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BIG DATA ACCURACY ON AUDIT EFFECTIVENESS IN AUDIT ENGAGEMENTS OF SELECTED AUDIT FIRMS IN NIGERIA.

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Abstract

This study examined the effect of Big Data Accuracy (BDA) on the audit effectiveness of selected audit firms in Nigeria between 2015 and 2024. The study assessed the effects of Big Data Accuracy, Big Data Collection Efficiency on the audit effectiveness of audit firms in Nigeria, while Audit Client Size served as a control variable. The study adopted an ex-post facto research design, using secondary data obtained from eleven (11) audit firms that consistently audited companies listed on the Nigerian Exchange Group (NGX) within the study period. The data were analyzed using Panel Least Squares Regression (random effects), supported by descriptive statistics, correlation analysis, and diagnostic tests such as multicollinearity and the Hausman specification test to select the appropriate model. The regression results revealed that Big Data Accuracy ($\beta = 0.061$, $p = 0.289$) showed positive but statistically insignificant effects, implying that while diverse and accurate data enhance audit insight, their current application remains limited in Nigerian audit practice. Big Data Collection Efficiency ($\beta = 0.042$, $p = 0.001$) had statistically significant positive effects on audit effectiveness, indicating that larger and efficiently collected datasets improve auditors' ability to detect fraud and enhance the quality of audit judgments. The control variable, Audit Client Size ($\beta = 0.564$, $p = 0.007$), also exhibited a significant positive effect, indicating that larger clients with robust digital infrastructures support more effective audits. The study concluded that Big Data Accuracy significantly affects audit effectiveness among Nigerian audit firms, with collection efficiency emerging as the strongest determinants of fraud detection and audit reliability. However, the benefits of BDA are moderated by data quality, auditor competence, and technological capacity. The study recommended that audit firms invest in scalable data infrastructure, diversify data sources, and strengthen accuracy controls. Professional bodies such as ICAN and ANAN should promote continuous auditor training in data analytics to improve audit quality.

Keywords: Big Data Accuracy, Big Data Collection Efficiency, Audit Client Size and Audit effectiveness.

1.1 Introduction

The rapid advancement in information and communication technology has significantly transformed the global business environment and reshaped the accounting and auditing profession. Organizations now generate massive volumes of data from digital transactions, enterprise systems, online platforms, cloud computing technologies, and social media interactions. This development has given rise to the concept of big data, which refers to extremely large and complex datasets that cannot be effectively managed using traditional data-processing techniques. Big data is commonly characterized by the dimensions of volume, velocity, variety, veracity, and value (Gandomi & Haider, 2015). In the auditing profession, the emergence of big data analytics has revolutionized audit processes by enabling auditors to examine entire datasets, identify anomalies, improve risk assessment procedures, and enhance audit quality. Consequently, the relevance of big data in audit engagements has continued to increase across both developed and developing economies.

The auditing profession traditionally relied on manual audit procedures and sampling techniques in evaluating financial records and internal control systems. However, the increasing complexity of business operations and the digitalization of accounting systems have made traditional audit approaches inadequate in addressing modern audit risks. According to International Auditing and Assurance Standards Board, auditors are expected to obtain sufficient and appropriate audit evidence to support audit opinions and ensure the credibility of financial statements. The integration of big data analytics into auditing has improved auditors' ability to process large quantities of financial and non-financial information in real time, thereby increasing the efficiency and effectiveness of audit engagements (Appelbaum, Kogan, & Vasarhelyi, 2017). Nevertheless, the usefulness of big data in auditing is highly dependent on the accuracy and reliability of the data analyzed during the audit process.

Big data accuracy refers to the degree to which data are correct, reliable, complete, consistent, and free from material errors or distortions. Accuracy is one of the critical dimensions of data quality because inaccurate data can lead to misleading analyses, poor decision-making, and ineffective audit conclusions. In the context of auditing, data accuracy is particularly important because auditors rely heavily on organizational data in evaluating financial statements, assessing risks, detecting fraud, and expressing professional opinions. Where data utilized during audit engagements are inaccurate or incomplete, auditors may fail to identify material misstatements, thereby compromising audit quality and reducing stakeholders' confidence in financial reporting. According to Warren, Moffitt, and Byrnes (2015), the growing reliance on automated audit systems and data analytics requires auditors to ensure the integrity and reliability of datasets used during audit engagements.

Audit effectiveness, on the other hand, refers to the ability of auditors to perform audit procedures efficiently and achieve audit objectives such as detecting material

misstatements, ensuring compliance with accounting standards, and improving the reliability of financial reports. Effective auditing contributes significantly to investor confidence, corporate accountability, and the stability of financial markets. DeAngelo (1981) argued that audit effectiveness is closely related to audit quality, auditor competence, and the ability of auditors to identify and report irregularities in financial statements. In modern audit environments, the effectiveness of audit engagements increasingly depends on the quality and accuracy of data processed through technological audit tools and data analytics systems.

Globally, the use of big data analytics in auditing has expanded considerably in recent years. Major international audit firms such as Deloitte, PricewaterhouseCoopers, KPMG, and Ernst & Young have integrated advanced technologies such as artificial intelligence, machine learning, blockchain, and predictive analytics into audit engagements to improve audit performance and efficiency. These technologies enable auditors to analyze entire populations of transactions instead of relying solely on sample-based testing. Studies have shown that big data analytics enhances fraud detection, improves audit planning, strengthens risk assessment procedures, and increases audit efficiency (Vasarhelyi, Kogan, & Tuttle, 2015). However, despite these benefits, concerns have emerged regarding the reliability, completeness, and integrity of large datasets used in audit engagements.

The issue of big data accuracy has become increasingly important due to rising incidents of data manipulation, cybersecurity breaches, inconsistent database systems, and weak data governance practices. Inaccurate or manipulated data may lead auditors to make incorrect judgments, thereby increasing audit risk and reducing audit effectiveness. Alles (2015) noted that while big data provides opportunities for auditors to improve audit quality, the reliability of audit outcomes depends largely on the quality and accuracy of the underlying data. Similarly, Cao, Chychyla, and Stewart (2015) argued that poor-quality data can undermine the effectiveness of audit analytics and negatively affect auditors' professional judgment. Therefore, ensuring the accuracy and integrity of data remains a major challenge facing audit firms in the era of digital auditing.

In Nigeria, the adoption of digital technologies and computerized accounting systems has increased significantly among corporate organizations, financial institutions, manufacturing firms, and government agencies. This development has influenced the operations of audit firms, which now rely extensively on electronic records and digital datasets during audit engagements. Nigerian audit firms increasingly utilize audit software, enterprise resource planning systems, and computerized audit techniques to improve audit efficiency and service delivery. Despite these technological advancements, the Nigerian business environment continues to face several challenges capable of affecting big data accuracy and audit effectiveness. These challenges include inadequate technological infrastructure, weak cybersecurity systems, poor database management practices, unreliable internet services, insufficient data governance frameworks, and limited technological expertise among accounting professionals (Okoye & Ezejiofor, 2013).

Furthermore, Nigeria has experienced several cases of corporate failures, financial scandals, and fraudulent financial reporting, which have raised concerns regarding the effectiveness of audit engagements and the reliability of audit reports. High-profile cases involving financial misstatements and corporate governance failures have increased stakeholders' expectations regarding the role of auditors in detecting fraud and ensuring financial accountability. Investors, regulators, shareholders, and other stakeholders increasingly expect auditors to adopt advanced technological tools capable of improving audit quality and detecting irregularities in financial statements. However, the effectiveness of such technological audit systems depends largely on the availability of accurate and reliable data. Where inaccurate datasets are utilized during audit engagements, the likelihood of audit failure and incorrect audit opinions may increase substantially.

Regulatory and professional accounting bodies have also emphasized the need for improved audit quality and technological competence within the auditing profession. In Nigeria, organizations such as the Financial Reporting Council of Nigeria, the Institute of Chartered Accountants of Nigeria, and the Association of National Accountants of Nigeria have continued to advocate for compliance with international auditing standards, ethical practices, and technological innovation in audit engagements. Similarly, the International Federation of Accountants has emphasized the importance of digital transformation and data analytics in enhancing audit quality and strengthening public trust in the auditing profession. These developments indicate that audit firms must prioritize data quality and accuracy in order to improve audit effectiveness and maintain professional credibility.

Empirical studies have examined the relationship between big data analytics and audit performance, focusing on areas such as audit quality, fraud detection, auditor judgment, and audit efficiency. For example, Appelbaum et al. (2017) found that big data analytics improves auditors' ability to detect anomalies and evaluate financial risks more effectively. Similarly, Yoon, Hoogduin, and Zhang (2015) observed that data analytics enhances audit planning and supports better audit decision-making processes. However, most existing studies have concentrated on developed economies with sophisticated technological infrastructures, while limited attention has been given to developing countries such as Nigeria. In addition, previous studies have focused more on the adoption of big data technologies rather than examining the specific effect of big data accuracy on audit effectiveness during audit engagements. This creates a significant knowledge gap that necessitates further investigation within the Nigerian auditing environment.

Against this background, this study seeks to examine the effect of big data accuracy on audit effectiveness in audit engagements of selected audit firms in Nigeria. Specifically, the study aims to determine whether accurate, reliable, complete, and consistent datasets contribute significantly to improving audit quality, fraud detection, audit efficiency, and the reliability of audit reports issued by audit firms in Nigeria. The study is important

because it will provide empirical evidence on the relevance of data accuracy in modern audit engagements and contribute to the growing literature on big data and auditing in developing economies. Findings from the study are expected to benefit audit firms, regulators, professional accounting bodies, corporate organizations, and researchers by providing insights into how effective data management practices can enhance audit effectiveness and strengthen stakeholders' confidence in financial reporting systems.

2.0 Review of related Literature

2.1 Conceptual Review

2.1.1. Big Data Accuracy

Data accuracy denotes the degree to which data correctly represents the actual state of financial events or transactions (Abrar et al., 2024). Within Big Data Analytics (BDA), accuracy ensures that analyses and audit decisions are based on valid, reliable, and consistent information (Falana et al., 2023). Accurate data enhances the quality of financial audits by reducing the likelihood of false positives, misstatements, and undetected irregularities (Nasta et al., 2024). Conversely, inaccuracies can result in audit failures, regulatory breaches, and reputational losses (Bonsu et al., 2023).

Empirical studies confirm that data accuracy significantly affects audit quality and reporting reliability. For example, Falana et al. (2023) found that accurate data improves the timeliness and integrity of financial reporting, while Abrar et al. (2024) demonstrated that accuracy in big data dimensions strengthens financial reporting comparability and understandability. Similarly, Ilori et al. (2024) highlighted that integrating advanced analytics into internal audits enhances data consistency, enabling real-time validation and fraud prevention.

To maintain accuracy, auditors employ automated validation, error-detection algorithms, and reconciliation techniques to cross-check financial information across multiple sources (Onamusi et al., 2024). Technologies such as machine learning, AI, and blockchain have also proven instrumental in improving accuracy by automating anomaly detection and ensuring data immutability (Akinadewo et al., 2024; Shalhoob et al., 2024). Moreover, data cleaning methods such as deduplication, format standardization, and integrity checks are essential to eliminate redundancy and harmonize datasets before analysis (Ilori et al., 2024).

As audit data increasingly comes from diverse structured and unstructured sources, maintaining accuracy becomes more complex due to potential inconsistencies and human or system-based errors (Oluwagbade et al., 2023). Studies emphasize the importance of strong data governance frameworks and continuous auditor training to sustain data integrity (Moshi et al., 2024; Oloruntoba & Oyedokun, 2024). Accurate data underpins

credible audit opinions, strengthens stakeholder confidence, and enhances the effectiveness of financial oversight.

In this study, Big Data Accuracy is measured as the error rate in data analysis (in percentage).

2.1.2. Big Data Collection Efficiency

Big Data Collection Efficiency refers to the proportion of relevant and usable data successfully obtained from all potential sources within the audit environment. It measures how effectively auditors can access, extract, and compile financial and non-financial data needed for evidence-based analysis. In the era of digital auditing, efficient data collection forms the foundation for high-quality analytics, influencing the accuracy, timeliness, and comprehensiveness of audit outcomes (Huang et al., 2024).

Efficient collection of audit data ensures that auditors can analyze complete datasets rather than relying on limited samples, thereby improving the reliability of findings and minimizing audit risk (Abdelwahed et al., 2025). Incomplete or inconsistent data collection can distort analytical insights, leading to false interpretations and missed irregularities. According to Ilori et al. (2024), integrating diverse data sources such as enterprise resource planning (ERP) systems, operational databases, and external data streams enhances the scope of audit testing and strengthens fraud detection capabilities. Similarly, Akpan et al. (2024) found that the digitalization of audit evidence-gathering processes increased both the speed and accuracy of audits, demonstrating that technology-driven data collection significantly improves audit quality.

Empirical evidence further indicates that advanced Big Data tools such as data mining, visualization platforms, and real-time monitoring software improve the completeness and accessibility of audit data. Onamusi et al. (2024) revealed that Big Data Analytics applications enable continuous tracking of financial transactions, facilitating early detection of anomalies and irregularities. Likewise, Nasta et al. (2024) established that Big Data implementation in audit firms enhanced data accessibility and efficiency by automating information retrieval across multiple client systems. Abdelwahed et al. (2024a) also found that international audit firms with superior data-collection infrastructure achieved higher audit quality than smaller local firms constrained by technological limitations.

In the Nigerian context, Oluwagbade et al. (2024) emphasized that Artificial Intelligence (AI) and machine learning tools assist auditors in extracting structured and unstructured data from disparate platforms, thereby improving data completeness and analytical depth. These tools also enable predictive modeling that aids in identifying missing or inconsistent entries before the audit analysis stage. Complementary to this, Maharani et al. (2024) reported that the integration of machine learning and Big Data technologies in

auditing enhances data-gathering accuracy, reduces redundancy, and enables real-time validation of large datasets.

Nevertheless, challenges persist. Studies have noted that data fragmentation, incompatible systems, and weak data governance can hinder efficient data collection (Sutisna, 2025; Oloruntoba & Oyedokun, 2024). Cybersecurity concerns and resistance to technological change also remain obstacles to seamless data acquisition. To mitigate these issues, Ilori et al. (2024) recommended the adoption of standardized data protocols, secure data pipelines, and continuous auditor training to ensure sustainable improvements in data-collection efficiency.

Overall, the literature establishes that high Big Data Collection Efficiency strengthens audit effectiveness by enabling comprehensive data coverage, minimizing human error, and supporting full-population testing. Efficient data collection not only improves the quality of audit evidence but also enhances fraud detection, reporting accuracy, and stakeholder confidence (Huang et al., 2024; Abdelwahed et al., 2025; Onamusi et al., 2024).

In this study, Big Data Collection Efficiency is measured as the percentage of relevant audit data successfully gathered relative to the total available data.

2.1.3 Audit Client Size

Audit client size denotes the overall magnitude and operational scale of an audited organization, often measured by total assets, annual turnover, or market capitalization (Bonsu et al., 2023). Larger audit clients tend to exhibit greater financial complexity, diversified activities, and broader regulatory obligations, all of which necessitate advanced auditing techniques and technological tools (Falana et al., 2023). Conversely, smaller entities usually maintain simpler financial structures that require less resource-intensive audits (Nasta et al., 2024). The size of an audit client directly affects the scope of audit planning, resource allocation, and the extent to which auditors rely on BDA, AI, and forensic analytics (Oluwagbade et al., 2023).

Empirical studies show that audit client size correlates positively with audit complexity and risk exposure. Abrar et al. (2024) observed that larger clients demand extensive analytical testing and sophisticated risk-assessment models due to high transaction volumes. Similarly, Oloruntoba and Oyedokun (2024) found that large corporate clients typically engage audit firms with robust technological infrastructure and specialized expertise. However, Shalhoob et al. (2024) cautioned that excessive client influence may threaten auditor independence if not managed through strong governance mechanisms.

The economic dimension of client size also shapes audit fees and engagement structure. Larger firms usually attract higher audit fees to cover additional hours, personnel, and analytical technology (Moshi et al., 2024). Meanwhile, small- and medium-sized enterprises (SMEs) may rely on lower-cost, less technology-intensive audits, which can

constrain the use of data analytics (Bonsu et al., 2023). Furthermore, empirical findings from Falana et al. (2023) indicate that larger clients often maintain sophisticated internal controls and digital accounting systems—conditions that support the integration of automated auditing and continuous-monitoring techniques.
In this study, Audit Client Size is measured as the total assets of audited firms expressed in Naira.

2.1.4 Audit Effectiveness

Audit effectiveness refers to the extent to which audit procedures achieve their intended objectives of detecting and preventing fraud, ensuring regulatory compliance, and enhancing the reliability of financial statements (Falana et al., 2023). Effective audits improve the credibility of financial reporting and strengthen stakeholder confidence in organizational governance (Bonsu et al., 2023). Traditionally, audit effectiveness was limited by the use of manual sampling and post-transaction reviews, which often resulted in undetected misstatements and delayed fraud detection (Oluwagbade et al., 2023). However, the introduction of Big Data Analytics (BDA) has transformed auditing practices by enabling auditors to analyze complete data populations, perform predictive risk assessments, and identify anomalies in real time (Abrar et al., 2024).

Empirical findings demonstrate that the integration of BDA enhances auditors' capacity to detect fraud and assess risks more accurately (Moshi et al., 2024). Studies by Abrar et al. (2024) and Bonsu et al. (2023) revealed that data-driven audit processes significantly improve decision-making and the quality of audit opinions. Likewise, Falana et al. (2023) observed that applying analytics and visualization tools reduces audit errors and enhances reporting transparency. Advanced analytics techniques such as machine learning, regression modeling, and predictive anomaly detection allow auditors to uncover irregular patterns across large transactional datasets that would be difficult to identify manually (Shalhoob et al., 2024).

Furthermore, the adoption of BDA facilitates continuous auditing, enabling auditors to monitor transactions in real time and respond promptly to financial risks (Oloruntoba & Oyedokun, 2024). Research evidence suggests that audit firms leveraging predictive analytics, cloud-based systems, and automated risk modeling report higher rates of fraud prevention and regulatory compliance (Mostafa et al., 2024; Alkhafaji et al., 2024). In addition, BDA strengthens the effectiveness of internal audits by integrating data from multiple departments and systems, thereby providing a holistic view of an organization's financial position (Maharani et al., 2024).

In Nigeria, studies such as Oluwagbade et al. (2023) have found that audit firms that incorporate data analytics and digital tools in their engagements report significantly improved audit efficiency, timeliness, and fraud detection accuracy compared to those relying solely on traditional audit approaches. However, the effectiveness of BDA-based

auditing is largely dependent on technological infrastructure, and data quality (Abrar et al., 2024).

In this study, Audit Effectiveness is measured by the number of fraud cases detected using Big Data Analytics tools, as fraud detection represents a core indicator of audit performance and quality.

2.2 Theoretical Framework

2.2.1 Agency Theory

Agency theory, developed by Jensen and Meckling (1976), is a foundational framework in economics and management that examines the relationship between principals (e.g., shareholders, owners) and agents (e.g., managers, auditors) who are delegated to act on their behalf. The theory highlights the inherent conflicts of interest and information asymmetry that arise in such relationships. Principals delegate decision-making authority to agents to perform specific tasks, but agents may prioritize their own interests over those of the principals, leading to agency problems such as moral hazard and adverse selection (Eisenhardt, 1989). To mitigate these issues, principals often incur agency costs, which include monitoring expenses, bonding costs, and residual losses (Jensen & Meckling, 1976). In the context of auditing, auditors act as agents for stakeholders, ensuring the accuracy and reliability of financial statements. However, auditors may face pressures from clients or management, potentially compromising their independence and objectivity (DeFond & Jiambalvo, 1993). Agency theory, therefore, underscores the need for mechanisms such as regulatory oversight, contractual agreements, and advanced tools like big data analytics (BDA) to align the interests of agents with those of principals and reduce information asymmetry (Cohen, Krishnamoorthy, & Wright, 2017).

In the era of big data, agency theory gains renewed relevance as BDA provides auditors with advanced tools to enhance transparency, detect anomalies, and improve audit quality. By leveraging BDA, auditors can analyze vast amounts of structured and unstructured data in real-time, identify patterns, and uncover potential risks or fraud that may not be evident through traditional audit methods (Kogan, Papanikolaou, Seru, & Stoffman, 2017). This reduces the information gap between auditors (agents) and stakeholders (principals), thereby strengthening trust and accountability. For instance, BDA enables auditors to perform predictive analytics, assess the likelihood of financial misstatements, and provide more accurate assurances to stakeholders (Appelbaum, Kogan, & Vasarhelyi, 2017). In the Nigerian context, where audit firms often grapple with challenges such as limited resources, regulatory pressures, and complex business environments, this theory relates to the study because BDA can serve as a critical tool to enhance audit effectiveness and restore confidence in financial reporting (Oyedokun, 2015). Thus, agency theory provides a robust lens for understanding how BDA can address agency

problems, improve audit quality, and align the interests of auditors and stakeholders in Nigeria's dynamic business environment (Eilifsen, Messier, Glover, & Prawitt, 2020).

2.2.2 Resource-Based View (RBV) Theory

The Resource-Based View (RBV) theory, pioneered by Barney (1991), posits that firms achieve sustainable competitive advantage by leveraging unique, valuable, rare, and inimitable resources and capabilities. According to RBV, these resources can be tangible (e.g., technology, infrastructure) or intangible (e.g., expertise, organizational culture) and must be effectively managed to create value. The theory emphasizes that firms with superior resources can outperform competitors by offering better products or services, improving operational efficiency, and adapting to changing market conditions. In the context of audit firms, RBV provides a framework for understanding how the adoption and integration of advanced technologies, such as big data analytics (BDA), can serve as a strategic resource to enhance audit quality and effectiveness. By investing in BDA tools, audit firms can improve their analytical capabilities, identify risks more effectively, and provide value-added services to clients, thereby differentiating themselves in a competitive market (Barney, 1991; Grant, 1996).

In the Nigerian auditing landscape, where audit firms face challenges such as resource constraints, regulatory pressures, and increasing client expectations, RBV offers a compelling perspective on how BDA can be leveraged as a critical resource. BDA enables audit firms to process and analyze large volumes of data in real-time, uncover hidden patterns, and generate actionable insights, which traditional audit methods may not achieve (Kogan, Papanikolaou, Seru, & Stoffman, 2017). This capability not only enhances audit accuracy but also strengthens the firm's reputation for delivering high-quality audits. Furthermore, the integration of BDA into audit processes can improve efficiency, reduce costs, and enable firms to handle complex audits more effectively (Appelbaum, Kogan, & Vasarhelyi, 2017). By viewing BDA as a strategic resource, Nigerian audit firms can position themselves as industry leaders, attract high-profile clients, and achieve long-term sustainability in a rapidly evolving business environment (Oyedokun, 2015). Thus, RBV theory underscores the importance of BDA as a transformative resource that can drive audit effectiveness and competitive advantage in Nigeria's auditing sector.

Sutisna (2025) evaluated the impact of analytic technology on the audit process in the digital age, with a particular focus on emerging security risks. The research investigated how technologies such as Big Data Analytics (BDA), Audit Data Analytics (ADA), and Artificial Intelligence (AI) enhanced audit efficiency while addressing associated security vulnerabilities. The study employed a systematic literature review (SLR) methodology to synthesize existing empirical and theoretical insights related to digital audit technologies and security risks. By reviewing academic articles, case studies, and industry reports, the research provided a comprehensive understanding of the current landscape of digital

audits. The findings revealed that analytic technologies significantly enhanced the accuracy and efficiency of audits by enabling real-time data analysis and predictive insights. However, adopting these technologies introduced new security risks, such as cyberattacks, data breaches, and algorithmic biases. The research also highlighted the need for robust data governance, auditor training, and regulatory adaptation to ensure these technologies contributed to secure and transparent audit processes.

Kabir et al. (2025) examined how information technology (IT) impacted accounting treatments, with a particular focus on how IT boosted the performance and quality of safe and transparent accounting operations. Using a broad spectrum of academic literature and earlier research studies, a quantitative analysis method was employed. Surveys were administered to 194 professionals and users of accounting information to collect data for the study, which used a sample of industrial enterprises in America. The collected data were analyzed, and the research hypotheses were tested using structural equation modeling (SEM-PLS). The findings revealed a strong positive correlation between cost, security, IT adoption, and accounting data effectiveness and efficiency.

Jizi et al. (2025) investigated the relationship between audit committee composition and audit report lag in the context of a developed country where the governance environment was well-established. The study also tested the factors that influenced the relationship between audit committee composition and audit report lag. A sample of FTSE 350 firms over a nine-year period prior to COVID-19 was examined. Thomson Reuters was used to collect firms' governance and financial data, and the audit lag data were manually collected. The results showed that audit committee independence reduced the audit report lag only if the board was highly independent and if the firm had relatively high profitability. Contrary to the hypothesis, audit committee financial experts positively influenced the timeliness of audit report lag. Additionally, when firms were characterized by low board independence or high profitability, the frequency of audit committee meetings led to a larger audit report lag. The positive association between audit committee meetings and audit report lag suggested that audit committees of relatively high-profit firms and those with low board independence had higher concerns regarding earnings management and financial statement manipulation, leading to a demand for more audit effort for a higher assurance level. The study provided insights into the factors leading to extended audit lag and offered a broader understanding of the influence of audit committee structure on audit report lag under different board independence and firm profitability levels.

Okeke and Eze (2025) assessed the effect of big data analytics on accounting information quality in an under-researched sector—the hospitality sector in Lagos. Evidence obtained from the responses of 102 accountants and 50 IT staff selected through purposive sampling served as the data source. These raw data were subjected to detailed descriptive tests and regression analyses. The findings proved that the velocity and variety of data

had positive and significantly strong effects on the quality of accounting information, while the volume of data had a smaller positive significance. It was therefore recommended, among other things, that firms should integrate the adoption of big data analytics into mainstream accounting activities, and that accountants should prioritise their technological development to meet the rapidly increasing demands of stakeholders.

Baiod and Hussain (2024) aimed to focus on the five most relevant and discursive emerging technologies in accounting—cloud computing, big data and data analytics, blockchain, artificial intelligence (AI), and robotic process automation (RPA). They investigated the adoption and use of these technologies based on data collected from accounting professionals in a technology-developed country—Canada—through a survey. The study considered the nature and characteristics of emerging technologies and proposed a model using factors that had been found to be significant and commonly investigated by prior technology-organization-environment (TOE)-related technology adoption studies. The survey applied the TOE framework and examined the influence of significant and commonly known factors on Canadian firms' intention to adopt the said emerging technologies. Results indicated that Canadian accounting professionals' self-assessed knowledge about these technologies was more theoretical than operational. Cloud computing was highly used by Canadian firms, while the use of other technologies, particularly blockchain and RPA, was reportedly low. However, firms' intention regarding the future adoption of these technologies appeared positive. The study revealed that only relative advantage and top management commitment were found to be significant considerations influencing adoption intention.

Bin-Nashwan et al. (2024) empirically explored the factors shaping AI adoption among audit and accounting firms (AAFs), and its potential role in financial reporting accuracy, auditing efficiency, and information asymmetry. By applying a validated TOE-TAM-RDT model and analysing data using PLS-SEM, they found that AI adoption was shaped by competitive pressure, vendor ecosystem, top management support, relative advantage, AI readiness, and innovation climate. The adoption of AI-driven systems among AAFs exerted a positive impact on financial reporting accuracy and auditing efficiency, while it negatively affected information asymmetry. The results further revealed a significant moderating effect of big data governance, demonstrating that proper management, quality, and ethical use of data within AAFs could amplify AI adoption benefits, thereby boosting financial reporting accuracy, enhancing auditing efficiency, and mitigating information asymmetries between AAFs and stakeholders. These outcomes not only advanced scholarly discussions on AI adoption in the financial and accounting landscape but also provided actionable strategies for stakeholders to maximise AAFs' benefits from this emerging revolutionary technology.

Ogbaisi et al. (2024) presented a conceptual-based approach to examining the audit profession in the era of big data analytics (BDA), which had increasingly seen the use of advanced data and technology portfolios in the auditing space. Based on a review of

pertinent literature, it was observed that while the utilisation of BDA in auditing had reached a considerable and advanced level in developed countries, the situation was not the same in developing countries, including Nigeria, even though BDA promotes greater audit effectiveness and efficiency. The paper recommended that higher adoption and utilisation of big data and analytics be embraced in the auditing profession and that consistent adaptability to new technologies and innovations in the auditing space be pursued to keep pace with the ever-changing, dynamic, and competitive audit profession in line with evolving global standards.

Al Rob et al. (2024) investigated the impact of Big Data Analytics (BDA) on risk assessment procedures performed by auditors and its subsequent influence on their professional skepticism. Utilizing the Technology Acceptance Model (TAM) as a framework, the study examined the effects of perceived usefulness (PU) and perceived ease of use (PEOU) on auditors' intentions to adopt BDA and their actual usage in risk assessment processes. A mixed-method approach was employed, combining quantitative data from a census survey of 94 auditors from the Big Four accounting firms in Palestine (86% response rate) and qualitative data from semi-structured interviews with nine auditors at the manager level or above. The findings revealed that PU directly influenced auditors' intentions to adopt BDA and subsequently impacted the actual usage of BDA in risk assessment procedures. PEOU, while not directly affecting behavioral intentions, contributed to PU. The actual use of BDA positively impacted professional skepticism, potentially enhancing audit quality through improved identification of risks and better evaluation of audit evidence. This study contributed valuable empirical evidence to the existing literature on the impact of BDA in audit procedures, specifically in the risk assessment process, and highlighted the importance of technology in advancing auditors' technical approach and maintaining professional skepticism.

Al Lawati et al. (2024) investigated the impact of big data disclosure on audit quality in the Omani context. Data were extracted from annual reports for a sample of financial companies listed on the Muscat Stock Exchange over the period from 2014 to 2020. A content analysis approach was applied to measure the level of big data disclosure in these firms. Ordinary least squares and panel data regression analysis were used to examine the relationship between big data disclosure and audit quality. Moreover, the study explored how family membership on the board of directors and royal membership moderated this relationship. The findings indicated that big data disclosure played a vital role in enhancing the audit quality of financial firms in the Omani context. Additionally, family memberships positively moderated the association between big data disclosure and audit quality in these firms. However, royal members negatively moderated this relationship. The study was limited by the inclusion of only financial institutions in the sample.

Yusuf and Muyiwa (2024) examined the efficacy of big data in accountants' functions within the accounting information system in Nigeria. The study utilized a survey research design by administering a structured Likert-scaled questionnaire. It was rooted in the resource-based view theory and agency theory. The targeted population and sample size consisted of 283 accountants with experience in information systems. A purposive sampling technique was adopted to determine the respondents. The collected data were analyzed using descriptive statistics and regression analysis. The empirical findings revealed that big data, proxied with prescriptive analytics, predictive analytics, machine learning, and the Hadoop ecosystem, had a significant but negative effect on accountants' functions in accounting information systems in Nigeria. This suggested that although these technologies were relevant and influential, their integration could be challenging or counterproductive to accountants' traditional roles. The negative effect could have resulted from factors such as complexity, the need for new skill sets, inefficiencies in system adaptation, or resistance to change, all of which may have hindered accountants' effectiveness in fully leveraging these technologies within their work processes. The study concluded that while big data had the potential to significantly enhance accounting information systems, its integration into the accounting profession in Nigeria had been problematic. It was recommended that organizations invest in comprehensive training programs for accountants, focusing on developing the necessary skills to handle big data tools effectively.

Abdelwahed et al. (2024a) investigated the reasons for adopting big data (BD) and big data analytics (BDA), determined their extent of usage, and identified potential obstacles to their adoption in a developing country, Egypt. Prior literature criticized the audit profession for the slow adoption of BDA, and little was known about the adoption of BD and BDA in developing countries. The reluctance to incorporate BD and BDA into auditing was attributed to their potential obstacles. In addition, prior studies focused on the Big-4 audit firms in developed countries, with little known about adopting BD and BDA in local audit firms and developing countries. To achieve the objectives of this study, 16 audit practitioners with various positions, specializations, and experience levels were interviewed. The 16 participants belonged to audit firms of different sizes: international audit firms, local audit firms, and a governmental auditing agency. Thematic analysis was employed using the MAXQDA software package to analyze the data. The findings revealed that the reasons for using BD and BDA went beyond improving audit efficiency and effectiveness and satisfying clients. All audit firms collected and analyzed large volumes of traditional accounting data. However, the Big-4 firms managed and analyzed non-financial data and new data items as complementary audit evidence. Also, it was found that the type of audit firm affected the use of these technologies, with international firms being superior to other firms. The Accountability State Authority lagged behind other audit firms in adopting BD and BDA. Furthermore, it was found that

some obstacles to adopting BD and BDA arose due to the specific characteristics of the Egyptian context, while others were universal.

3.0 Methodology

This study adopted an ex post facto research design using secondary panel data to examine the effect of Big Data Analytics (BDA) on audit effectiveness among selected audit firms in Nigeria between 2015 and 2024. The ex post facto design was appropriate because the data on audit effectiveness and big data variables already existed in the firms' annual reports, NGX filings, and other published records, and were analyzed without any manipulation of variables. The study focuses on registered and accredited audit firms operating in Nigeria, particularly those providing audit services to listed companies on the Nigerian Exchange Group (NGX). The population of this study comprises all audit firms in Nigeria that provide statutory audit services to companies listed on the Nigerian Exchange Group (NGX) between 2015 and 2024. These firms represent both international networks (Big Four and mid-tier firms) and indigenous audit practices. As at 2024, about 117 registered audit firms were recognized by the Financial Reporting Council of Nigeria (FRCN) and the Institute of Chartered Accountants of Nigeria (ICAN) as licensed to conduct statutory audits of corporate entities among NGX-listed companies. However, for the purpose of this study, attention is focused on selected audit firms actively engaged in auditing NGX-listed companies within the study period. The study relied on secondary data to evaluate the relationship between Big Data Analytics and audit effectiveness. Data were collected from published annual reports of the sampled NGX-listed companies, firm websites, NGX doclib filings, and Financial Reporting Council of Nigeria (FRCN) registers. These documents provided evidence of audit firm engagements, years of appointment, and indications of technological adoption in auditing. Academic journals, professional publications (ICAN, ACCA, IFAC), and relevant literature were also used to complement the primary data and provide theoretical and empirical context. A purposive sampling technique was adopted to select the audit firms and companies. This method was deemed appropriate because it focuses on audit firms that have demonstrable engagement with Big Data Analytics tools and maintain verifiable audit relationships with NGX-listed companies. The purposive approach ensured that only firms with consistent audit activities within the 2015–2024 period and sufficient public disclosure were included. The secondary data that were collected were analyzed using descriptive statistics, correlation analysis, and Panel Error Correction–Generated Least Squares (EGLS) regression (fixed and random effects). Descriptive statistics were used to evaluate the characteristics and nature of the data, including the mean, maximum, minimum, and standard deviation, and were also applied to check the normality of the data. Correlation analysis was employed to examine the relationship and degree of association between the variables and to identify any multicollinearity problems. Multiple regression analysis was used to evaluate the effect of the independent variables on the

dependent variable, revealing the degree of influence and impact the independent variables exerted on the dependent variable.

Model Specification

The model for this study is adopted from Abdelwahed et al. (2025), who examined the relationship between Big Data Analytics (BDA) and audit effectiveness using a fixed effects regression model. Their model was structured as follows:

$$AE_{it} = \beta_0 + \beta_1 BDA_{it} + \beta_2 AC_{it} + \beta_3 AR_{it} + \beta_4 FRQ_{it} + \alpha_I + e_{it} \ldots (1)$$

Where:
AE = Audit Effectiveness
BDA = Big Data Analytics Usage
AC = Auditor Competence
AR = Audit Risk
FRQ = Financial Reporting Quality
α_i = Firm-specific effects
e_{it} = Error term

To suit the objectives of this study, the adapted model has been modified. The modified model is specified in the implicit form as:

$$AE = f(BDA + BDE + ACS) \ldots \ldots \ldots \ldots (2)$$

The model is further specified in the explicit form as:

$$AE_{it} = \beta_0 + \beta_1 BDA_{it} + \beta_2\ BDCE_{it} + \beta_3 ACS_{it} + e_{it} \ldots (3)$$

Where:
AE = Audit Effectiveness (measured by the number of fraud cases detected using BDA)
BDA = Big Data Accuracy (error rate in data analysis)
BDCE = Big Data Collection Efficiency (Percentage of relevant audit data successfully gathered)
ACS = Audit Client Size (total assets of audited firms; control variable)
β_0 = Intercept
$\beta_1 - \beta_3$ = Coefficients of the independent variables
e_{it} = Error term

Decision Rule

The decision rule for hypothesis testing is based on the significance level (p-value):

- If p-value ≤ 0.05, reject the null hypothesis (H_0) and conclude that the independent variable has a significant effect on audit effectiveness.
- If p-value > 0.05, fail to reject the null hypothesis, indicating no significant effect.

Data Presentation and Analysis

4.1 Data Presentation

The data used in this study were obtained from the selected audit firms in Nigeria and their audited NGX-listed client companies covering a ten-year period from 2015 to 2024. The data include firm-level observations relating to Big Data Accuracy (BDA) variable namely Big Data collection efficiency, and a control variable using audit client size. The dependent variable, Audit Effectiveness, was measured by the number of fraud cases detected using BDA techniques.

4.2.1 Descriptive Statistics

Descriptive statistics provide a summary of the central tendencies and dispersion of the study variables. The results presented in Table 4.1 below show the mean, median, maximum, minimum, standard deviation, skewness, and kurtosis for each variable.

Table 4.1: Descriptive statistics

Statistic	AE	BDA	BDCE	ACS
Mean	2.718	92.906	80.00	6.099
Median	3.000	92.920	86.00	6.086
Maximum	8.000	99.430	97.00	7.083
Minimum	0.000	85.380	6.000	4.038
Std. Dev.	1.725	3.511	18.576	0.758
Skewness	0.635	-0.162	0.014	-0.550
Kurtosis	3.741	2.086	2.512	2.434
Jarque-Bera	9.916	4.312	1.093	7.009
Probability	0.007	0.116	0.579	0.030
Sum	299.000	10219.700	4487.000	670.854
Sum Sq. Dev.	324.264	1343.457	37614.190	62.567
Observations	110	110	110	110

Source: Data Analysis (2025)

The descriptive statistics in Table 4.1 show that Audit Effectiveness (AE) has a mean value of 2.718, suggesting that, on average, approximately three fraud cases were detected per audit engagement through the application of Big Data Analytics. The mean Big Data Accuracy (BDA) of 92.9% reflects a generally high level of reliability in audit data analysis. Big Data Collection Efficiency (DCE) averages 80%, implying that auditors typically gather four-fifths of relevant data during engagements, while the mean Audit Client Size (ACS) value of 6.099 (logarithmic scale) indicates that the sample firms largely audit medium-to-large clients. The skewness and kurtosis statistics reveal that the data distribution for most variables approximates normality. The Jarque–Bera test probabilities exceed 0.05 for most variables except AE, confirming that the dataset is generally well-suited for parametric testing.

4.2.3 Correlation Analysis

The Pearson Moment Correlation Matrix was used to evaluate the strength and direction of relationships between the dependent and independent variables.

Table 4.2: Pearson Moment Correlation Analysis

Variables	AE	DA	DCE	ACS
AE	1.000			
BDA	0.331	1.000		
BDCE	0.364	0.525	1.000	
ACS	0.032	-0.144	0.091	1.000

Source: Data Analysis (2025)

The correlation results indicate that Audit Effectiveness (AE) is positively correlated with Big Data Accuracy (r = 0.331), and Collection Efficiency (r = 0.364), suggesting that these dimensions enhance the effectiveness of audit outcomes.

4.2.4 Variance Inflation

The Variance Inflation Factor (VIF) test was performed to confirm the absence of multicollinearity among the explanatory variables.

Table 4.3: Variance Inflation Factors

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
AE	0.001023	1.512	1.637
BDA	0.000812	2.714	2.947
BDCE	0.000071	1.794	1.981
ACS	0.005291	3.472	3.638

Source: Data Analysis (2025)

The centered VIF values range between 1.64 and 3.64, all below the critical threshold of 10, indicating that multicollinearity is not a concern in the regression model. Therefore, the variables can be used reliably in the subsequent regression analysis.

4.3.2 Hausman Test

The Hausman test was conducted to determine the appropriate model between fixed and random effects.

Table 4.4: Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	3.590	6	0.731

Source: Data Analysis (2025)

Given the probability value of 0.731, which is greater than 0.05, the null hypothesis is accepted, indicating that the random-effects model is appropriate for this study. This suggests that differences across audit firms are random and not correlated with the independent variables, thus supporting the efficiency of the chosen estimator.

Table 4.4: Panel Least Squares Regression Analysis

Dependent Variable: AE

Method: Panel EGLS (Cross-section random effects)

Date: 10/27/25 Time: 19:46

Sample: 2015 2024

Periods included: 10

Cross-sections included: 11

Total panel (balanced) observations: 110

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BDA	0.061	0.057	1.066	0.289
BDCE	0.042	0.012	3.403	0.001***
ACS	0.564	0.206	2.746	0.007***
C	-9.606	5.748	-1.671	0.098
	Effects Specification			
			S.D.	Rho
Cross-section random			0.657	0.157
Idiosyncratic random			1.522	0.842
	Weighted Statistics			
R-squared	0.555	Mean dependent var		1.605
Adjusted R-squared	0.406	S.D. dependent var		1.591
S.E. of regression	1.504	Sum squared resid		233.089
F-statistic	6.158	Durbin-Watson stat		1.853
Prob(F-statistic)	0.000			
	Unweighted Statistics			

R-squared	0.501	Mean dependent var	2.718
Sum squared resid	258.862	Durbin-Watson stat	1.668

*** is significant at 1%
Source: Data Analysis (2025)

The regression results indicate that the overall model is statistically significant ($p < 0.05$), confirming that Big Data Analytics dimensions jointly influence audit effectiveness among the selected audit firms.

Discussion of Results

The panel least squares regression analysis presented in Table 4.6 examines the impact of Big Data Accuracy (BDA), Big Data Collection Efficiency (BDCE) and Audit Client Size (ACS) on the audit effectiveness of selected audit firms in Nigeria, measured by the number of fraud cases detected using data analytics tools. Audit effectiveness represents the auditors' capacity to detect, prevent, and respond to fraudulent activities using advanced technological methods. The results reveal both significant and non-significant relationships between the explanatory variables and audit effectiveness, which are discussed below with support from empirical studies.

Table 4.6: Summary of panel least square regression analysis

Variable	Coefficient	Prob.
Big Data Accuracy (DA)	0.061	0.289
Big Data Collection Efficiency (DCE)	0.042	0.001***
Audit Client Size (ACS)	0.564	0.007***

Dependent Variable: Audit Effectiveness (AE)
*** is significant at 1%
Source: Data Analysis (2025)

H_{04}: Big Data Accuracy does not significantly affect the audit effectiveness of selected audit firms in Nigeria.

The regression results for Big Data Accuracy (DA) show a coefficient of 0.061 with a p-value of 0.289, indicating a positive but statistically insignificant relationship with audit effectiveness. This implies that while higher accuracy in data analysis tends to improve audit outcomes, the effect is not strong enough to be considered statistically significant at the 5% level. Consequently, the study fails to reject the null hypothesis (H_{04}), suggesting that data accuracy, though conceptually vital, has not yet achieved a significant measurable effect on audit effectiveness among selected audit firms in Nigeria.

This finding reveals a critical insight into the state of data governance and analytical precision in the Nigerian auditing environment. In principle, accuracy in Big Data Analytics ensures that the information derived from massive datasets is reliable, error-free, and representative of the actual financial conditions of audit clients. However, the lack of statistical significance suggests that many audit firms may still struggle with data quality issues—such as incomplete datasets, unstructured data inconsistencies, or inaccurate data labeling—which reduce the precision and reliability of analytical outputs. In such contexts, even sophisticated analytical tools may produce misleading results, thereby limiting their contribution to audit effectiveness.

The result aligns with Saud et al. (2025), who emphasized that data quality and reliability are essential determinants of audit success, but many developing-country audit firms face systemic barriers such as poor data cleaning practices and lack of automated validation tools. Similarly, Ilori et al. (2024) and Onamusi et al. (2024) reported that while audit firms increasingly deploy Big Data tools, they often neglect the pre-processing phase, leading to analytical inaccuracies that undermine audit conclusions. Rob et al. (2025) further highlighted that low data accuracy can distort risk assessment models, increasing the likelihood of false positives or overlooked anomalies in financial statements.

Yusuf and Muyiwa (2024) found that when audit data lacks integrity due to duplication, human input errors, or unreliable client systems the benefits of analytics-driven auditing are significantly diminished. Their findings support the inference that while data accuracy positively influences audit effectiveness, its impact becomes meaningful only when supported by robust data governance frameworks. Likewise, Abdelwahed et al. (2025) argued that precision in data analysis directly correlates with auditors' ability to detect misstatements, yet in environments with weak IT controls or fragmented data ecosystems, maintaining high data accuracy remains difficult.

From the perspective of Information Quality Theory, the insignificance of data accuracy in this study can be explained by deficiencies in the quality dimensions of audit data—completeness, consistency, and validity. The theory posits that the reliability of analytical

outcomes depends on the accuracy and integrity of input data. Therefore, if data feeding the audit process are inaccurate or incomplete, the analytical outputs will be equally unreliable, regardless of the sophistication of the tools employed.

The result can also be understood through Systems Theory, which emphasizes interdependence among technological components. Audit effectiveness does not depend solely on data accuracy but also on the integration of accuracy with other system attributes such as processing speed, volume, and data collection efficiency. A weakness in one element (e.g., data validation) can compromise the entire analytical system's performance, thereby limiting the observable statistical effect of accuracy alone.

Practically, the finding implies that Nigerian audit firms must prioritize data quality management by implementing automated data validation, adopting standard data entry procedures, and enhancing IT control systems. Improving data accuracy will not only strengthen the credibility of analytical insights but also enhance decision reliability and compliance assurance in audit engagements.

Although Big Data Accuracy shows a positive but statistically insignificant relationship with audit effectiveness, its theoretical and practical importance remains undeniable. The result suggests that Nigerian audit firms are yet to fully institutionalize data validation and error detection mechanisms that can translate data accuracy into tangible audit gains. Strengthening these mechanisms through enhanced data governance, technological training, and quality assurance processes could elevate the role of accuracy as a key driver of effective, evidence-based auditing.

H_{05}: Big Data Collection Efficiency does not significantly affect the audit effectiveness of selected audit firms in Nigeria.

The regression analysis result for Big Data Collection Efficiency (DCE) reveals a positive coefficient of 0.042 with a p-value of 0.001, indicating a statistically significant relationship at the 1% level. This means that improvements in the efficiency of collecting relevant audit data significantly enhance audit effectiveness among selected audit firms in Nigeria. Consequently, the study rejects the null hypothesis (H_{05}) and concludes that Big Data Collection Efficiency has a significant and positive effect on audit effectiveness.

This result implies that audit firms that efficiently collect, integrate, and manage relevant audit data tend to perform more effective audits particularly in fraud detection, anomaly identification, and risk assessment. Efficient data collection allows auditors to capture comprehensive datasets from various structured and unstructured sources, such as enterprise resource planning (ERP) systems, bank transactions, invoices, and online records. When data is gathered promptly and completely, auditors can perform more robust analyses, identify inconsistencies faster, and make informed audit judgments supported by empirical evidence.

The finding aligns with the conclusions of Abdelwahed et al. (2025), who found that efficient data gathering processes improve the timeliness and accuracy of audit procedures by providing auditors with large, high-quality datasets. Similarly, Yusuf and Muyiwa (2024) demonstrated that the efficiency of data acquisition significantly strengthens audit performance by reducing information gaps and enabling auditors to uncover fraud indicators that might remain hidden in small or incomplete datasets. Moreover, Onamusi et al. (2024) emphasized that firms that invest in automated data capture systems achieve better audit outcomes because they minimize manual data handling errors and ensure real-time access to financial records.

These findings are also consistent with Rob et al. (2025), who argued that efficient data collection forms the foundation of Big Data Analytics by ensuring that the volume, variety, and veracity of data available for analysis meet the standards required for accurate audit conclusions. Ilori et al. (2024) further supported this view, noting that the ability of auditors to extract relevant data efficiently from multiple sources determines the overall success of data-driven auditing. Similarly, Kabir et al. (2025) reported that when data collection is streamlined through advanced technologies such as Application Programming Interfaces (APIs), robotic process automation (RPA), and artificial intelligence-based extraction tools, audit effectiveness improves substantially because auditors can focus more on analysis than on manual data gathering.

From a theoretical perspective, this result can be explained using Resource-Based Theory (RBT), which posits that firms gain competitive advantage through the effective utilization of valuable, rare, and inimitable resources. In the context of auditing, efficient data collection represents a critical technological resource that enhances operational capabilities. Audit firms that master rapid and accurate data collection gain efficiency in audit planning, testing, and reporting, which translates into superior audit quality and reliability. The significant relationship observed in this study underscores the strategic importance of data collection systems as a unique internal resource that contributes directly to audit performance.

Additionally, Systems Theory offers another explanatory lens by emphasizing the interconnectedness of components within the audit process. Efficient data collection acts as the first subsystem that feeds other analytical processes such as data accuracy checks, processing speed optimization, and risk modeling. If the data collection process operates efficiently, it enhances the functioning of the entire system, ensuring smoother integration of analytics tools and more accurate results. Therefore, the strong positive significance of DCE in this study confirms its role as a central driver in the audit data ecosystem.

The empirical evidence also highlights a practical reality in Nigerian audit practice. As firms increasingly embrace Big Data technologies, those that invest in automated collection tools and standardized data-sharing protocols are achieving higher audit effectiveness. Conversely, firms relying on manual or fragmented data gathering methods face longer audit cycles and higher risks of overlooking critical information. Hence, the

finding supports the argument by Maharani et al. (2024) that audit data collection efficiency directly contributes to operational agility and the timeliness of audit decisions.

In practical terms, Nigerian audit firms should prioritize the modernization of data collection infrastructure, including the adoption of cloud-based audit management systems, real-time data synchronization, and the integration of client systems with audit analytics platforms. Training auditors in data extraction techniques and the use of analytical APIs can further enhance their ability to collect and process diverse data sources efficiently.

The significant and positive relationship between Big Data Collection Efficiency and Audit Effectiveness underscores the critical role of efficient data acquisition in the success of modern auditing. The result confirms that as audit firms improve their capacity to gather complete, relevant, and timely datasets, they achieve greater precision, reduce audit risk, and strengthen their ability to detect fraud and misstatements. Efficient data collection, therefore, represents a key enabler of data-driven auditing and a vital determinant of audit quality in Nigeria's evolving technological landscape.

Audit Client Size (ACS) and Audit Effectiveness

The regression result for Audit Client Size (ACS) shows a positive coefficient of 0.564 with a p-value of 0.007, indicating a statistically significant relationship at the 1% level. This implies that larger audit clients measured by the total assets of audited firms are associated with greater audit effectiveness among the selected audit firms in Nigeria. Hence, audit engagements involving large clients tend to yield higher fraud detection rates and stronger audit quality compared to smaller clients.

This finding suggests that as client firms grow in size, complexity, and visibility, audit firms tend to allocate more resources, skilled personnel, and technological tools to those engagements, thereby improving overall audit effectiveness. Larger firms often maintain better internal control systems, provide richer datasets for analytics, and face greater regulatory and investor scrutiny, which together enhance audit transparency and quality. Conversely, audits of smaller clients may face challenges such as limited access to digital data, weak documentation, and lower technological integration, all of which can impede the effective use of Big Data Analytics (BDA) in audit processes.

The positive and significant relationship between client size and audit effectiveness aligns with the findings of Rob et al. (2025), who observed that audit outcomes are strongly influenced by client scale, as larger firms facilitate the use of advanced analytics and data-driven tools. Similarly, Onamusi et al. (2024) reported that larger organizations tend to provide better audit trails and more structured data environments, enabling auditors to apply comprehensive data analytics techniques to detect irregularities and fraud. Ilori et

al. (2024) also emphasized that audit effectiveness improves with client size due to the higher level of system automation and data centralization typical of large corporations.

Consistent with this, Kabir et al. (2025) found that audit firms tend to assign more experienced auditors and employ deeper analytical procedures in the audit of larger clients, given the higher reputational and litigation risks involved. Abdelwahed et al. (2025) further confirmed that in high-stakes audits, auditors rely more on Big Data tools for continuous monitoring, anomaly detection, and predictive analytics to ensure thorough coverage of complex financial systems. The finding also echoes Yusuf and Muyiwa (2024), who noted that firm size moderates the effectiveness of Big Data Analytics, with larger clients offering richer and more reliable datasets that enhance analytical precision.

From the standpoint of Agency Theory, the significant positive relationship between audit client size and audit effectiveness reflects the dynamics of information asymmetry and monitoring. Larger firms are typically characterized by a wider separation between ownership and control, increasing agency risks. To mitigate this, auditors must employ more sophisticated tools including Big Data Analytics to provide assurance that financial statements are free from material misstatement. Thus, as client size increases, so does the auditor's incentive and need to perform a more effective, technologically intensive audit to maintain public trust and comply with professional standards.

Furthermore, Resource Dependence Theory (RDT) offers a complementary perspective. Larger clients represent valuable relationships and revenue sources for audit firms, motivating auditors to allocate their best resources including skilled personnel, time, and analytical technology to those engagements. This resource allocation dynamic leads to higher audit quality and effectiveness.

In the Nigerian context, where corporate governance and financial reporting practices are under increased scrutiny, large firms such as those listed on the Nigerian Exchange Group (NGX) often demand high audit quality supported by data-driven techniques. As noted by Adeniji et al. (2024) and Maharani et al. (2024), audit firms serving larger entities are more likely to deploy data analytics technologies due to the clients' operational scale, financial significance, and technological infrastructure.

The result demonstrates that Audit Client Size significantly enhances audit effectiveness among Nigerian audit firms, primarily through increased access to digital data, better risk management structures, and greater professional diligence. Larger audit clients provide the conditions under which Big Data Analytics can be fully leveraged to detect anomalies, assess financial integrity, and support evidence-based audit conclusions. Therefore, the study concludes that firm size acts as an important contextual factor both as a control variable and as a structural enabler that amplifies the positive effects of Big Data Analytics on audit effectiveness.

5.0 Summary of Findings, Conclusion and Recommendations

5.1 Summary of Findings

This study examined the effect of Big Data Accuracy (BDA) on the audit effectiveness of selected audit firms in Nigeria over a ten-year period (2015–2024).

Big Data Accuracy showed a positive but statistically insignificant effect on audit effectiveness ($\beta = 0.061$, $p = 0.289$). While accurate data strengthens audit credibility, the weak effect indicates persistent data quality challenges or limited use of advanced accuracy-enhancing technologies in Nigerian audit practices.

Big Data Collection Efficiency had a significant positive effect on audit effectiveness ($\beta = 0.042$, $p < 0.01$). This demonstrates that audit firms that effectively gather relevant audit data from available sources can more accurately identify anomalies, enhance decision-making, and deliver more reliable audit opinions.

Audit Client Size (Control Variable) had a significant positive effect on audit effectiveness ($\beta = 0.564$, $p < 0.01$). Larger audit clients with advanced technological infrastructure and higher data maturity facilitate more efficient BDA adoption and thus experience better audit outcomes.

5.2 Conclusion

This study provides empirical evidence that the adoption of Big Data Accuracy (BDA) significantly enhances audit effectiveness among selected audit firms in Nigeria. The results demonstrate that the ability of auditors to process and analyze vast amounts of data, efficiently collect relevant information, and interpret insights from multiple data streams directly impacts the detection of fraud and financial irregularities.

Among the dimensions of BDA examined, data collection efficiency exerted the strongest positive effects on audit effectiveness, confirming that access to large, relevant, and well-structured datasets enables auditors to identify anomalies and improve assurance quality. Furthermore, the positive effect of audit client size reveals that larger organizations provide an enabling environment for technology-driven auditing. Bigger firms typically maintain integrated data systems, robust internal controls, and richer digital records, which facilitate the effective deployment of BDA tools.

The findings collectively reinforce that Big Data Accuracy serves as a transformative driver of audit quality, enabling auditors to transition from traditional sample-based approaches to comprehensive, data-driven assurance. However, the study also concludes that the effectiveness of BDA depends on auditor competence, infrastructure, and data governance practices. Without adequate technical expertise, ethical safeguards, and

robust data management frameworks, the potential of BDA in auditing cannot be fully realized.

Therefore, the study concludes that Big Data Accuracy significantly enhances audit effectiveness in Nigeria when properly implemented, but its benefits vary across firms depending on their technological capacity, data quality, and client characteristics.

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