Nigerian National Petroleum Corporation (NNPC) is accused of withholding from the N8.1 trillion the nation received from the sale of crude oil between 2012 and 2015. Based on this evidence, participants opined that it is expedient to go beyond the routine revenue audits and system integration reviews but rather engage forensic auditing as a one-step remedy to address revenue shortage.

The findings of this research align with result of Mbasiti et al. (2021), which investigates the degree to which forensic accounting techniques are a magic bullet for stopping revenue leaks at Nigerian federal universities. The outcome demonstrates the beneficial benefits of forensic auditing analysis techniques on revenue leaks in Federal Universities in Nigeria. This suggests that forensic data analysis methods can be used to expose revenue leaks in government institutions in Nigeria. It follows that there would be a significant decrease in income leaks if these solutions were implemented. Hence the reason it is engaged.

It is then established that the main reason forensic auditing engagement is its capacity to identify discrepancies in financial record and ensuring that organization recover its lost revenues. This corroborates the findings of Eme et al., (2015) that examines how to address revenue leakages in Nigeria and the findings revealed that the capacity of forensic auditing in enhancing transparency and accountability has enabled public organizations to recover lost revenues. More so, the result corroborates the findings of Ekwe et al., (2019) which investigated the necessity of forensic auditing in the Nigerian public sector to reduce fraud. To do this, information was gathered from secondary sources, such as press reports, reports from the Economic and Financial Crime Commission (EFCC), the Independent and Corrupt Practices Commission (ICPC), and investigation committees and the findings showed that there is a significant correlation between forensic audit and fraud reduction. The implication of the findings is that if the government indeed seeks to enhance financial integrity an address revenue leakage in all public organizations, especially the NNPC. It must engage data analysis employed in forensic auditing and legal frameworks to find disparities and put preventative measures in place, which will eventually reduce the loss of revenue.

#### 5.1.2. Flawed Business Model

The findings of this research revealed that there are pronounced flaws in the flow of administrative power vested in the management of public organization in this case the NNPC. This finding is in line with the discussion of scholars in empirical literature including the study of Rifai et al., (2023) which discovered that ill-structured processes in government establishments often lead to mismanagement, which usually cause to the need for forensic audits to investigate these problems. In support of this opinion, Abdullahi and Mansor (2018) while researching how fraud incidents relate to the components of the fraud triangle theory found out that fraudster usually has the chance to betray the financial trust he has with his organisation because of a known weakness in the business model. There may be a chance because of the organization's poor management and supervision which in this case is the situation of NNPC. Likewise, inappropriate policy design in the Nigerian public sector has been noted by Abdullahi and Mansor (2018) as a way for public officials to knowingly transfer public funds into their personal accounts. They exploit the policy to push for official corruption and fraud, which can cost the government funds and necessitates immediate attention.

Anomah et al. (2014), opined that forensic auditing is an essential tool for preventing financial mismanagement and corruption in settings with slack regulatory frameworks as it provides a proactive method of detecting fraud. This is likewise supported by Oyedokun (2024) while examining forensic accounting and financial reporting quality of banks in Nigeria as the study highlighted inadequate regulatory oversight, inefficiencies in the public sector, and inconsistencies in financial reporting as factors that prompted demands for better financial system protection, which has made the use of forensic accounting necessary.

The results of this research lays emphasis on weak and inefficient system as the most prominent flawed observed as the financial reporting method showcase paucity of needed information. This clearly confirm the opportunity component of the fraud triangle theory. Inadequate financial reporting, characterised by a lack of relevant information, combined with weak and ineffective processes, creates an environment in which internal controls become ineffective or are easily bypassed. Lack of transparency and completeness in reporting increases the possibility of fraud by decreasing the chance of detection. Without prompt monitoring, management can take advantage of oversight vulnerabilities in such a system, potentially leading to financial misreporting and increased risk of fraudulent activities.

This aligned with the findings of Adeidre (2016), that found out that people in general have discovered the extraordinary need for professionals known as forensic auditors to identify, unearth, and prevent flaws in the governance system and financial statements because of the management's lack of accountability. Lokanan (2015) likewise established that the chance to commit fraud is significantly linked with insufficient or weak controls. More so, Rifai et al. (2016) discovered that the control environment has contributed to the growth of fraud because top officers hardly ever seek advice from external auditors regarding fraud suspicions and this shortcoming is traceable to weak business model. Therefore, from the above discussion, the study concludes that flaws that are noticed frequently result in vulnerabilities that can be used to commit fraud and to uncover and resolve these flaws and encourage accountability and transparency in businesses, forensic auditing is therefore an essential tool.

### 5.1.3 Statutory Audit Failure

The result of this research analysis suggested that one of the key reasons for forensic audits and its increasing popularity is their greater level of intensity compared to routine audits, which increases the possibility of success. Most of the literatures validate the fact that most statutory audit in public sector have not been able to achieve many results because after the auditors must have declared that the financial position and financial performance presented by the organization portray the true and fair view, and thereafter the organisation experiences escalation of fraudulent behavior. This can be attributed to the fact that test group, periodic reviews, and compliance checks are frequently used in routine statutory audits, and this usually leave gap that individuals can take advantage of. Even in cases when auditors claim to have a "true and fair view," their inability to spot fraud makes it possible for fraudulent activity to continue after the fact. The shortcomings of statutory audits highlight their failure to adequately address the factors of opportunity and capability as explained by the fraud triangle theory and the fraud diamond theory.

This position was supported by Omigie and Osarenmwinda (2023) in their assessment of the audit effectiveness in Nigeria's public sector and the findings revealed that the country's public sector has various difficulties that raise questions about the efficiency of performance auditing. Investigation was made by Okoye et al. (2015) which looked at ways to combat the prevalence of audit failures in Nigeria whilst the search for audit quality. The findings showed that audit failure is a significant issue in Nigeria, with grave repercussions for both the country's economy and the auditing profession. It then suggests, among other things, that public interest organisations in Nigeria immediately be required to do forensic audits, say once every five years. In their analysis of how forensic audit might improve corporate governance, Verma and Verma (2022) assert that internal and statutory audit systems are inadequate for preventing frauds and that a redefining of the role of auditors is urgently needed. The field of forensic audit is therefore anticipated to expand significantly.

The research finding supports the result of Nandini and Ajayi (2021) which examined the impact of forensic audit on fraud investigation and prevention in corporate companies and found that typical statutory audits frequently fall short of identifying financial irregularities, which results in large company failures and losses for investors. It equally supports the result of Akinleye et al. (2023) which provide evidence from Nigeria the outcome of ccombating financial crimes through forensic audit and reported that forensic auditing must be used to successfully combat financial crimes, especially in Nigeria, as statutory audits have failed globally. This likewise align with the result of Singh and Singh (2024), which submitted that audit failure makes forensic auditing necessary because management manipulation makes it impossible for traditional internal and external auditors to identify emerging frauds.

In summary, the findings of exiting literature established that fact that there is a significant correlation between forensic auditing techniques and Nigeria's public sector efforts to detect and prevent fraud. And it has been adjudged that forensic auditing techniques are an important way to address the level of fraud in the Nigerian public sector and the reason for advocating for its usage.

The implication of the findings of the research is that forensic auditing is generally expected to alleviate the current vulnerability of traditional accounting and auditing systems to financial fraud by uncovering existing fraud and bridge the audit expectation gap. The study therefore concludes that audit failures have significantly contributed to the rise of forensic auditing as a specialized field aimed at investigating and preventing financial fraud and forensic audit will provide relief from the current vulnerability of conventional auditing systems to financial fraud.

## 5.2 How Forensic Audit Tools and Techniques Can Be Used to Detect and Prevent Fraudulent Activity in Nigeria Public Sector

The findings of the research showed that forensic auditing can prevent fraudulent activities because of its distinctive features such as the legal repercussion, the special audit mandate it uses and specialized professional knowledge that it entails in the process. It was also revealed in the analysis that forensic audit independence is another way it was able to detect and prevent fraudulent activities. This would further be discussed under the following side headings.

### 5.2.1 Forensic Auditors Independence

The result from the research analysis buttresses the point that the independence of the forensic auditor contributes significantly to its success in audit prevention and detection. The independence of forensic auditors can rarely be compromised as the assignment of fraud detection is a top priority. This imply that the independence of forensic auditors greatly improves fraud detection and prevention, supporting the claims of the fraud triangle and fraud diamond theories. Auditors' independence reduces the risk of fraud by increasing supervision and restricting managerial influence. Furthermore, independence in the Fraud Diamond framework limits the capacity of those with the necessary skills to commit and hide fraud, which strengthens the effectiveness of forensic auditing. Demeke et al., (2020) reinforce the fact that a key component of forensic audit is the reinforcement of accuracy and credibility in financial reporting through independent and morally sound audits. Kipng'eno and Ngahu (2022) while examining the independence of forensic auditors and fraud prevention in Kenya banks found out that managers can only get the desired outcomes in terms of preventing fraud when they let forensic auditors work without interfering. Since the main circumstances influencing auditors', compromise seldom happens in case of forensic audit, forensic auditor independence is attainable. Forensic audit does not involve the provision of non-audit services, which may result in conflicts of interest and undermine auditors' independence (Kamal, 2023). Furthermore, the forensic audit assignment is for a set time frame that typically doesn't extend. Therefore, avoidance of long tenure that could result in familiarity threats, when auditors grow too close to clients, which could compromise their objectivity and skepticism is possible and all this aids forensic auditor's independence.

The independence of forensic auditors is well guaranteed because their gadgets for investigation are less susceptible to manipulation. This aligns with the position of Carazas-Romero et al., (2024) when analysing the successful rate of forensic auditing with the use of artificial intelligence through systematic review, the study found out that the use of technology such as artificial intelligence (AI) and data analytics in forensic auditing has a big impact on auditor independence by improving their capacity to identify fraud while remaining unbiassed. The application of AI preserves the auditor's objectivity as it minimises human interference and opinion as human factors is the higher factor that compromise independence of auditor and the worries about conflicts of interest is minimised with the use of AI (Libby & Witz, 2024). In similar vein, Raji et al. (2023) discovered that the use of computer forensic audit technology improves auditors' independence by allowing them to identify major errors and misstatements, which raises the reliability of audit reports and meets stakeholder expectations in financial reporting. In their investigation into the perceived significance of emerging technologies in the audit environment, Alipourfallahpasand and Asgari (2020) discovered a positive relationship between the use of emerging technologies and audit firms' quality rankings. According to these results, using AI can lessen the tension of conflicts between internal auditor and forensic auditor and increase confidence in the auditing process. According to Mbasiti et al.'s (2020) investigation into how forensic accounting reflects the application of investigative and analytical techniques for the purpose of resolving fraudulent practices, forensic accounting technologies enhance auditors' independence by providing proactive fraud detection tools that enable them to identify fraudulent activities without worrying about management repercussions.

From a theoretical standpoint, the independence of forensic auditors is related to the fourth component of capacity in the fraud diamond theory. Independent auditors make it harder for people who can commit fraud. Hence, it can be established that one important factor affecting forensic auditors' efficacy in detecting and prevention of fraud is their independence. The research hereby concludes that, higher level of independence is accorded to forensic auditors, and this have earned them higher success rate in fraud prevention and detection. Also, this independence is essential for offering objective assessments of the accuracy of data produced by information systems, particularly in the technologically advanced world of today.

### 5.2.2 Legal Repercussion

The study's findings demonstrate that the substantial legal consequences that follow forensic audit are equally ingrained with the ability of forensic audit to prevent and detect fraud. These audits improve accountability and governance by not only spotting fraudulent activity but also offering crucial proof for court cases**.** According to Alvarado et al. (2016) forensic audits produce technical results that can be used as proof in court, and this indicates that beyond fraud detection, it makes it easier to prosecute cases of corruption and fraud since it will present evidence to the courts, increasing the certainty of justice.

Since the reason for forensic audit in public sector is to mitigate fiscal mismanagement, going legal is a potent means of serving deterrent to others seeking opportunity to commit such atrocities. It creates tension and the efficacy of the legal penalties makes it a potent tool. Hence, in court cases, forensic audits are quite helpful. Likewise, Anggraini et al. (2019), highlights that forensic auditors collect evidence during their investigations and if it doesn't lead to legal actions, they may be important for alternative dispute resolution procedures.

The types of legal evidence produced by forensic audit ranges from documentary evidence to expert testimony, audit working papers and fraud detection report. According to Maryani and Sastradipraja (2022), forensic audits generate thorough reports that contain financial records, which are essential pieces of evidence in court cases. When analysing financial forensic evidence in a court of law, Denhere (2022) argued that forensic audits can produce a variety of legal evidence, such as financial statements, transaction records, and information on financial crimes. This evidence supports courts in matters involving embezzlement, fraud, and other financial offences throughout litigation and arbitration.

Therefore, it is accurate to state that the forensic audit working paper and the investigative audit result report both provide instructional and documented proof which has repercussion in the court of law. This supports the results of Sudarmadi (2023), which submitted that comprehensive findings produced by investigative audits can show instances of fraud and provide a coherent story that can be applied in court. This position further aligns with the study of Oliveira et al. (2024) which revealed that forensic accounting makes use of specific technical expertise to support claims in court. This knowledge helps judges make fair and well-informed decisions, emphasizing how important accounting knowledge is to produce high-quality court results.

The key components that make up the admissibility of evidence generated by forensic audits in legal contexts are the rigorous adherence to established legal standards and the technique employed during the forensic audit process. These elements ensure the validity and reliability of the evidence presented in court and the fact that it is usually almost 100 percent valid, it makes it effective in detection and prevention of fraud. In alignment with the fraud triangle theory, forensic audits' strong evidence limits perceived opportunity by raising the moral and legal cost of fraud while also reducing rationalization. Furthermore, in connection to the fraud diamond theory, those who possess the necessary skills are prevented from committing and hiding fraud by the prospect of legal repercussions because of its deterrent impact; forensic auditing not only detects fraud but also strengthens governance and accountability.

### 5.2.3 Popularized Audit Mandate

Results from chapter four shows that forensic assignment usually comes with a mandate that determines the engagement of the operation. The mandate defines the scope and details of the investigation. Usually, a forensic audit is started in reaction to suspicions or claims of misconduct within an organisation, the auditor general or any authorised officer must carefully examine a request for a special audit of a parastatal or organisation with the purpose of meticulously identifying and gathering evidence pertaining to financial misconduct, fraud, embezzlement, or any suspected irregularities in financial activities. This task came come with mandate especially in the public sector, where there are frequently numerous cases of fraud. It further aligns with the result of Boyelayefa (2021) which submits that forensic audit mandate includes a variety of duties that integrate accounting, legal, and investigative skills to uncover fraudulent activities and provide evidence for legal proceedings because forensic audit employs a multifaceted approach that not only helps detect fraud but also improves ethical standards.

Since it differs from a routine audit, the assignment's mandate typically requires them to start audits with suspicion of fraud and use investigative techniques including searches and espionage when needed (Anggraini et al., 2019). This supports the findings of Mokhomole (2023) which scrutinises the mandate of the forensic investigations unit in combatting financial malfeasance, fraud, corruption, anomalies, and maladministration within the South African public sector. The result of the study reveals that part three of the Public Service Regulations of 2016 (PSR), PFMA, and Treasury Regulations of 2001 provide a Forensic Investigations Unit with a more defined mandate.

The submission of other empirical studies supports the conclusion that the Minister of Finance is responsible for creating regulations pertaining to the investigation of allegations of financial misconduct in the public sector. And to ensure that the mandate does not fail, the judiciary can be a collaborator to designing and popularising the mandate. This corroborates the idea of fraud triangle and fraud diamond theories by demonstrating the importance of audit mandate which distinguished forensic audits for fraud prevention and detection. Providing clear scopes and authority reduces the likelihood of fraud and rationalisation. Furthermore, because forensic auditors may undertake complete, legally sound investigations such restrictions limit people's ability to commit and hide fraud which connect to the capability component of the fraud diamond theory.

### 5.2.4 Specialized Professional Knowledge

Forensic auditing services typically need the use of accountants' specialised knowledge and investigation abilities. The findings from this research shows that forensic auditing relies heavily on specialised professional expertise to achieve the target of fraud prevention and fraud detection.

This supports the result of Pcholkin and Muradly (2023), which submitted that forensic experts contribute through specialised knowledge by helping audit teams with fraud brainstorming, fraud testing process creation, and result review. Hence, their participation in riskier engagements is guaranteeing that forensic audit deploys specialised professional precautions that birth brilliant results. Also, it aligns with the result of Reschiwati et al. (2022) which revealed that only specialised knowledge may offer professionalism and skill, which is why forensic audit procedures are so successful in detecting and preventing fraud. More so, research by Verwey and Asare (2016) shows that forensic experts spot more fraud indicators than regular audits, and that their specialised knowledge enhances cue detection and audit program design. Oyerogba's (2021) study emphasises that efficient fraud detection in the Nigerian public sector is highly predicted by specialised professional knowledge and skills deployed by forensic auditors. Yefimov (2020) confirmed that forensic audits use specialised knowledge by enlisting forensic experts and involving specialists, which allows for qualified answers to complicated challenges in the investigation of crimes against morals. In the same vein, Afriyie et al. (2022) found out that specific professional knowledge improves fraud detection in forensic audits by giving accountants investigative and proactive auditing skills. This allows them to spot weaknesses in governance, internal controls, and financial statements, which in turn helps with successful fraud prevention and prosecution.

Hashim (2024) highlighted that having specific professional expertise in forensic accounting helps detect fraud by allowing forensic accountants to carefully examine financial statements, spot fraud, and evaluate accounting estimates, which in turn improves financial reporting's accuracy and transparency. This result further support Alhumoudi & Alhumoudi (2023) which investigates the role of forensic accountants in fraud and corruption cases and its impact on business development posit that the pillar behind forensic auditing is the use of certain knowledge and skills to find proof of financial transactions. More so, according to Anghel and Poenaru (2023), experts in forensic audit don't only look at financial statements; they adopt a comprehensive strategy to uncover the truth. Hence, the study conclude that the specialised knowledge is equally important to due diligence that will help forensic auditors to prevent and detect fraud.

## 5.3. Role of Auditors in the Public Sector on Fraud Prevention and Detection

The auditors play a crucial role in the detection and prevention of fraud in organisations. They verify revenue and receipts, account for property, and investigate defects and monetary losses. They also ensure that the accounting system used by the government complies with regulations. It is also anticipated that discrepancies in government financial records, fund disbursements, and transactions will be disclosed in the course of their duty.

This research findings indicate that good number of the participants which are auditors have indicated that their roles contribute to fraud prevention and these roles serve as preliminary measures in ensuring that fraud fails. These roles are statutory as they are embedded in the regulations operating in public sector and the roles revolve round inspection, checking vouchers, crosschecking books of records, verification of financial information. Hence, it could be said that in the public sector, voucher inspection and verification play a critical role in preventing and detecting fraud. In alignment with the fraud triangle, these roles decrease the opportunity for fraud by improving internal controls and increasing transparency, while also decreasing rationalization via constant oversight. Furthermore, in connection to the fraud diamond theory, frequent audit efforts serve as preventative measures that address the core motivations of fraudulent activity and improve accountability in the public sector.

This aligns with the study of Sokoleko (2022) which posit that these procedures are crucial tools for guaranteeing transparency and accountability in the administration of public fund. Internal auditors check vouchers, and this allows them to verify the legitimacy of transactions, ensuring that funds are used appropriately. This viewpoint further supports the findings of Erbuğa (2022), which showed that public sector voucher inspection and checking are essential for preventing and detecting fraud because they guarantee accuracy and accountability in financial transactions, discouraging fraudulent activity and boosting transparency in government and state-owned businesses.

Furthermore, Ziorklui et al. (2024) revealed that voucher inspection and checking in the public sector are essential for preventing and detecting fraud because they improve internal controls, guarantee accountability, and assist in identifying discrepancies, all of which lower the likelihood of fraudulent activity. According to Yahya et al., (2018), an auditor's primary responsibility in an organisation is inspection, which includes verifying vouchers. They also play a vital role in preventing and detecting fraud in the public sector by guaranteeing process control, strengthening internal reviews, and facilitating cash and inventory oversight, all of which increase overall effectiveness against fraud.

In summary, the discussion has showed that ensuring the correctness of financial records is the primary responsibility of auditors and based on the results of the study, it is concluded that auditors' roles are essential in making sure they are effective at preventing and detecting fraud, and regular verification is their top specific role in prevention of fraud.

## 5.4 Factors that Impact the Effectiveness of Fraud Detection Activities

The fraud triangle theory explained that pressure, opportunity and rationalisation are the three main elements that made fraud possible. Studies have shown that ineffective control or governance factors are what makes the opportunity to commit fraud and rationalisation of the fraud possible and when these are addressed, fraud prevention is possible. The results from the analysis likewise projected this idea as the study findings highlighted control and governance drivers as the main factors can impact the effectiveness of forensic audit in fraud prevention and fraud detection. The findings revealed that management support and organisational structure play a significant role in the effectiveness of forensic audit in fraud prevention and the discussion of the sub-themes was further discussed in sections below and it covers identified factors which are established procedures and policies, functional internal control, duty segregation and regular audit

### 5.4.1 Established Procedures and Policies

The participants pinpoint the fact that to accomplish the goal of fraud prevention and fraud detection, every government agency and its personnel must adhere to a set of rules or guidelines. This must be in place for necessary guidelines and procedure for decision-making, boundaries, principles, and directives. This result implies that following defined guidelines promotes an integrity-based culture and guarantees adherence to regulatory norms.

According to the fraud diamond theory, which incorporates capacity as a fourth criterion, strict adherence to regulatory standards restricts individuals with the requisite competence to perpetrate fraud. Governance structures founded on clear legislation and ethical principles are effective in addressing the root causes of fraudulent behavior. This aligned with the study of Ameyaw et al., (2024) which posit that procedures and policies in an organization create a control environment that conveys a zero tolerance for fraud. Hence, established procedures and regulations, can be used to mold and direct staff behavior and expectations of stakeholders in achieving an organization goal.

According to Murphy (2015), policies improve fraud prevention and detection skills by empowering organisations to pinpoint specific risks, put appropriate measures in place, and guarantee continuous oversight. Furthermore, Yuniasih and Iskandar (2019) posit that a highly successful method for identifying fraud is the implementation of specified policies. Atagboro (2015) conducted an empirical investigation to determine whether due process procedures can prevent fraudulent activities in the Nigerian public sector. The study revealed that due process guarantees transparency and can prevent fraudulent activities.

The provision of a procedural or policy framework can readily make up for the internal audit unit's shortcomings in carrying out oversight across the entire organisation. Also, it supports the findings of Babatola (2022) which revealed that the standard operating procedures and policy statements that govern employment and working conditions in the public sector are necessary for effectiveness. This can then imply that adherence is an encouragement of actions that support the goals of public service whilst serving as a guideline and work guide for the bureaucratic culture of public employees and offers an operational framework. Furthermore, in a public organisation, the efficacy of rules such as gratification and whistleblowing policies can have a good effect. Therefore, the organisation should establish policies to manage gratuities provided to officials and employees.

The policy's goal is to ensure that gratuities collected by officials or personnel are handled properly and reported to the appropriate units. Additionally, data confidentiality and reporting protection procedures should be in place to support the whistleblower policy. This supports the findings of Nadhifah and Hanif (2024) which revealed that rules and procedures can stop fraud by implementing an active whistleblower system, conducting risk assessments to develop good procedure, developing a clear punishment policy, and utilising automation technology. In the same vein, Sani and Mohammed (2021) investigated the impact of whistleblowing policies on preventing fraud in Nigeria. Their findings showed that organisations lacking such policies are susceptible to fraud, and that state and local government parastatals can minimise fraud by fully implementing whistleblowing policies. For stakeholders to comply and accept established procedures and policies, they must be clear, understandable, and supported by evidence (Rangone, 2018). Likewise, Ardanaz et al. (2023), revealed that regulations in the public sector are improved by well-designed rules that enable compliance mechanisms and provide explicit instructions on how to return to compliance after using escape clauses.

Based on the discussion of findings above, the study concludes that in the public sector, following established policies and procedures can improve government effort in preventing fraud while ignoring these policies will result to unanticipated legal cost and failures, underscoring the significance of established procedure and policies for success.

### 5.4.2 Functional Internal Control

The opinions issued by the participants suggested that internal controls are crucial organisational structures that greatly aid in the prevention of fraud. These controls include several elements that cooperate to protect resources, guarantee correct financial reporting, and advance operational effectiveness. This is supporting the findings of Saidi's (2024) which demonstrated that adequate internal controls considerably minimise the likelihood of fraud. Therefore, organisations must continuously adapt and strengthen their internal control systems to handle fraudulent activities and build a culture of integrity and transparency. This establish the postulation of the fraud triangle and fraud diamond hypotheses which imply that internal controls limit rationalisation by boosting monitoring, improving transparency, and guaranteeing accurate financial reporting. Additionally, it is consistent with the fraud diamond architecture, whereby efficient control mechanisms limit the capacity of those who possess the necessary skills to commit and hide fraud. As a result, functional internal controls are a fundamental governance instrument that improves organisational integrity.

It further aligns with the study of Azizah et al., (2023) which analysed the role of internal audit in avoiding fraud within the organisation, they discovered that functioning internal controls can prevent fraud by identifying system weaknesses, guaranteeing policy compliance, and frequently reviewing transactions. It also entails teaching staff about ethics and offering whistleblower routes for disclosing wrongdoing without fear of punishment.

In the same vein, Bhat (2023) found out that functional internal controls lower fraud by ensuring that internal control systems identify and discourage fraudulent activities within businesses, this proactive approach significantly reduces fraud and professional misconduct. Yulianti et al.'s (2024) examination of internal control and governance in fraud prevention revealed that it enables organisations to recognise and terminate fraudulent conduct, as positive work environments are created by organised internal controls that support strong corporate governance and increase reliability while adhering to business needs. Likewise, Nadhifah and Hanif (2022) sought to evaluate the efficacy of the internal control environment as an endeavour to detect and prevent fraud to gain a better understanding of internal auditors' opinions regarding the environment's efficacy. The results of the study indicate that adequate internal controls can assist an organisation or entity with a specified disciplinary policy in identifying and preventing fraud.

These findings imply that internal control that can be adjudged effectives have a wide range of activities, strategies, and tactics employed by management to guarantee the efficient and cost-effective functioning of the organisation. This aligned with the study of Rashid (2022) which examined the effect of internal control in fraud prevention and detection. The results showed that an efficient internal control system greatly aids in preventing fraud by guaranteeing accountability, encouraging moral behaviour, carrying out risk assessments, and setting up procedures for reporting and investigation.

Moreso, Dwi and Sonia (2020) investigated how internal controls and reporting systems affected Indonesian state-owned enterprises' (SOEs') ability to avoid fraud. The findings demonstrate that fraud prevention, internal control, and reporting systems all fit into respectable categories in Indonesian state-owned businesses. Internal control and the reporting system are key components in preventing fraud. The impact of internal control systems on fraud detection and prevention among SMEs in Nairobi, Kenya was examined by Opiyo (2023). The findings showed a favourable relationship between risk assessment and monitoring and fraud detection and prevention among SMEs in Nairobi, Kenya. However, among Nairobi's

SMEs, there was only a modest relationship between the control environment and fraud detection and prevention.

Unlike the previously discussed investigations, Adiko et al. (2019) examined corporate governance and internal control and according to the findings, fraud prevention is unaffected by internal control. In the same vein, Herawati and Hernando (2020) examine the relationship between internal control and both fraud prevention and sound corporate governance. The findings of their study indicate that internal control has no effect on fraud prevention and detection

The summary of the evidence indicates that internal control as a system helps organisations achieve their objectives while reducing fraudulent activity. It further demonstrates that putting in place credible internal controls helps prevent fraud. Thus, the research concludes that internal controls are created and put into place to handle business risks such as financial and non-financial fraud that have been identified as endangering the accomplishment of organisational objectives.

### 5.4.3 Management Commitment and Support

According to the research interviews, management commitment can support organisations in fostering transparency and honesty, which in turn highlights management's role in fraud prevention. The commitment of management is believed to starts from embracing process and strategies that can achieve fraud prevention and fraud detection. This aligns with empirical findings from previous literature such as Ewa (2022) which assessed the effectiveness of forensic accounting methods in Nigerian fraud management and according to the study findings, management support is essential for putting forensic methods like data mining and trend analysis into practice which greatly improve fraud detection and prevention in Nigeria's public sector MDAs. According to the findings of Erbuga (2022), it is revealed that management can show their commitment to preventing fraud by putting in place strong anti-fraud policies, regularly training staff, setting up clear reporting procedures, and encouraging an accountable culture in Nigeria's public sector institutions.

Pandjaitan and Setyawanta (2023) examined Corruption Prevention Strategies in Government Institutions in Indonesia, an economy comparable to Nigeria. Their findings indicated that management could show their commitment to preventing fraud by enforcing stricter bureaucratic ethics, punishing dishonest officials, rewarding honest workers, and educating the public about the negative effects of corruption. According to Widiutami et al. (2017), organisational management commitment has a negative impact on preventing fraud, suggesting that a high level of commitment can reduce fraud tendencies. Therefore, an ethical culture is fostered by a dedicated management team, which is necessary for the effective execution of anti-fraud measures (Ulfah et al., 2024).

Natasya et al., (2017), management commitment is essential for assisting organisations in identifying threats and thwarting fraud. Also, according to Ulfah et al.'s (2024) research, commitment improves the Government Internal Control System's (SPIP) ability to prevent procurement fraud. The efficiency of anti-fraud procedures is increased by a strong ethical commitment, underscoring the significance of managerial commitment in fraud prevention tactics. Gbegi and Adebisi (2015) claimed that management practices and public sector fraud in Nigeria are positively and significantly correlated with fraud detection and prevention in the Nigerian public sector has and it is recommended that modern accounting and auditing software should be used in the public sector to improve the effective and seamless identification of fraud.

Lastri et al., (2022) when considering the mediation of the relationship between management commitment and fraud prevention, found out that Strong leadership can increase the efficacy of internal control systems. Hence, it is easier for an organisation to establish sufficient internal control and give stakeholders trust about the accuracy of financial reports when all executives have a high level of commitment. This is corroborated by a study by Siwambudi et al. (2016), which suggests that it is difficult to establish sufficient internal control to guarantee the integrity of the financial statements generated in the absence of strong organisational commitment. Similarly, Rachman (2021) discovered that management commitment has a significant effect on fraud prevention and that the more organisational management commitment increases, the higher level of fraud prevention in the organisation.

Betts (2024), management commitment is essential for successful fraud prevention since it cultivates a responsible and awareness culture. To ensure that resources are given and to encourage a proactive approach to identifying and managing fraud risks, leaders must actively promote programs aimed at preventing fraud. In summary, employees find it increasingly challenging to exploit system flaws when leadership rigorously enforces rules and supervision procedures. This aligns with the opportunity component of the fraud triangle theory. Furthermore, by ensuring that adequate funds are allocated to internal controls, monitoring systems, and anti-fraud initiatives, a strong commitment from management to fraud prevention significantly reduces opportunities for misconduct. A proactive leadership approach ensures that even capable individuals are subject to scrutiny and control as implied by the fraud diamond theory.

Based on the discussions and supporting evidence in the literature, it confirmed this study findings that beyond established procedure, the commitment of management to monitoring and providing support the existing system is germane in fraud prevention because they serve as the bridge. It is concluded that management can successfully show their allegiance to preventing fraud in Nigeria's public sector by helping and demonstrating greater commitment through calculated measures that can deter fraud in all its forms.

### 5.4.4 Regular Audit

The result of the research analysis shows that participants are keen on audit in various forms in the public institutions. The findings established the fact that regular audits are a vital component of good financial health and a crucial element that affects fraud prevention. This provides a thorough assessment of the public institution's financial health all over the time and guarantees that rules are observed and that there are no opportunities for fraud.

To confirm that your financial statements accurately reflect the condition of the company's finances, the most common type of audit in the public sector is a financial statement audit. Compliance audits, on the other hand, are intended to make sure that your company complies with internal rules, statutory requirements, and laws while operational audit is meant to evaluate the effectiveness and efficiency of operations. Regularly carrying out these practices block the opportunity for fraud and quick detection of fraud if it occurs. This support the study of Effiong et al. (2016), who evaluated the efficacy of Nigeria's fraud prevention and detection mechanisms, and the results revealed that operational auditing, ranked first and imply that it is the most often utilised fraud detection and prevention mechanism. Likewise, it supports the result of Sokolenko (2022) which submits that regular audits are crucial for preventing fraud in the public sector because they assist in identifying fraud risks, evaluating transactions, obtaining evidence, and informing authorities of findings.

Ceki (2024) submitted that regular audits are essential for fraud prevention in the public sector because constant examination protect government property and budget funds from possible misuse and reputational damage. Amalia (2023) did a comprehensive review of public sector accounting practice and submitted that regular audits are a means of detecting fraud and, eventually, of promoting public confidence in government operations.

Regular audit is a vital tool for preserving financial stability and attaining sustained organisation success since exploitation and intentional misstatement will be exposed if the exercise is carried out diligently. This supports the findings of Lazbery and Ine-Tonbarapa (2023) which investigated the accountability of federal public institutions in Rivers State, Nigeria in line with public sector audit processes. The study's findings demonstrated a significant connection between Nigerian government institutions' financial responsibility and financial audit. Also, the result further shows that regulatory/compliance audits and the financial responsibilities of Nigerian government entities are also correlated, and the implication of the findings is that financial auditing enhance finance deepening, hence, it needs to be given greater attention.

Also, according to Wahua et al. (2024) which considered public audit reforms and financial management in Nigeria, the study concluded that regular audits improve accountability and transparency in the public sector by guaranteeing that financial management procedures are closely evaluated, encouraging integrity, and thwarting corruption. The highlighted benefit of regular audit in Nigeria is targeted at preventing revenue leakages and boost public confidence. In the same vein, Joseph and Onyeanu (2023) investigated the impact of financial and performance audits on transparency in the Federal Capital Territory, Benue, Kogi, Kwara, Nasarawa, Niger, Plateau, and other North Central states. The results showed that financial and performance audits are statistically significant in terms of transparency that is free from irregularities. The transparency in public operation is critical in ensuring fraud does not occur because all is exposed by audit scrutiny, and this indicate that transparency enhance fraud prevention effort. This is supported by the study of Liu and Lin's (2020) which concentrated on audits and corruption in China. Government audits are positively significant in detecting abnormalities in the provinces being examined. Lauletta et al. (2022) discovered that frequent audits minimise discretionary practices and encourage merit-based hiring, which helps to fraud

Based on the discussion and empirical analysis above, the study therefore conclude that regular audits are essential for improving accountability, transparency, and performance efficiency by the means of uncovering weaknesses and guarantee regulatory compliance, all of which help prevent fraud.

### 5.4.5 Duty Segregation

One of the main principles of financial control is to break down processes so that no one person oversees each step to prevent fraud and error. According to participants' contribution in chapter four, dividing responsibilities among different individuals to reduce the risk of fraud impact fraud prevention and detection. The organisation is expected to consider the roles allocated to each person involved in financial process. This supports the results of Sewsankar (2024) investigates the significance of segregation of duties in the public sector and how it affects private sector adherence to national regulations. The study findings underline how improper task segregation in the public sector resulted to inefficiencies, resource misuse and fraud ultimately jeopardising financial integrity of the government entities. The potential number of organisational fraud incidents, both with and without task segregation, was mathematically modelled by Barra et al. (2020). The objective was to find out how prevalent the separation of duties is in the public sector and whether it works as a preventive measure. According to the study findings, segregation of duties increases the risk of fraud by the same amount or more, and it needs to be 99 percent effective to be considered a preventive strategy.

It further aligns with the study of Ong'are and Njeru (2022) which investigated how well internal control systems in Kenya prevented fraud in state businesses. The findings demonstrated that segregation of duties is a crucial component of internal control systems that influences how effectively fraud is prevented. Adelana and Toba (2018) conducted an empirical investigation into the connection between internal control systems and fraud detection and prevention, as well as other associated elements such segregation of roles. The results indicate a positive and significant correlation between fraud detection and prevention and system authorisation. Segregation of Duty (SoD) shows that for every unit increase in segregation of duties, fraud detection and prevention decreased. Takai (2023) examined how internal controls affected fraud detection and prevention in Kenyan public universities, specifically aiming to ascertain how segregation of duties affected fraud detection and prevention in Kenyan public universities. The correlation results indicated that segregation of duties is positively and significantly correlated with fraud detection and prevention.

## 5.5 Effectiveness of Forensic Auditing Techniques in Identifying Fraudulent Activity in the Nigerian Public Sector

The results of the study show that the accuracy and adequacy provided by forensic audit techniques dictates its effectiveness. The results play more emphasis on the adequacy of forensic audit techniques that accuracy of forensic audit techniques. More so, the results from the study participants implied that the precision of auditing techniques boost its accuracy, and the independence of the technique helps them to attain fraud prevention and fraud detection easily. These techniques cannot be easily subjected to firm manipulative system as its reliance on existing control is minimal. More so, the findings imply that the adequacy can be based on the techniques capacity to minimize fraud occurrence, its delivery of exceptional result, the availability of forensic audit unit in the public sector organizations and lastly the satisfactory detection measures. Effectiveness of forensic auditing techniques in identifying fraudulent activity are discussed under this theme are as follows.

### 5.5.1. Independence of Forensic Tools and Techniques

To guarantee the dependability of forensic investigations, forensic auditing procedures must be independent. Participants of the study emphasise the autonomous approaches that helps forensic auditing tool to function independently of possibly compromised systems or methods. This independence is necessary to improve the accuracy of forensic analysis and reduce the hazards related to audit failures.

This result supports the findings of Rasin et al. (2018) which revealed that forensic tools can discover breaches even in compromised environments since they can operate efficiently on configured systems without the need for prior tamper-detection procedures. Likewise, Mukoffi et al. (2023) examined auditors' capacity to identify fraud in public accounting firms in Malang City and the result revealed that the effectiveness of the forensic investigation is influenced by their expertise, independence and professional scepticism. The implication of this findings shows that independence is an issue central in auditing both in traditional auditing and forensic. According to Alvarado et al. (2016), forensic auditing procedures are independent from regular audits in that they employ specialised approaches for examining fraud. Sandar (2016) investigates the effects of forensic auditing techniques on the professionalism, independence, and fraud detection of Indonesian forensic auditors. According to the results of the hypothesis test, forensic audit practices significantly affect the independence of forensic auditors in detecting fraud, which usually results in an increase in the professionalism of forensic auditors in fraud detection

The independence of the forensic auditing technique is achievable due to the use of contemporary technology been used which allows it to function without regard to human values, frequently ignoring the detrimental effects of humans. When Pradeep et al. (2024) examined innovations in forensic science, it is argued that contemporary technology improves forensic analyses by offering non-destructive, high-sensitivity bodily fluid detection and differentiation, increasing the precision and effectiveness of crime scene investigations in comparison to conventional techniques.

Based on the findings and empirical analysis, it is concluded that the effectiveness of forensic auditing is a function of its independence, and this is important to maintain ethical standards and guarantee objective investigations.

### 5.5.2 Precision of Forensic Tools and Techniques

The precision of forensic tools remains an important scorecard of forensic auditing. The result of the analysis done implies that forensic auditing techniques has a standardized testing procedure, which can enhance the credibility of investigations. Considering a theoretical position, the possibility that fraudulent activity will be correctly identified and backed up by reliable evidence is increased by the application of precise and standardised forensic procedures. Hence, potential fraudsters are aware that manipulation is more likely to be discovered by methodical and trustworthy testing processes, this immediately lowers opportunity as projected by the fraud triangle theory. Additionally, it undermines rationalisation since it is more difficult for people to defend fraudulent activity when detection is extremely likely due to the reliability and strength of forensic procedures.

This align with the position of Terwel et al. (2018) which states that the reliability of forensic auditing is determined by the method's relevance to the scenario under investigation and its suitability for the intended objective. The forensic approach's accuracy implies that, under the same conditions, the procedure can be repeated with the same results. The results indicate that to meet the ring of trustworthiness, an inquiry must be objective, repeatable, verifiable, thorough, and accurate. The function of proactive forensic auditing approaches in stopping fraudulent activities among NGOs in the eThekwini region is examined by Mvunabandi and Nomlala (2020). The findings indicate that proactiveness is a factor that improve the accuracy of forensic auditing and that a proactive approach to forensic auditing procedures could significantly aid in preventing fraudulent activities among non-governmental organisations in the eThekwini region of South Africa, according to empirical data.

By improving the precision of forensic tools and procedures through technological developments have significantly increased the accuracy of investigations. With the advent of many biometric technology and analytical methods, forensic experts now have reliable methods to find and analyse evidence. The precision and reliability of forensic auditing techniques and tool in identifying fraud in the public sector is confirmed in literatures.

According to Sunde (2022), who studies how practitioners of digital forensics handle objectivity and evidence reliability during investigations and the findings indicates that forensic techniques do not manipulate or regulate the dependability of evidence. The implications and impacts of forensic accounting as a legitimate financial tool for qualitative financial reporting were investigated by Desi (2023). The findings showed that forensic accounting had a major impact on all the qualitative traits and improved features of the financial reporting systems under investigation.

Existing studies shows that the techniques engaged are more reliable and can reliably identify anomalies hereby exposing fraudulent transactions. The correctness and accuracy of the results is paramount in ensuring that potential fraud is identified and addressed promptly. the integration of advanced forensic tools allows auditors to analyse vast amounts of data efficiently, uncovering patterns and discrepancies that may have otherwise go unnoticed. Ibhawaegbele (2023) argues that because of the accuracy and reliability brought about by the exceptional skills involved, forensic accounting is fully accepted as evidence in a court of law and was required to monitor crimes in various ways for the purpose of litigation in the courtroom. As a result, public sector organisations must enhance their auditing procedures since doing so will increase the efficacy of fraud prevention measures.

The results of the study addressed the reliability of forensic tools and revealed that its ability to increases the sensitivity of audits has instil public and government confidence in the findings of forensic auditing. When Islam and Islam (2024) examined the effectiveness of auditing, they found out that forensic accounting techniques strengthen the auditing framework by combining specialised expertise to uncover financial abnormalities, hence increasing the accuracy and reliability of audits. The result of this is more accurate financial reports, and greater transparency which is essential to prevention and detection of fraud. According to Chango (2024), forensic sciences have several innovative tools, techniques, and software that enable forensics to be better and more accurately comprehend the crime scene, acquire data and information more efficiently, and process information more quickly. This leads to more reliable findings and significantly enhances the scientific study of fraud.

### 5.5.3 Training and Development

Public sector auditors must receive forensic audit training and development to improve their ability to detect and prevent financial fraud. As fraud gets more complex, auditors need to learn certain forensic accounting techniques. The deficit in auditors with expertise in forensic auditing is noticeable in the findings as many of the participants noted that they do not have a forensic auditing training but only involve in mere routine verification. This finding aligned with the study conducted in Kwara State, Nigeria, by Ariyo-Edu and Woli-Jimoh (2024), which examined the effect of forensic accounting on the detection and prevention of public sector fraud. The results showed that internal auditors and accountants were largely in charge of fraud investigations, and there was a severe shortage of forensic accounting specialists.

The lack of auditor with specialization in public sector has led to less effectiveness in detection of fraud and this is confirmed by the results of Safiyanu et al., (2019) which investigate into the effectiveness of forensic accounting investigations in identifying financial fraud in Nigeria. The findings demonstrated the significant influence of forensic accounting services in identifying financial fraud in Nigeria, indicating that they constitute a crucial development in fraud detection techniques. The report also suggested that to fight financial fraud in the public sector, professional accounting organisations like the Association of National Accountants of Nigeria (ANAN) and the Institutes of Chartered Accountants of Nigeria (ICAN) encourage practitioners to specialise in forensic auditing. Likewise, Ewa (2022) evaluated how forensic accounting methods were used in Nigerian public sector ministries, departments, and agencies (MDAs) to manage fraud. The study found weaknesses in the way forensic methods are used in government agencies. According to Ali and Hafidh (2024), two crucial tactics for optimising the effectiveness of forensic auditing are ongoing training for auditors and modifying methods to suit organisational circumstances. The study's conclusions include suggestions for putting proactive forensic auditing methods into practice and investing in regular training,

The results of the study indicated that for public sector auditors to perform efficient audits, they need to have a strong grasp of forensic analysis, investigative methods, and critical thinking. It aligned with the result of Mahsun and Popoola, (2023) which submitted that internationally recognised forensic accounting curricula that prioritise fraud detection and prevention should be incorporated into training programs for public sector auditors. There is an existing gap in traditional audit training for fraud prevention and considering the dynamics of modern-day financial operations, public sector auditors' competencies need to be enhanced and to easily achieve this, training and development is essential.

Oyerogba (2021) is of the opinion that forensic auditing skills and techniques are significant predictors for fraud detection in the Nigerian public sector. Hence, MDAs should invest in human capital by requiring accounting and auditing staff to have professional credentials and

IT knowledge pertinent to forensic audits to provide robust fraud prevention and detection. Oyerogba (2021) examines how accounting professionals perceive the knowledge, skills and technique that a forensic auditor should have to provide high-quality services in fraud detection. The study concludes that professional accountants and accounting graduates in Nigeria need to have their training improved for effective fraud prevention.

The participant of this study in their responses projected the idea that training and development significantly impacts auditor expertise. This supports the result of Perwita-Sari et al. (2022) which found out that auditors must receive specialised training in forensic auditing techniques. The study pointed out that a strong forensic training can improve competencies and guarantee that auditors are ready to handle current auditing practices and successfully fight fraud in the public sector. According to Rumasukun (2024), auditor competencies can be developed through regular training and education. The research findings indicate that to effectively improve competencies, public sector auditor training programs should incorporate forensic techniques by stressing analytical abilities, critical thinking, and practical applications in addition to traditional auditing methods. Collectively, these studies highlight how important forensic auditing training and development are to reducing fraud risks in Nigeria's public sectors. Based on the findings discussion, it has been concluded that improved institutional support and professional training will bolster efforts to prevent and detect fraud, which will result in successful outcomes.

### 5.5.4. Availability of Forensic Audit Unit

Participants of the study emphasise on how crucial forensic audit units are to the fight against corruption and fraud in the public sector. This supports the study of Mokhomole (2023) which investigates the function and influence of the forensic investigations unit in the battle against financial malfeasance, fraud, corruption, irregularities, and maladministration in South Africa's public sector. According to the findings, the public sector's Forensic Investigations Unit's purpose is to investigate claims of common law offences include financial irregularities, fraud, corruption, and poor administration. Through its feedback, this unit aims to enhance ethical public service and lessen instances of fraud and corruption in the public sector.

According to Hashim (2024), the emergence of Forensic Audit Units improves internal control practices and periodic assessments of financial estimations, greatly lowering the likelihood of financial manipulation and fraud in public sector financial operations. In the same vein, Vutumu (2024) developed a theoretical framework for forensic accounting that combines ethical governance, control systems, and frequent reviews. This proactive framework improves accountability and protects financial integrity in public operations, and it is suggested that the creation of Forensic Audit Units can improve fraud prevention through the application of the Vutumu Forensic Accounting Theory.

In any modern organisation with advanced fraud history need to have an established forensic audit unit because its absence will undermine the effectiveness of fraud prevention effort. This supports the study of Ogbaini et al. (2024), forensic accounting unit plays a role in identifying and preventing fraud in the Nigerian public sector. According to the study's findings, the Lagos State Government does not have a forensic accounting department, employs forensics very rarely, and has not provided managerial training on forensic fraud prevention.

Onuora and Manafa (2021) studied the Nigerian public sector's use of forensic audit and assurance services. Based on the study's empirical analysis, forensic audit and assurance services and Nigerian public sector performance and accountability have a significant and positive relationship at the 1% significant level. This then means the effectiveness is on high level and this should consider having a forensic audit unit or department for better results when it comes to fraud prevention.

More so, the availability of forensic audit unit exposes on first hand any irregularities that may be going on in the organisation before it festers. It will as well make government officials more accountable because the severity of the unit judgement that make or mar their career reputation and this is supported by literatures. Establishing forensic audit units, according to Sodehinde et al. (2024), can greatly lower fraud in public financial operations by improving accountability and transparency. These units can handle white-collar crimes by implementing efficient forensic accounting techniques, looking into inconsistencies, and deterring potential criminals through legal measures. Likewise, according to Alam (2024), forensic audit units can foster confidence among public sector stakeholders. The trust can improve the identification of fraud in public financial operations, thereby protecting the government's financial integrity. In the same vein, Ogiriki (2018) conducts an empirical analysis of how forensic auditing affects fraud investigation, detection, and prevention. According to the study, forensic auditing methods and Nigerian public sector fraud detection, investigation, and prevention have a substantial association.

The findings coupled with existing literature imply that giving an auditing procedures provide a significant remedy for the extent of fraudulent activity that occurs in the Nigerian public sector, making them available is an appropriate action to preserve their effectiveness. In conclusion, it is established from discussion of findings that the presence of forensic audit units will reduce incidents of fraud and corruption because the existence will promote ethical practices within public service.

### 5.5.5. Exceptional Results

One the main distinct feature of forensic auditing is the delivery of exceptional result. The participants of the study opinion indicates that the outcome of forensic investigation supersede that of statutory audit because of its diverse usefulness courtesy of its details and preciseness. The adequacy forensic audit technique and tools is linked to its exception results, and this is evidenced in the findings of Sudarmadi (2023) which submitted that forensic auditing produces extraordinary results by offering comprehensive proof for court cases, whereas external audits check financial accounts for only correctness and compliance. Forensic audits are found to be more thorough; they frequently uncover intricate fraud that external audits might overlook.

Verma and Verma's (2022) study, forensic auditing is a dynamic and comprehensive tool for looking into financial fraud. The analysis revealed that the results of forensic auditing are unique because they entail a thorough examination of financial records to find fraud and provide thorough documentation for legal proceedings. This specialised method focusses on successfully preventing and treating financial malfeasance, going beyond traditional audits.

The exceptional result of forensic auditing could as well be because of the focused assignment that serves few purposes unlike the statutory audit the aims in serving several business stakeholders at once, hereby giving room for expectation gap as the interest of many stakeholders were not well captured. This supports the opinion of scholars who advocates for adoption of forensic audit unit in public sector. Forensic auditing distinguishes itself by applying scientific methods to investigate financial discrepancies with the primary objective of discovering the truth in legal situations. To protect the innocent and hold the guilty accountable, they try to support litigation or conflict resolution.

The findings of the analysis showed that the outstanding outcomes obtained are results of the fundamental qualities, attributes, and abilities that forensic auditors must have for the various investigative cases for which they are hired. Currently, forensic accountants possess superior analytical abilities in comparison to auditors who are more interpretative and integrative.

According to Oyerogba (2021), In Nigeria's public sector, forensic auditors' abilities and methods are important indicators of fraud detection. It suggests that the outstanding outcome is reliant on the critical thinking and problem-solving skills of forensic auditors, which are crucial success elements for assessing situations and developing practical solutions which forensic auditing is known for.

In conclusion, to produce remarkable outcomes, forensic auditors should be well-versed in accounting, auditing, law, investigation methodologies, strong ethical principles, and soft skills. This is because the effectiveness of their findings is mostly justified by how useful they are.

### 5.5.6 Minimization of Fraud Occurrence

The results of the analysis showed that the effectiveness of forensic auditing is judged by the extent of reduction in fraud occurrence after one time of forensic auditing. From the perspective of fraud triangle theory, the experience of investigation and its consequences weaken rationalization, as individuals become more aware of the risks and consequences of fraudulent behaviour, making it harder to justify such actions in the future. More so, the participants expressed the need for government to develop more interest in forensic accounting for monitoring and investigating suspected culprits in fraud cases because it can minimise it to the barest minimum. This is evidence by the findings of Uniamikogbo et al. (2020) which looked at how forensic audits affected the banking industry in Nigeria in terms of fraud detection and prevention. The results showed that forensic audit significantly reduces the number of fraud cases, the number of employees engaged in bank fraud, and the actual amount of bank losses due to fraud.

Luo, 2023 assert that addressing the root causes of fraud is crucial to reducing its incidence. One way to actively avoid fraud is to employ forensic auditing, which can successfully shut off these reasons. For example, forensic auditing can strengthen internal control. Forensic auditing can minimise fraud because it strengthens governance and compliance within organisations through its recommendation if applied. This aligns with the result of Sudarmadi (2023) which submitted that forensic auditing reduces the likelihood of fraud by detecting and exposing fraudulent activity, improving internal controls, and offering suggestions for remedial measures. In the same vein, Goel (2022) revealed that minimizing fraud occurrences through effective investigation is possible because it usually opens the organisation up to better operational system and control whilst implementation of best practices within organizations.

The evidence that forensic auditing is effective in fraud prevention and fraud detection is found in literatures. Appah and Inini (2021) discovered a strong negative correlation between occupational fraud in the Nigerian public sector and forensic auditing techniques. The study concluded that, because of a decrease in corrupt activities, the use of forensic investigation techniques in Nigeria's public sector will raise the standard of accountability and transparency in public sector financial management. Also, Eze and Okoye (2019) examined the impact of fraud prevention and forensic accounting in the Nigerian public sector. The findings showed a strong correlation between forensic accounting and public sector fraud detection and prevention. Strengthening forensic accounting in the public sector was suggested to reduce fraud more quickly. Likewise, Bassey (2018) investigated how fraud management was impacted by forensic accounting. According to the findings, actively using forensic auditing for litigation support minimises fraud occurrence especially among the micro-finance banks in Cross river states. Ogiriki (2018) conducts an empirical analysis of how forensic auditing affects fraud investigation, detection, and prevention. According to the study, forensic auditing methods and Nigerian public sector fraud detection, investigation, and prevention have a substantial association.

Based on the discussion above, it is concluded that forensic auditing tools is a catalyst for enhancing best corporate practices which in turn minimize the possibilities of fraud making forensic auditing adequate and effective.

### 5.5.7 Satisfactory Detection Measures

The results of this research revealed that the satisfaction gotten from detection measures contributes to the effectiveness of forensic auditing. The participants opined that the users and end users of forensic auditing are satisfied because the process and results are usually robust. Effective detection systems in connection to the fraud triangle theory decrease opportunity and rationalisation, as robust forensic auditing processes enhance user satisfaction and indicate a high likelihood of detection.

This finding is supported by evidence from existing literatures that the satisfactory detection measures stem out from the robustness of forensic audit tools and techniques. According to Iftikhar et al., (2023) which assess quality assurance in digital forensic investigations found out that standardised processes and the incorporation of artificial intelligence and machine learning to improve the robustness and reliability of forensic audit tools and techniques bring satisfaction in the detection and prevention of fraud efforts. Quality control measures significantly enhance the effectiveness of forensic auditing in ensuring satisfaction of detection measures. In the same vein, Mahmod et al., (2024) acknowledged robustness in correctness testing of forensic tools, emphasizing the necessity of multiple observations in ensuring accuracy and precision to reduce error and fraud.

The empirical analysis supports the idea that if effectiveness of forensic auditing tools wants to be improved, the techniques can be reviewed for more robustness and based on the discussion above, it is concluded that the level of satisfaction of gotten from forensic audit is considered adequate and effective.

## 5.6 Summary of Chapter Five

The chapter 5 has focused towards addressing the research questions based on the findings of the research and the analysis based on the literature reviews. Among the various findings discussed, effectiveness of forensic techniques stood out, and the study has been able to establish that the accuracy and adequacy of the forensic audit techniques is the predominant description of effectiveness of forensic auditing techniques and tools. In this regard, the study findings corroborated the findings of several other studies that were conducted in the past to determine the effectiveness of forensic audit in fraud prevention and fraud detection.

It is noted in discussion and empirical analysis of findings that few differences in findings were observed and the observed differences can be because of difference in geographical location of where the study took place as there may be gap in technological advancement and embracement of forensic audit practices in the considered areas. The difference in methods and data too were observed as many of the studies made use of survey design through the aid of questionnaire as data collection method and this study made use of interview resulting to less data and difference in data analysis technique.

However, the conclusion of the study is that forensic auditing techniques significantly relate to fraud prevention and detection in Nigeria public sector; Also, forensic auditing techniques is highly effective in fraud prevention and detection in the public sector as they are found to be accurate and adequate. This submission aligned with the various studies like study of Ogbaini et al., (2024) which submitted that forensic auditing could perform its role in fraud detection and prevention in Nigerian public sector. Likewise, it aligns with the study of Anghel and Poenaru (2023) which submitted that forensic accounting is a tool for detecting and preventing the economic fraud. Also, it supports the result of Ewa (2022) which identified forensic accounting as a significant means of fraud management in Nigeria public sector. Likewise, it supports the findings of Mokhomole (2023) which revealed that the mandate of forensic investigation has been able to fight against fraud, corruption, financial misconduct, irregularities and maladministration in the public sector in South Africa.

# CHAPTER SIX: CONCLUSION

## 6.0 Introduction

This chapter summarises the study findings and describes the conclusions drawn from the study's findings regarding the effectiveness of forensic auditing in preventing and detecting fraud in the Nigerian public sector. The study's objectives, research questions, and findings served as the basis for the conclusions. This chapter outlines the contributions in terms of the implications for theory and practice, addresses research limitations, supports the development of new knowledge, and identifies areas for future research.

## 6.1 Evaluation of Research Objectives

The current research focused on empirical investigation that critically investigates the effectiveness of forensic auditing techniques in fraud prevention and detection within the Nigerian public sector through an empirical qualitative study of the Nigerian National Petroleum Corporation (NNPC). To achieve this aim, the following research objectives were addressed: To critically identify through the existing literature how forensic audit tools and techniques can be used to detect and prevent fraudulent activity; To critically explore the effectiveness of forensic auditing techniques in preventing and detecting fraud within the Nigerian public sector; To critically examine the organizational and operational factors influencing the effectiveness of forensic auditing practices within the Nigerian public sector; and To create a conceptual model for practitioners and policy makers to use which represents how forensic auditing can be used to effectively detect and prevent fraud.

To achieve these objectives, the concepts of the study were reviewed, and a conceptual framework was developed. Related theories such as fraud diamond theory and fraud triangle theory were reviewed to provide theoretical framework. The researcher was able to delve deeper and examine the subject in greater detail by conducting an interview. To get individuals to participate, the researcher had to network and was able to recruit participants that are knowledgeable about the subject of discussion. After the interviews, a data analysis using NVivo was done, enabling the researcher to draw conclusions. The majority of the study's conclusions aligned with those of previous research studies.

The evaluation of each of the research objectives and its conclusion is discussed below:

1. The first specific objective of the study was to determine, from the body of available literature, the reasons for forensic auditing in the public sector, with a focus on the Nigerian National Petroleum Corporation (NNPC). Three publications that examined this subject within the confines of NNPC and another that focused on the public sector generally were the analysed to achieve this objective. After the examination, three primary causes were identified – Statutory audit failure, revenue leakage and flawed business model. Previous studies stated in their findings too that these among others are some of the reasons for forensic auditing and the study therefore concludes that when income that ought to have been collected and kept is either lost or omitted, and there are frequent reports of crude losses brought on by theft and sabotage, the service of forensic auditing should be engaged for a rescue mission because it is either a fraud has been committed and needs to be detected or fraud is been planned and needs to be prevented.

2. The second objective of the research was to investigate the ways in which forensic auditing methods and tools may be applied to detect and prevent fraud in the Nigerian public sector. The interviewee's response was analysed to accomplish this objective, and the findings were thoroughly covered in chapter four. Among how forensic auditing techniques could prevent fraud, the results demonstrated that forensic auditing could stop fraudulent activity because of its unique characteristics, including the legal consequences, the unique audit mandate it employs, and the sophisticated professional expertise it requires. The investigation additionally disclosed that the forensic audit's impartiality was another factor in its ability to identify and stop fraudulent activity. It is therefore concluded that outlined process and outcome of forensic auditing increase its capacity to prevent and detect fraud.

3. Examining the function of auditors in the Nigerian public sector's efforts to prevent and detect fraud was the third specific research goal. Analysing the respondent’s opinion on this research question gave results which suggest that auditors are essential to identifying and stopping fraud in businesses. They investigate flaws and financial losses, account for property, and confirm income and receipts. They also make sure that the government's accounting system conforms with rules. In the course of their duties, it is also expected that disparities in government financial records, fund disbursements, and transactions will be revealed. This is in alignment with international practices that revolves round auditors’ roles.

4. Examining the factors that affect the effectiveness of fraud detection efforts in the Nigerian public sector was the fourth specific study objective. The analysis's results supported the

assumption of fraud triangle theory which postulated that the three primary factors that enabled fraud were pressure, opportunity, and rationalisation. The chance to conduct fraud and the rationalisation of the crime are made possible by inefficient control or governance aspects. It was established that established procedure and policies is necessary for guidelines and directives, functioning internal control to protect resources, management commitment to foster transparency and efficiency, regular audit to ensure financial health, duty segregation to prevent error and reduce the risk of fraud. The study's conclusions emphasised control and governance drivers as the primary elements that can affect how well forensic audits work to prevent and detect fraud. The results showed that organisational structure and managerial support are important factors in how effectively forensic audits prevent fraud.

5. The fifth specific objective is to determine how effectively forensic auditing methods work in detecting fraudulent activity in the Nigerian public sector. The study finds that the accuracy and adequacy of forensic auditing have a major role in their effectiveness. It was found out that the independence of forensic audit tools boosts the dependability of forensic auditing techniques, its highly level of precision contributes to the correctness and reliability of forensic auditing. More so, training to attain strong grasp of forensic analysis is important for the public sector auditors and to lessen the occurrence of fraud, availability of forensic audit unit is suggested. The adequacy of forensic audit techniques is also linked to exceptional results as the extent of reduction of fraud is significant after one time of forensic auditing in public organisations. Furthermore, it was noted that incorporation of artificial intelligence improves that satisfaction of detecting and prevention of frauds.

The overall effectiveness is embedded in the techniques of precision and independence as it enhances their accuracy due to their low dependence on preexisting control and are less vulnerable to manipulation. The effectiveness of these methods may be assessed based on their remarkable outcomes and their capacity to reduce fraud.

## 6.2 Contributions

The research gap reveals a profound weak governance that have enabled fraud in the public sectors which have denied the country better national development. Part of the research gap found is that only few studies has focused on NNPC after the downstream deregulation was enforced. More so, the scope of existing literature tends to be limited to certain events or domains rather than holistic assessments of vulnerabilities and controls needed in the public sector. To fill these gaps, this study engaged in further empirical research to help redefine approaches to detection and prevention of fraud as the research makes a substantial contribution to academic theory by expanding the understanding of forensic auditing techniques in public sector. Likewise, the study is supporting the forensic auditing framework by advocating that the usage of forensic audit techniques becomes proactive anti-corruption instruments in public sector rather than been a reactive instrument.

This research makes a substantial contribution to academic theory by expanding the understanding of forensic auditing techniques in public sector. It provides critical insights for policymakers, emphasizing the importance of forensic auditing especially in Nigeria system that has been tagged with corruption due to a lot of mis-appropriation cases traced to public officials. It also fosters economic growth because it will prevent fraud and incidences whereby the resources of the nation can be used to purse development.

### 6.2.1 Theoretical Implications

As discussed in chapter two, Cressy (1950) led a considerable shift in understanding how fraud occurs and what influences it through the postulation of the fraud triangle theory. The theory proposed pressure as the foundation of fraud and perceived opportunity is what enables it in an organisation and rationalisation as means for covering up to avoid detection. Based on his famous three concepts to form a triangle that is recognised and provide theoretical framework for studies. Some researchers whose objectives looks similar to the study followed this stream of to focus on how to fraud triangle impact fraud in a corporate setting and specifically, Albrecht et al., (2008) examined the theory to explain the role of auditors and whether auditors should be held accountable for failing to detect financial statement fraud; Cohen and Sayag (2010) investigated the connection between the elements of the fraud triangle theory and the effectiveness of internal controls in preventing financial statement fraud. Sujeewa et al. (2018) investigate how fraud triangle theory can be used to integrate ethical values of employees, while Abdullahi and Mansor (2018) investigate the connections between the elements of fraud triangle theory and the incidence of fraud to combat current fraud outrages in the Nigerian public sector. It could be observed that existing studies have not given a precise finding on the effectiveness of this theory in fraud prevention and detection effort which this study have been able to fill the gap in the current research.

Second, findings pertaining to the third research question about auditors' role in fraud detection and prevention are significant for theoretical implications. The current results provide theoretical reasons for how the auditors' job lapses could empower the opportunity element for fraud to occur and show that the role of checking and verification has possibly unlocked the element of opportunity in the fraud triangle theory. According to the research, the opportunity may be improved by addressing all the breaches that were found and by implementing effective internal control, which is one of the elements that the study found to have an impact on fraud prevention.

Furthermore, the study suggests that the establishment of a forensic audit unit may logically affect rationalisation, the third component of the fraud triangle theory, as government employees will be aware of how difficult it is to justify fraud occurrences. Employees' perception of getting away with fraud will change, which will impact their ethical behaviour in providing services. This will help the government achieve accountability and transparency because fewer frauds will help them gain the confidence of the public. Consequently, the latter will improve a NNPC's organisational effectiveness as a manager of the country's oil stocks. These findings therefore have significant theoretical ramifications for any behavioural theory and align with Cress's (1953) theoretical framework, which puts forth the fraud triangle theory.

Lastly, the study contributes to the fraud diamond theory, and the implication is that the capability of fraud occurrence is potent and could be tamed. According to Wolfe and Hermonson's (2004) description of capability, which is the fourth element of the fraud diamond theory, it suggests that an individual's role or position within an organisation may empower them to take advantage of a fraud opportunity that is not available to others. The results of the study on factors that impact fraud prevention, which is the segregation of duties, may be extended by this theory, as it highlights the need for an individual's role inside an organisation to be planned so that there are no opportunities for fraud to turn into reality.

### 6.2.2 Practical Implications

The study offers practical implications to both the executives of the government agencies and parastatals, the legislative arm of government and policy makers. In practice, the study contributes to educating and exposing top government official (The executives) to means of tightening the system against fraud occurrence because the factors influencing fraud prevention have been identified and explored in the study. This will enable them to deliver appropriately on the mandate of eradicating economic and financial crimes from Nigeria and to efficiently coordinate the national efforts of the international anti-money fraud campaign.

When factors such as established procedure and policies, segregation of duty among others are considered for policy making, it exposes government officials to strategies of preventing fraud and eventually, detecting it. It upholds the culture of accountability throughout the organisation as individuals will be held liable if fraud is observed in the course of their duty. Hence, the resulting fraud prevention will provide transparency and accountability in the public sector as they hold public resources in trust.

Furthermore, the study shows that the public sector in Nigeria lacks operational forensic audit units and has insufficient forensic auditors in the system, which has negatively impacted the sector's fraud detection rate. Therefore, by offering proof of the effectiveness of forensic auditing in fraud detection and prevention, the research helps regulators evaluate the necessity of operational forensic audit units in all government ministries, departments and agencies (MDAs) in accordance with global best practices because of the urgent need for forensic auditing to curtail fraud occurrence. The study also helps to educate public sector auditors to improve their training and learn how to use forensic auditing techniques due to the urgent need for it and the many career opportunities associated with it, particularly the benefits the training has on their professional development.

According to the study's findings, forensic auditing's impact on preventing fraud includes its potential legal consequences. The study helps to reawaken the government's awareness of the necessity of prosecuting offenders to successfully discourage white-collar crime. Analysing the integration of anti-graft agencies' procedures also guarantees efficient investigation and prosecution of fraud cases, which eventually fosters public trust and good governance.

In practice, the study provides strategic recommendations for government organisations looking to adopt cutting-edge measures to prevent fraud and enhance the effectiveness and general performance of government organisations, particularly the NNPC. Moreso, it highlights the necessity of improving internal control quality to boost the credibility of financial reporting, which would ultimately improve performance and lessen corruption in public entities.

More so, the legislative arm of government may need to review and revisit the Acts of laws that establish certain public organisations, particularly the NNPC, to ensure that the shortcomings and loopholes are adequately addressed for improved performance and to reduce governance costs. At the managerial level, the current study provides pertinent results that show how to implement fraud prevention techniques.

Given Nigeria's ranking in the worldwide transparency index, this study offers a fresh perspective to public sector organisations that wish to educate and increase public awareness about the seriousness of fraud in the nation. By shedding light on the function of forensic auditing in safeguarding the interests of public sector organisations' stakeholders, the study's findings helped to raise the level of knowledge and acceptability of forensic auditing.

Future or prospective academicians and researchers who wish to investigate the functions and effectiveness of forensic auditing can use this study as an introduction because it will add to the body of knowledge already in existence and serve as a resource for additional empirical research into the lesser-known forms of public sector fraud. These findings offer a practical prediction that, when combined with theoretical justifications, suggests that forensic auditing can have a greater impact on fraud detection and prevention.

## 6.3 Study Limitations

Despite the contributions of this work, we acknowledge a few numbers of limitations, which are essential to define the scope, exceptions and reservations inherent in the manner at which the research is done. Firstly, using interview as a means of data collection pose some limitations as the interviews were conducted over the phone, and network interference was experienced as the interview flow was occasionally interrupted by technical difficulties such as poor call quality or failed connections, which resulted in word repetition. Additionally, the participants gave concise responses due to the interview's structured questions, which has limited the amount of information that could have been obtained because it prevented the researcher from learning additional crucial details about fraud that might have come to light in a more conversational or flexible interview environment.

Secondly, although the whole population of the public sector was targeted, this study is applied majorly on the Nigerian National Petroleum Company (NNPC). Hence, the sample size could not be bigger, and limited auditors were gotten to be interviewed hindering the opinion to be more diverse. More so, there is limited information about forensic audit in Nigerian National Petroleum Company (NNPC) as few of auditors in the organisation were accessible and to have detailed information, opinion of forensic auditors outside the organisation were sought.

Lastly, the assessment of forensic audit effectiveness is not governed by any stipulated or regulatory practices, hence the judgement of effectiveness is mainly based on the opinion of the participants. Irrespective of this, the most referenced studies and expected forensic audit practices in the public sector has been considered in the study and the extension is done as regards examining the relationship between forensic audit effectiveness and fraud prevention.

However, since the results of this study significantly add to the body of knowledge regarding the effectiveness of forensic auditing techniques in fraud detection and prevention in the Nigerian public sector, all the limitations could be viewed as opportunities and potential areas for future research. As a result, the study's findings can serve as valuable resources for future research in both academia and management.

## 6.4 Areas for Further Research

The government and the people themselves hold the public organisation in high regard. To enforce accountability and gain the public trust, this scenario requires the best possible attention to detail to guarantee any public sector performance by minimising fraud. Therefore, it is crucial to carry out in-depth research and propose creative solutions that can assist forensic auditing in reducing fraud in the public sector to broaden the scope and investigate new avenues that forensic auditing could assist in doing so, which will benefit the national economy. Suggestions for further research are stated below.

i. The study recommends that to improve fraud prevention strategies, further study be done to explore the influence of integrating of advanced technologies in forensic auditing and the effect on fraud detection while taking into consideration variations in regulatory frameworks.
ii. Given the continued awareness of the significance of the availability of forensic audit units in the public sector, the study suggests that research should be conducted on the potential for creating pseudo-forensic auditing methods pending the time of its actualisation to counteract changing fraud risks through improved data analytics and the incorporation of digital forensics to fortify fraud prevention and detection tactics across different agencies in the public sector.
iii. Researchers are advised to expand the scope of the current research by focus on a many key ministries and department of public sector. For instance, investigation is needed about the forensic auditing and fraud prevention in Central Bank of Nigeria (CBN), the National House of Assembly and other key organisations that are of concerns to the citizens due to the key role they play in the economy.
iv. Further studies may want to review the methodology of the study by employing questionnaire to obtain more information and any participants could be involved so that diverse opinion for a more robust result can be gotten.

v. Further research could be conducted based on the finding of this study by using quantitative approach to provide trends and statistical illustration of the status of the sector on fraud prevention and as well provides with a deep understanding for the phenomenon under research without been subjective to participants opinion.

## 6.5 Summary of the Chapter

The chapter presented an overview of the research and a summary of the key findings that correspond with each study's specific objectives. Following that, the chapter presented and addressed the study's research questions in tandem with its objectives, drawing from a thorough analysis and justification of the findings in relation to those objectives. The chapter also emphasised the findings of the investigation, along with its theoretical and practical implications. After then, the chapter discussed the limitations of current research and offered some beneficial recommendations. Ultimately, the areas for further investigation were also depicted.

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# APPENDICIES

## Appendix N0.1: The Interview Permission

Dear Sir or Madam

I am conducting research, at University of Gloucestershire (UK). The title of my thesis is "The Effectiveness of Forensic Auditing on Fraud Prevention and Detection Within the Nigerian Public Sector".

This Semi-structured interview is part of my research. At this initial stage I am concerned with collecting data from different parts of Nigerian public sector. The purpose of this semi- structured interview is as follows:

1. To critically identify through the existing literature how forensic audit tools and techniques can be used to detect and prevent fraudulent activity.
2. To critically analyse from the qualitative findings (analysing the data and its methodology) how effective are the current forensic auditing techniques in identifying fraudulent activity.
3. To critically evaluate how effective is forensic auditing techniques used to detect fraud in the Nigerian public sector.
4. To create a conceptual model for practitioners and policy makers to use which represents how forensic auditing can be used to effectively detect and prevent fraud.

I will be very grateful if you would participant in this semi-structured interview. It will take 40-45 minutes to complete. Your response will be kept strictly confidential and used only for research purposes. Finally, I would like to thank you for spending your time in answering the questions in this interview and for your comments and your suggestions, which will be useful.

Yours faithfully

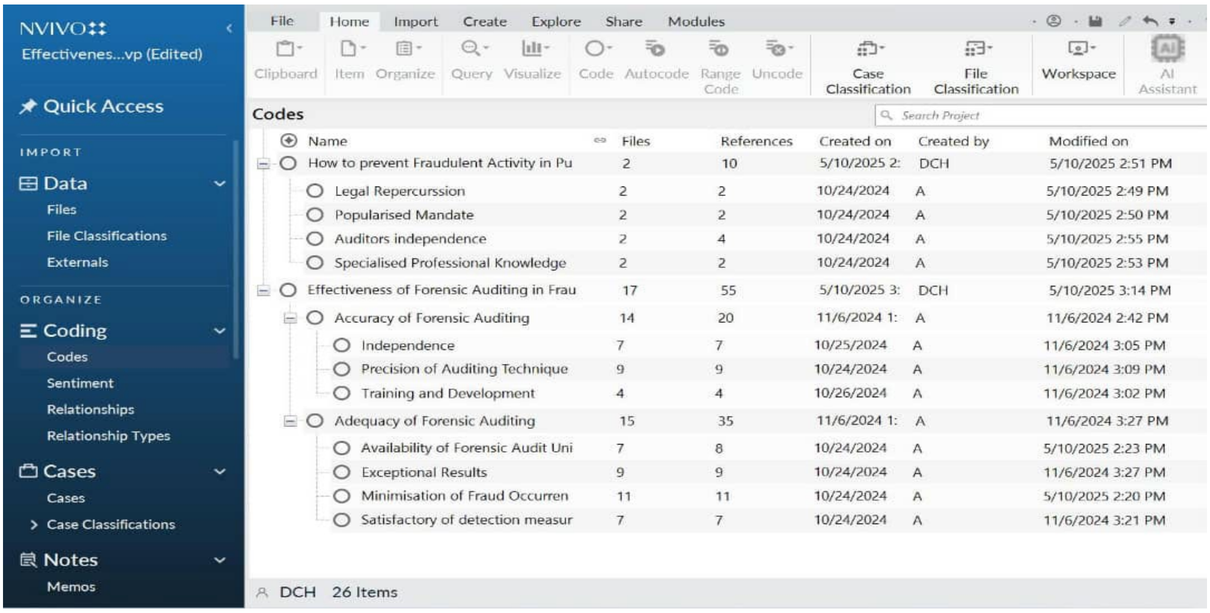
Muhammad Temitope Fatimah

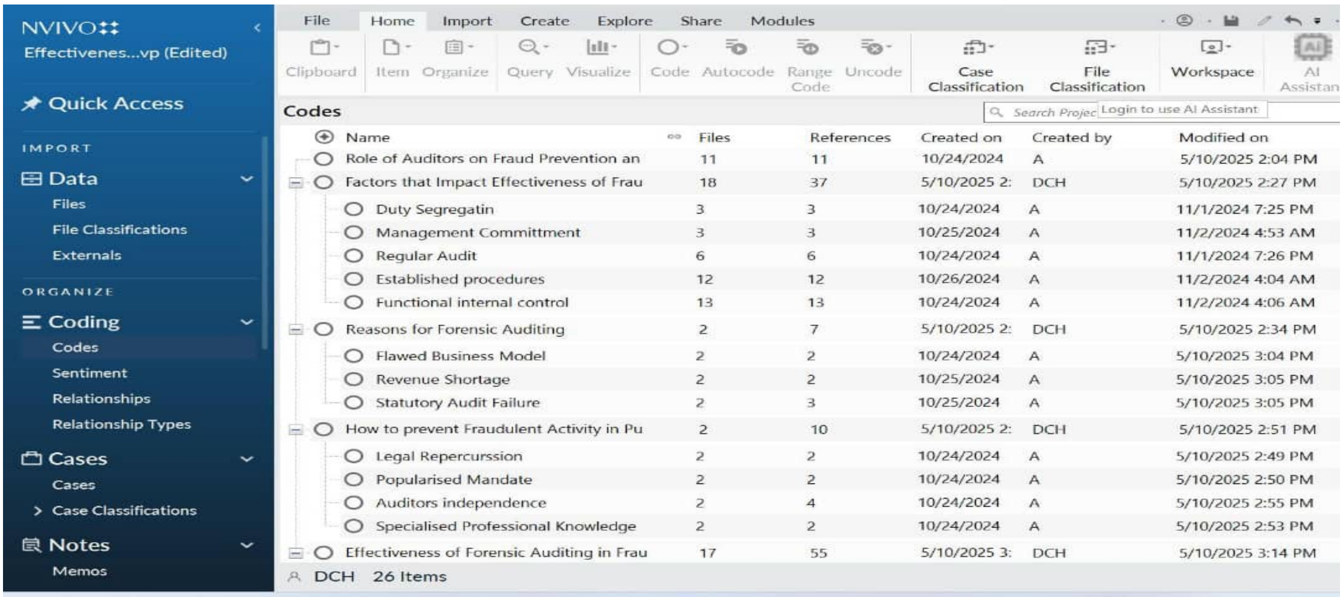
**DBA student at University of Gloucestershire (UK)**

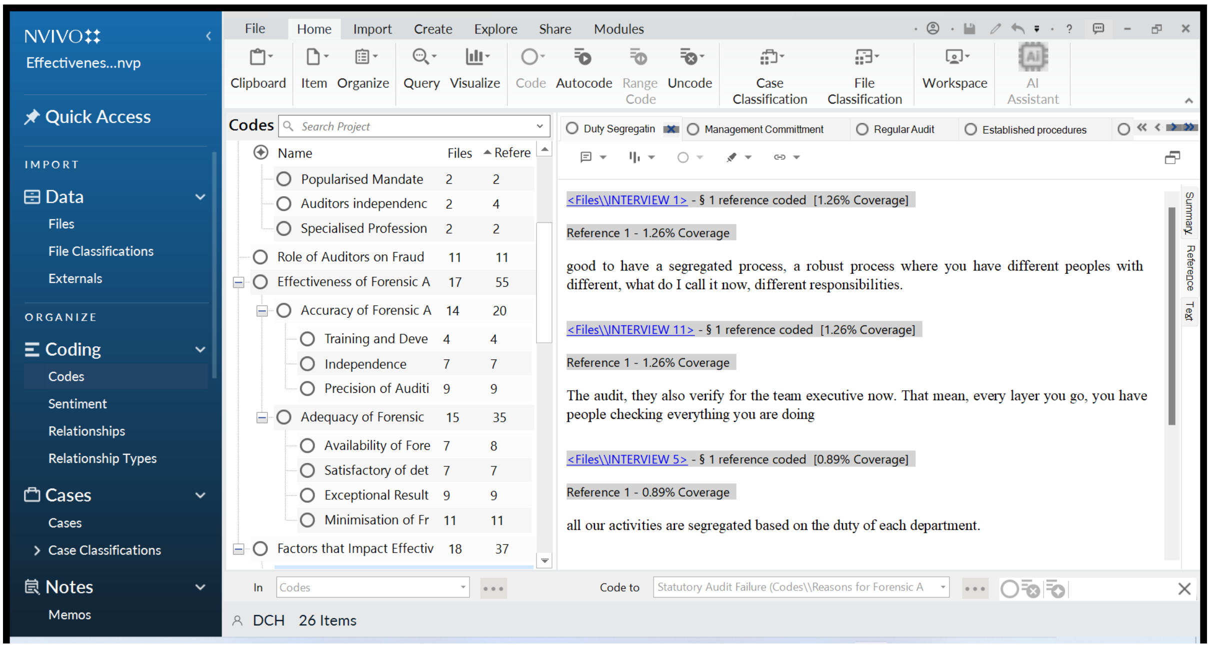
## Appendix No 2: INTERVIEW QUESTIONS

1. What department are you in and can you please provide a brief overview of your role (a brief analogy of your role and responsibilities).
2. Is there a functional forensic audit unit in the organization and does the organization have existing policies such as an internal control department?
3. Does the organization have established procedures, rules, and regulations guiding discharge of duties. Additionally, what forensic accounting methodology are adopted in the organization to detect potential fraud?
4. What is the frequency of cases of fraudulent activities in the organization.
5. What is your perspective about the adequacy and effectiveness of statutory audit and fraud detection measures in the detection of fraudulent activities?
6. How accurate are the findings of fraudulent activities investigations using forensic auditing techniques.
7. Do you agree that fraud investigations have been in depth when forensic audit techniques are adopted?
8. Does the forensic audit techniques have the potential to identify red flags in business transactions and does the technique adopted can identify abnormal transaction.
9. Has the organization recorded a reduction in the cases of fraud since the adoption of forensic audit and can an analogy be done on the reduction indication with a margin or percentage on this reduction.
10. What is your assessment of forensic audit techniques used in your organization and can a ranking be done in order of their effectiveness?
11. Which of the forensic techniques adopted have been mostly useful in fraud prevention and detection and which technique is mostly adopted? Indicate the most effective.
12. What factors do you think impact the effectiveness of fraud detection activities.
13. Based on your assessment, do you think forensic audit techniques can work independently of each other or are dependable on the other.
14. What recommendations you may offer to other organizations that aim to enhance their fraud detection and prevention ability.

## Appendix NO 3: NVIVO WORKINGS

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The audit, they also verify for the team executive now. That mean, every layer you go, you have people checking everything you are doing
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all our activities are segregated based on the duty of each department.
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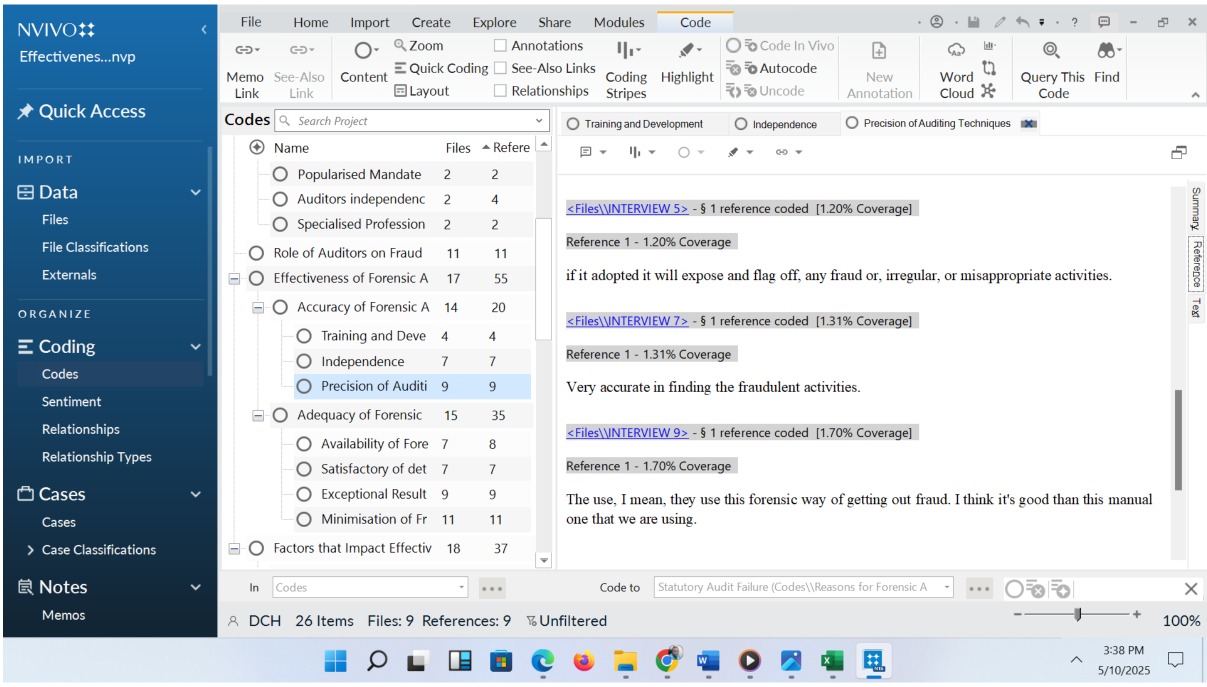
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if it adopted it will expose and flag off, any fraud or, irregular, or misappropriate activities.
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Very accurate in finding the fraudulent activities.
<Files\\INTERVIEW 9> - § 1 reference coded [1.70% Coverage]
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The use, I mean, they use this forensic way of getting out fraud. I think it's good than this manual one that we are using.
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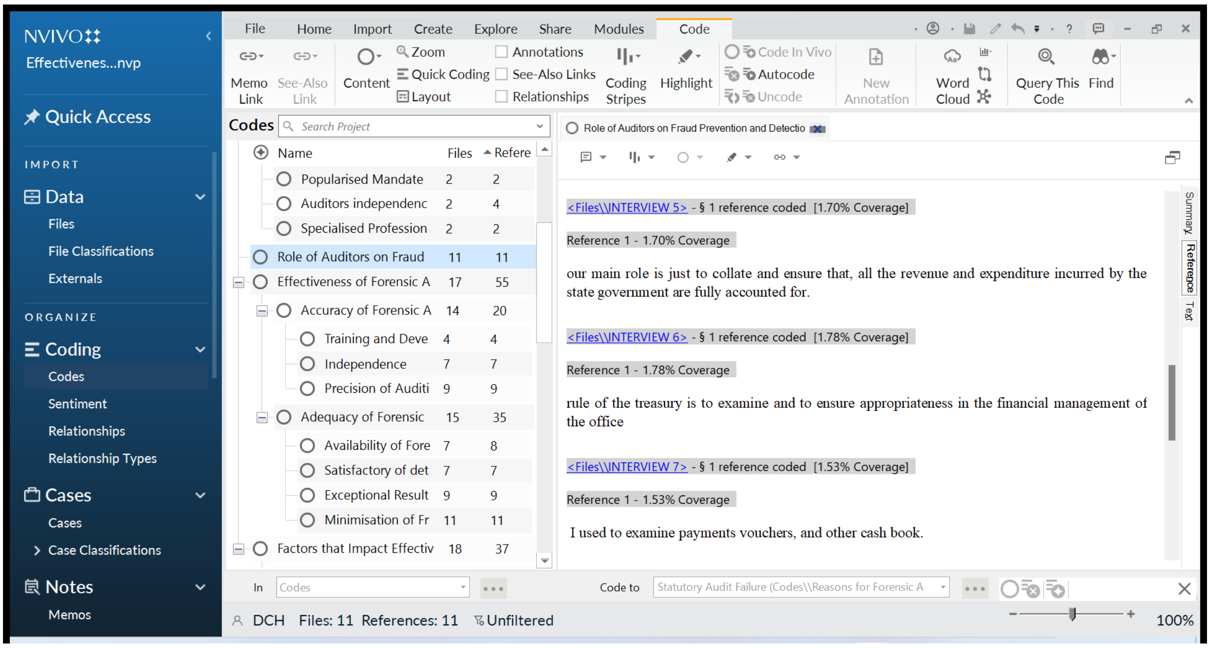

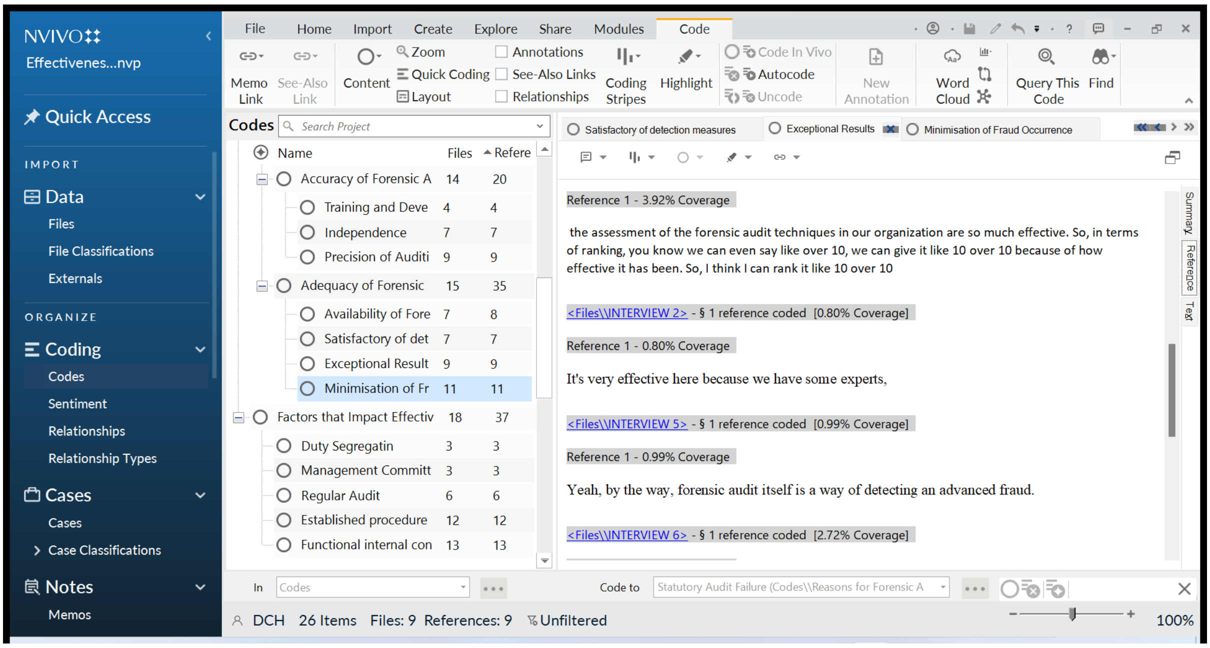

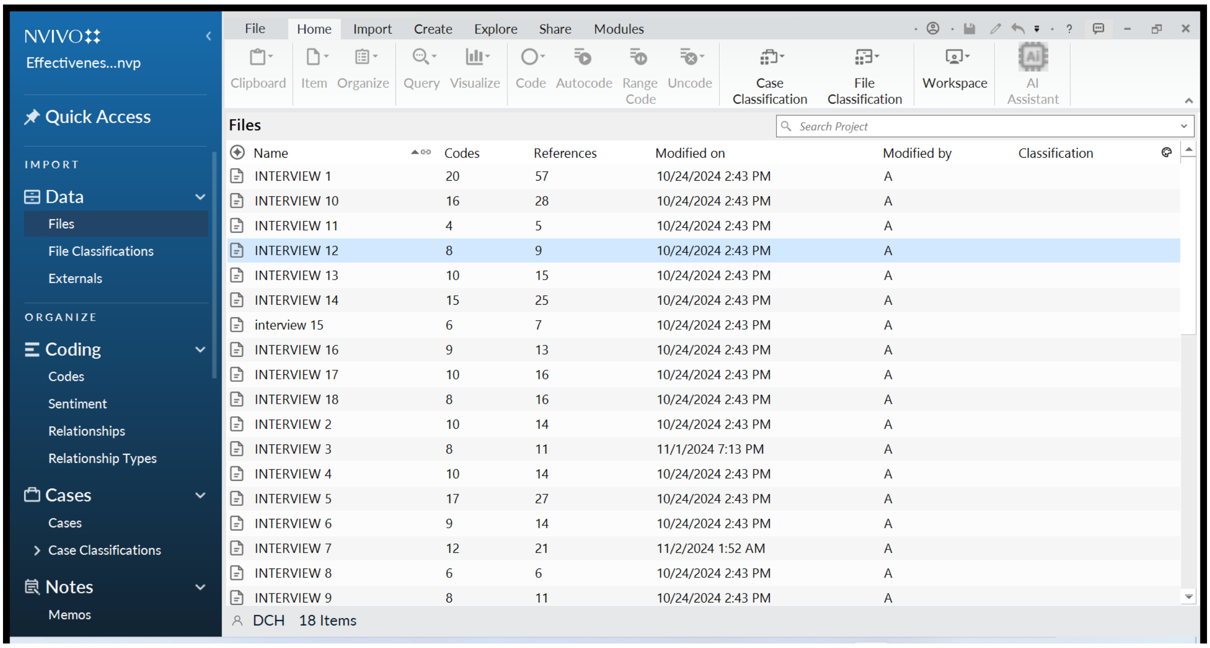
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