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Artificial Intelligence Adoption in Financial Reporting and Audit Quality: Evidence from Nigerian Listed Firms

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Abstract

This study examines the effect of artificial intelligence (AI) adoption in financial reporting on audit quality in an emerging market context, using evidence from Nigerian listed firms. Drawing on the governance substitution perspective, complemented by institutional and technology diffusion theories, the study argues that AI-enabled reporting systems enhance audit quality by strengthening firm-level governance mechanisms. Using a mixed-method quantitative design, the study combines content analysis of corporate annual reports with archival audit data and applies Structural Equation Modeling (SEM) to test both direct and indirect relationships. AI adoption is operationalized through a disclosure-based AI adoption index, while audit quality is modeled as a latent construct reflected by financial restatements and audit fees. The results reveal that AI adoption is positively associated with audit quality and that this relationship is partially mediated by improvements in reporting transparency and internal control quality.

The These findings suggest that AI adoption enhances the reliability of financial reporting and the effectiveness of audits by reducing information asymmetry and strengthening internal monitoring processes. The study contributes to the literature by providing firm-level evidence from an underexplored emerging market setting, advancing methodological approaches to measuring AI adoption, and offering policy-relevant insights for regulators, audit firms, and corporate boards. Overall, the findings highlight AI adoption in financial reporting as a governance-enhancing mechanism with significant implications for audit quality in emerging economies.

Keywords: Artificial Intelligence, Financial Reporting, Audit Quality, Reporting Transparency, Internal Control Quality, Emerging Markets

1. Introduction

1.1 Background and Rationale

The rapid development of artificial intelligence (AI) is profoundly changing the methods of financial reporting and auditing worldwide. AI-based technologies, such as machine learning, natural language processing, and data analytics, are increasingly being used to improve the efficiency of transaction processing, anomaly detection, risk evaluation, and continuous auditing and assurance services. AI technologies are being used in the field of financial reporting to improve the efficiency of data validation, disclosure analysis, and internal control monitoring, thereby reducing errors and information asymmetry (Appelbaum *et al*., 2020; Kokina *et al*., 2021) [3, 16]. Similarly, AI-based technologies are being used in the field of auditing to improve the efficiency of audit analytics, enabling the examination of the entire population of transactions rather than samples, thereby enhancing the quality of audit planning, judgment, and fraud detection (Issa *et al*., 2022; Sun & Vasarhelyi, 2023) [13, 22].

Despite these potential benefits, the impact of AI adoption on audit quality has not been empirically investigated to a satisfactory extent, especially in the context of emerging markets. Audit quality, which generally refers to the reliability of financial reports, the probability of misstatements, and the level of audit effort, continues to face challenges in developing economies. In Nigeria, for instance, there are challenges with enforcement mechanisms, heterogeneous reporting practices, capacity limitations of auditing firms, and higher levels of information asymmetry between firms and capital market participants (Adegboye *et al*., 2021; Iyoha & Oyerinde, 2022) [1, 14]. Even though there are efforts to improve reporting

credibility through regulatory reforms and governance codes, issues of financial statement restatements, earnings manipulation, and heterogeneous audit quality are still prominent.

Therefore, AI adoption could act as a governance substitute in emerging markets by improving transparency, enhancing internal control mechanisms, and improving audit quality, where institutional enforcement mechanisms are not strong. However, the literature has largely focused on conceptual debates and empirical evidence from developed economies, with limited firm-level empirical research on the impact of AI adoption in financial reporting on improving audit quality outcomes (Raisch & Krakowski, 2021; Cao *et al*., 2023) [19, 6]. In addition, past research has adopted a simplistic approach to measuring technology adoption and has not investigated the mechanisms by which AI influences audit quality.

1.2 Research Problem

Although AI is increasingly referenced as a transformative force in accounting and auditing, there is insufficient empirical evidence on whether and how AI adoption in financial reporting enhances audit quality in emerging market settings such as Nigeria. Specifically, it remains unclear whether AI adoption leads to tangible improvements in audit outcomes—such as lower restatement risk or changes in audit fees—or whether its effects operate indirectly through improvements in reporting transparency and internal control quality. The absence of robust, mechanism-based evidence limits the ability of regulators, audit firms, and corporate managers to assess the true value of AI investments in financial reporting systems.

1.3 Research Objectives

The main objective of this study is to examine the effect of artificial intelligence adoption in financial reporting on audit quality among Nigerian listed firms. The specific objectives are to:

1. Assess the extent of AI adoption in financial reporting disclosures of Nigerian listed firms;
2. Examine the direct relationship between AI adoption and audit quality;
3. Analyze the mechanisms through which AI adoption influences audit quality, with particular attention to reporting transparency and internal control effectiveness; and
4. Provide evidence-based insights relevant to audit regulation and digital reporting policy in Nigeria.

1.4 Research Questions

To achieve these objectives, the study addresses the following research questions:

1. To what extent do Nigerian listed firms adopt artificial intelligence in their financial reporting processes?
2. Does AI adoption in financial reporting significantly influence audit quality?
3. Through which mechanisms does AI adoption affect audit quality outcomes?
4. What are the implications of AI-driven reporting practices for audit regulation and oversight in Nigeria?

1.5 Overview of Methodology

The research design adopted in the study is a mixed-method quantitative approach, which incorporates content analysis, archival research, and Structural Equation Modeling (SEM). The adoption of AI is measured using content analysis in the form of annual reports, which is then used to construct an index for the adoption of AI at the firm level. The measure of audit quality is obtained using archival measures, which include financial restatements and fees paid to auditors. SEM is used in the study to model AI adoption and audit quality as latent factors, and it also allows for the examination of direct and indirect relationships simultaneously (Hair *et al*., 2022) [10].

1.6 Contributions of the Study

The present study makes a number of important contributions to both practice and literature. First, from an empirical perspective, the present study offers new firm-level evidence on the relationship between AI adoption in financial reporting and audit quality from an emerging market context, thereby filling an important void in existing literature that has been primarily focused on developed economies. Second, from a methodological perspective, the present study extends existing literature by incorporating content analysis with archival audit data and SEM, which allowed for a deeper analysis of underlying constructs and mechanisms instead of simplistic measures of technology. Third, from a practice perspective, the present study offers important implications for regulators, audit firms, and boards in an emerging market context such as Nigeria by demonstrating how AI adoption in financial reporting can support regulatory oversight and audit quality.

2. Literature Review and Theoretical Foundation

2.1 Institutional and Regulatory Context of Nigeria

2.1.1 Nigeria's Capital Market and Financial Reporting Environment

Nigeria has the largest capital market in Sub-Saharan Africa, with its equity and debt securities primarily traded on the Nigerian Exchange Group. The firms are mandated to disclose annual financial statements that are compliant with International Financial Reporting Standards (IFRS), following the mandatory adoption of IFRS in Nigeria in 2012. Despite the positive impact of IFRS compliance on financial reporting quality, empirical studies have shown that the quality of financial reporting remains low, reflecting differences in governance practices, auditing practices, and enforcement practices (Iyoha & Oyerinde, 2022; Adegboye *et al*., 2021) [14, 1].

The Nigerian financial reporting environment is marked by high information asymmetry, concentrated ownership structures, and a higher proportion of non-Big Four audit firms for listed firms. This environment underscores the need for financial reporting and auditing while, at the same time, highlighting limitations in monitoring and auditing practices. In this context, financial reporting and auditing practices may be significantly influenced by firm-level innovations, such as AI-based financial reporting and control systems.

2.1.2 Audit Regulation and Enforcement Structure

Audit regulation is carried out under a multilayered structure. The Financial Reporting Council of Nigeria (FRCN) is the main standard setter and overseer of financial reporting and auditing practices. The FRCN is responsible for setting accounting and auditing standards, enforcing compliance with the standards, and overseeing the quality of financial reports of public interest entities. The audit

profession is also regulated by professional bodies such as the Institute of Chartered Accountants of Nigeria (ICAN), which is responsible for the certification of auditors.

The regulation of capital markets is overseen by the Securities and Exchange Commission Nigeria (SEC Nigeria), which is responsible for reviewing financial disclosures and enforcing sanctions on non-compliance. However, despite the presence of an established audit regulation structure, past studies have established that there are capacity limitations, low inspection activities, and poor enforcement, which have weakened the overall effect of regulation on firms' compliance with regulations. These limitations have also been a major cause for concern for audit quality, particularly for the timeliness of audits and for financial statement re-statements.

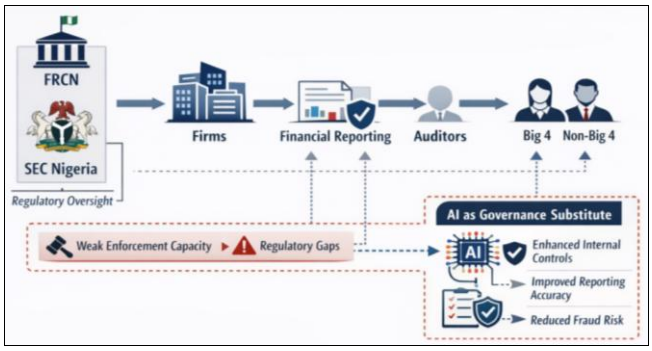

Fig 1: Institutional Context of Nigeria as an Empirical Setting

The above figure illustrates the institutional and regulatory environment of the firm's financial reporting and auditing processes in Nigeria. It highlights the role of the key regulatory institutions, such as the Financial Reporting Council of Nigeria (FRCN) and the Securities and Exchange Commission Nigeria (SEC Nigeria), in overseeing the firm's financial reporting and auditing processes, including the presence of both Big 4 and non-Big 4 firms. It highlights the gaps in the enforcement of the regulations and the role of artificial intelligence-based reporting and control systems as a substitute to governance in the context of an emerging market environment.

2.1.3 Digital Reporting and Technology Adoption Landscape

The digital transformation of Nigeria's corporate reporting environment is progressing, albeit with mixed progress. For instance, while regulators have made efforts to introduce electronic filing systems and initiatives that support XBRL, the adoption of sophisticated digital technologies by firms—especially AI-based applications—remains variable. Large corporations and multinational subsidiaries have a stronger tendency to explore data analytics, AI, and other digital reporting systems, while smaller corporations often rely on conventional and manual systems (Ogunode *et al*., 2021; Arowolo *et al*., 2024 [4]).

Current studies on accounting research in emerging economies suggest that AI adoption by corporations in their financial reporting is often presented qualitatively instead of quantitatively. Therefore, content analysis is a highly appropriate technique for measuring AI adoption by corporations (Cao *et al*., 2023) [6]. In a country like Nigeria, where disclosures regarding digital reporting maturity are often lacking standardization, narrative reporting is a critical framework for examining AI adoption by corporations.

2.1.4 Nigeria as a "Critical Case" for AI–Audit Quality Analysis

Nigeria is an important case study site that is theoretically relevant to the research problem of the study, i.e., the relationship between the adoption of AI in the reporting of financial information and the quality of audits. From an institutional perspective, the case of Nigeria is important because it represents an environment that has both formal convergence with international reporting standards and relatively weak enforcement capabilities. Such an environment makes it more likely that technological governance mechanisms could play the role of substitutes or complements to traditional forms of regulatory oversight, as discussed by Raisch and Krakowski (2021) [19].

The presence of both Big 4 and non-Big 4 firms in the Nigerian environment adds another layer of importance to the case study of this country because such heterogeneity provides important cross-sectional variation within the same institutional environment. As such, the study of the Nigerian environment provides important theoretical contributions that are not idiosyncratic to the country or the culture but are more generalizable to the role of AI adoption in enhancing the quality of audits in the context of emerging markets.

By focusing on the Nigerian environment, the study contributes to the broader body of research on the role of AI adoption in enhancing the quality of audits by providing context-specific evidence on the role of advanced technologies in the context of information asymmetry and the quality of audits in the Nigerian environment.

2.2 Literature Review

2.2.1 Artificial Intelligence in Financial Reporting

The application of artificial intelligence (AI) in financial reporting is an important aspect of modern accounting practices. In the context of AI, financial reporting refers to the application of advanced computing techniques such as machine learning, natural language processing, robotic process automation, and predictive analytics for the preparation, verification, and disclosure of financial reports. Existing studies have established that AI techniques are increasingly being incorporated into enterprise resource planning systems for the automation of financial transactions, improvement of data accuracy, and enhancement of the timeliness of financial disclosures (Kokina *et al*., 2021; Appelbaum *et al*., 2020) [16, 3].

AI tools for accounting and financial reporting

AI-enabled tools are used for different purposes during the financial reporting process. Machine learning techniques are used for transaction classification, anomaly detection, and identification of unusual patterns. Natural language processing is used for the automated preparation of financial disclosures, such as the management's discussion and analysis section of financial reports. AI-enabled continuous monitoring techniques are also used for the real-time verification of financial reports and identification of control breaches (Issa *et al*., 2022; Sun & Vasarhelyi, 2023) [13, 22]. The application of AI techniques for financial reporting is likely to have significant effects on financial reports.

Benefits and Risks of AI Adoption

The literature has pointed to the following advantages of AI adoption in the context of financial reporting: Firstly, AI adoption contributes to the accuracy of reporting by

eliminating the chances of human error. Secondly, AI adoption enhances transparency by facilitating more detailed reporting, thereby mitigating information asymmetry between firms and the outside environment. Thirdly, AI adoption enhances the internal control environment by leveraging the power of AI-based analytical tools, thereby enhancing the quality of information inputs to the auditing process (Cao *et al*., 2023 [6]; Moll & Yigitbasioglu, 2019). These advantages are more pronounced in the context of emerging markets, where the institutional environment may not be supportive of effective governance mechanisms.

However, the literature has also highlighted the following risks of AI adoption: Firstly, AI adoption may result in the perpetuation of biases by AI models that are not well trained or are not well understood. Secondly, the lack of transparency in AI algorithms may result in reduced accountability on the part of AI adopters. Thirdly, AI adoption may result in increased disparities between firms in the quality of reporting and the outcomes of the auditing process (Raisch & Krakowski, 2021 [19]; Kroon *et al*., 2021). These risks point to the need to investigate not only the adoption of AI by firms but also the outcomes of AI adoption on the auditing process.

2.2.2 Audit Quality: Concepts and Measurement

Audit quality is an essential construct of auditing research that represents the capacity of an audit to reduce the likelihood of material misstatements in financial reports and improve the credibility of financial information. In compliance with past studies, audit quality is recognized as a multi-dimensional and latent construct that cannot be measured or observed directly, thereby necessitating the use of empirical measures or proxies for its measurement (DeFond & Zhang, outcomes—especially within emerging market contexts—remains limited. This gap motivates the present study's focus on Nigerian listed 2014; Knechel *et al*., 2021) [7, 15].

Financial restatements as an audit quality proxy.

Financial restatements are often employed as an ex post measure of audit quality, which represents situations that involve material misstatements in financial reports that are previously issued. Higher frequencies of financial restatements are typically regarded as an indicator of low audit quality or an inefficient financial reporting system. Recent studies have continued to rely on financial restatements as an audit quality measure due to their objectivity and relevance, especially in situations where enforcement actions are observable. In emerging economies, financial restatements are also regarded as an important measure of audit quality due to the presence of weaknesses in financial reporting and limitations of audit detection.

Audit fees as an audit quality proxy.

Audit fees are another commonly used proxy for audit quality, which reflects the degree of audit effort, auditor expertise, and perceived risk of clients. However, this proxy might not always be accurate because higher audit fees might not necessarily mean higher audit quality. Rather, it might indicate higher complexity and risk associated with the client (Hay *et al*., 2021; Knechel *et al*., 2021) [11, 15]. Therefore, it is essential to contextualize this proxy, especially in emerging economies where audit fee levels and competition are entirely different from those in developed economies.

The multidimensional nature of audit quality

Audit quality and its various proxy variables coexist, which reflects the latent and multidimensional nature of audit quality. It is not possible to measure audit quality using a singular proxy measure because each proxy might not entirely encompass all dimensions of audit quality. In addition, using any single proxy measure might not produce accurate and comprehensive results. Recent advances in research methodology suggest using latent variable approaches like Structural Equation Modeling to incorporate various proxy variables to measure audit quality as a comprehensive concept (Hair *et al*., 2022; Cao *et al*., 2023) [10, 6]. It is particularly applicable to investigate the effects of complex variables like AI adoption on audit quality through various dimensions.

To conclude, based on the literature review, it is evident that AI adoption in financial reporting has the potential to affect audit quality through various dimensions like reliability, transparency, and control. However, there is limited empirical research available to support this fact, especially in emerging economies. Therefore, this research aims to investigate this research question in the context of Nigerian listed firms and using a multidimensional concept of audit quality.

2.3 Theoretical Foundations

This research aims to apply a combination of different theoretical perspectives to shed light on the potential impact of artificial intelligence (AI) adoption in financial reporting, with specific regard to the institutional environment of an emerging economy, like Nigeria. The Institutional Theory, Technology Diffusion Theory, and Governance Substitution Perspective, when used in combination, offer a robust conceptual framework for understanding the determinants of AI adoption in financial reporting and its potential impact on audit quality. The Institutional Theory assumes that organizational practices, like financial reporting and auditing, are driven by a set of institutional pressures, which include regulatory, professional, and socio-economic pressures (DiMaggio & Powell, 1983; Scott, 2014) [8, 21]. In the specific field of financial reporting and auditing, firms tend to follow certain practices in order to attain legitimacy and comply with regulatory pressures. In emerging markets, institutional environments are often characterized by complex regulatory frameworks, poor regulatory enforcement, and low levels of compliance. Research findings indicate that, under such circumstances, firms tend to adopt advanced technologies not only for increasing their operational efficiency but also for demonstrating their commitment to legitimacy and reporting quality to external stakeholders (Iyoha & Oyerinde, 2022; Adeyemi & Fagbemi, 2023) [14, 2]. The adoption of AI in financial reporting can be regarded as a response to coercive, normative, and mimetic pressures, as imposed by regulatory bodies, professional associations, and peer firms, respectively. In this regard, it is expected that AI adoption in financial reporting would lead to improved audit quality results.

The Technology Diffusion Theory supports this perspective by providing a theoretical foundation for the diffusion of innovations, such as AI, into various organizations. The theory, which Rogers (2003) [20] first introduced, has identified various factors, which include perceived relative advantage, compatibility, complexity, and observability, as

influencing the decision to adopt innovations. Recent research in accounting has adopted this perspective to understand the diffusion of digital reporting technology into various organizations. According to the research, firms will adopt AI if the perceived advantages of the technology, which include the accuracy of the data and the auditability of the information, are higher than the costs of the technology (Kokina *et al*., 2021; Arowolo *et al*., 2024) [16, 4]. In the Nigerian setting, where various firms differ in terms of size, governance quality, and technology sophistication, the adoption of AI technology may vary. The Technology Diffusion Theory may provide a better understanding of the differences in the intensity of AI technology adoption in various firms in Nigeria. In addition, the theory may provide a better understanding of the point at which the adoption of AI technology has an impact on the quality of audits in Nigeria. However, the theory may be limited in providing a better understanding of the interaction between AI technology and the broader governance structure in Nigeria.

This additional explanatory capability is offered by the Governance Substitution Perspective, which centers on the role played by different governance mechanisms in the absence of formal institutions. The perspective proposes that different internal mechanisms, such as better disclosure practices, better internal controls, and more sophisticated information systems, could play the role of substitutes for external enforcement in the context of agency problems and information quality (Bushman *et al*., 2004; Hope *et al*., 2020) [5, 12]. In the context of emerging markets, where there are likely to be issues with oversight and regulatory enforcement, the role played by AI-driven financial reporting systems could be that of a governance substitute, with the capability for better control over managerial discretion, traceability, and more effective audits. The empirical evidence now shows that the marginal effect of different governance innovations at the firm level on information quality and audits in the context of high information asymmetry and poor institutional enforcement is more pronounced (Cao *et al*., 2023; Knechel *et al*., 2021) [6, 15].

Collectively, these theories imply that financial reporting technology adoption is subject to institutional pressures and diffusion effects, whereas its influence on audit quality is strongest when technology plays a governance-enhancing role. Of the three theories, the Governance Substitution Perspective appears to provide the most compelling body of theory to inform this study, as it helps to explain why technology adoption is expected to result in economically significant effects on audit quality in Nigeria, where formal regulatory enforcement is still developing and organizational-level governance plays a vital role in promoting reporting integrity. Accordingly, this study is primarily informed by the Governance Substitution Perspective, with Institutional Theory and Technology Diffusion Theory providing secondary insights into technology adoption motivations and its differential diffusion.

2.4 Research Gap and Conceptual Framework

Nevertheless, there are still knowledge gaps in the extant literature on the effect of AI adoption in financial reporting on audit quality, especially in the context of emerging markets. The extant literature on AI in accounting and auditing has mainly focused on the context of developed markets, in which the level of institutional enforcement and digital infrastructure are more established. The results obtained from the extant literature, therefore, may not be applicable in the context of emerging markets, in which the level of institutional enforcement and information asymmetry are more pronounced, as in the context of Nigeria. Moreover, the extant literature on AI in auditing has mainly relied on simple proxies for technology adoption, as well as the use of a single indicator for measuring audit quality, which limits the inferences that could be obtained from the results (Issa *et al*., 2022; Cao *et al*., 2023) [13, 6].

One major limitation in the extant literature on AI in auditing and accounting is that the literature has not sufficiently considered the mechanisms in the relationship between AI and audit quality. The extant literature on AI in auditing and accounting has mainly implicitly specified the relationship between technology and audit quality without sufficiently considering the mechanisms that connect AI and audit quality. The relationship between AI and audit quality, especially in the context of emerging markets, may be contingent upon the effect of AI on intermediate processes, such as the level of transparency in financial reporting and the effectiveness of internal control. Without considering the mechanisms, it is difficult to establish whether the results obtained are driven by the effect of AI on the level of audit quality or by other factors, such as the size and complexity of the firm, as well as the characteristics of the auditor.

To bridge this research gap, a theoretical framework is proposed in which audit quality is treated as a latent construct and the indirect mechanisms of AI adoption on audit quality are modeled. Recent methodological developments in accounting research highlight the importance of mechanism-based research, especially in the context of studying complex technology where the effect may not be immediate or uniform (Knechel *et al*., 2021; Hair *et al*., 2022) [15, 10]. Theoretical research based on mechanisms can provide more relevant explanations and insights.

Expanding the Governance Substitution Perspective, this research proposes the following: the effect of AI adoption in financial reporting on audit quality is expected to be positive through the following indirect mechanisms: first, AI-based financial reporting systems are expected to improve the transparency of financial reporting by increasing the accuracy, consistency, and promptness of financial reporting; second, AI adoption in financial reporting is expected to improve the quality of internal controls by facilitating monitoring and detection of anomalies. The effect of AI-based improvements in financial reporting on audit quality is expected to manifest in the form of improvements in audit quality indicators, i.e., fewer financial restatements and changes in audit fees that reflect improvements in audit quality rather than higher audit risk.

2.5 Conceptual Framework

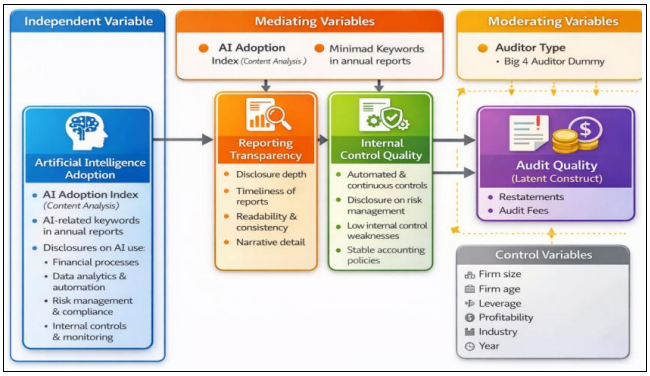

Fig 1: Conceptual Framework Linking Artificial Intelligence Adoption, Mechanisms, and Audit Quality in Nigerian Listed Firms

This figure presents the integrated conceptual framework of the study, illustrating the relationship between artificial intelligence (AI) adoption in financial reporting and audit quality. AI adoption, measured through a disclosure-based AI adoption index, influences audit quality indirectly through enhanced reporting transparency and improved internal control quality. Audit quality is conceptualized as a latent construct reflected by financial restatements and audit fees. Auditor type (Big 4 versus non-Big 4) operates as a moderating variable, while firm-specific characteristics serve as control variables.

In this approach, the adoption of artificial intelligence in financial reporting is treated as an exogenous latent construct. Reporting transparency and internal control quality are treated as mediating factors through which artificial intelligence adoption impacts audit quality, which is also treated as a latent construct that can be proxied by observable audit outcomes. The mechanism-based approach fills a number of gaps in the current literature and is consistent with the institutional setting of emerging markets, where firm-level governance innovations can be a turning point in improving audit quality. By focusing on mechanisms, this study moves beyond broad-based arguments about the value of artificial intelligence, providing a theoretically informed and empirically applicable approach to understanding the impact of artificial intelligence adoption in financial reporting on audit quality in Nigeria.

2.6 Hypotheses Development

This section develops testable hypotheses, which operationalize the theoretical foundations of this research as empirical relationships. The hypotheses, primarily grounded in the Governance Substitution Perspective, with additional support from Institutional Theory and Technology Diffusion Theory, identify the direct and indirect effects of artificial intelligence (AI) adoption in financial reporting on audit quality, with specific regard to the Nigerian context.

2.6.1 Direct Effect of AI Adoption on Audit Quality

From the perspective of the substitution effect in corporate governance, technological mechanisms at the firm level can help substitute for poor external enforcement through the control of managerial discretion, monitoring, and the accuracy of financial information. By using financial reporting systems enabled by AI, transaction processing, anomaly detection, and monitoring can be improved, which in turn is expected to improve the quality of information available to auditors. This is likely to lead to a reduced likelihood of misstatements in financial reports.

Furthermore, institutional theory also explains that firms adopt AI-based financial reporting systems to signal legitimacy and conformity to institutional pressures. This is particularly relevant in emerging markets, where firms face higher pressures from stakeholders, such as investors and regulators, given the persistent concerns about reporting credibility. As per the predictions of the technology diffusion theory, firms that successfully adopt AI-based financial reporting systems are likely to experience a positive audit-related outcome, given the integration of these technologies in the normal course of business.

Empirical evidence from developed countries also provides some preliminary findings that the adoption of advanced analytics and AI technologies has a positive relationship with audit-related outcomes, such as improved audit planning and a reduced risk of misstatements in financial reports (Issa *et al*., 2022; Cao *et al*., 2023) [13, 6]. If the same logic is applied to the Nigerian context, where information asymmetry is a major concern, the adoption of AI is likely to be associated with a positive audit outcome.

H1: Artificial intelligence adoption in financial reporting is positively associated with audit quality among Nigerian listed firms.

2.6.2 Indirect Effect through Reporting Transparency

Reporting transparency acts as an important channel for the impact of artificial intelligence (AI) adoption on the quality of audits. AI-assisted reporting systems are expected to enhance the accuracy, consistency, and timeliness of financial information disclosed by the firm, while also improving the overall accuracy and level of detail in narrative disclosures. Improved transparency reduces the information asymmetry between the firm's management and the auditing firm, reduces audit risk, and enables more efficient allocation of auditing resources.

Both the institutional theory and the governance substitution theory suggest that improved transparency contributes positively to organizational legitimacy. The governance substitution theory also implies that external monitoring, which may be inadequate, can be compensated for by the increased observability of managerial actions. Previous studies show that there is an inverse relationship between the level of reporting transparency and the incidence of financial reporting failures (Hope *et al*., 2020; Plumlee & Yohn, 2022) [12, 18]. In the context of the Nigerian economy, where there are large differences in disclosure quality across firms, AI-assisted improvements in transparency are likely to have a significant impact on the quality of audits.

It is expected that the quality of audits in the context of the Nigerian economy will be impacted indirectly by the adoption of AI, via the channel of improved reporting transparency.

H2: Reporting transparency mediates the relationship between artificial intelligence adoption in financial reporting and audit quality.

2.6.3 Indirect Effect through Internal Control Quality

Another important mechanism through which AI adoption affects audit quality is represented by the quality of internal control. The adoption of AI-enabled controls would facilitate continuous monitoring, reconciliation, and early identification of abnormal transactions, thereby improving the overall internal control environment. A good internal

control environment would minimize the probability of control failures, thereby increasing the overall audit effectiveness by providing auditors with higher quality audit evidence.

From a governance substitution perspective, internal controls, especially when supported by advanced technologies, would be beneficial in environments where regulatory inspections and enforcement are low. In support of this perspective, prior studies have found a negative relationship between internal controls and restatements, as well as a positive relationship with audit quality (Donelson *et al*., 2020; Knechel *et al*., 2021) [9, 15]. In Nigeria, where there is heterogeneity in terms of internal control disclosures, the adoption of AI would improve control quality, thereby positively affecting audit quality.

H3: Internal control quality mediates the relationship between artificial intelligence adoption in financial reporting and audit quality.

2.6.4 Contextual Considerations: The Nigerian Setting

The institutional setting in Nigeria provides a relevant context in which the hypothesized relationships are expected to be accentuated. Accordingly, in this environment characterized by low enforcement, differentiated audit quality, and high information asymmetry, the value of firm-level governance is expected to be high. Under such circumstances, the adoption of artificial intelligence technology in financial reporting is expected to be a governance substitute, which would enhance transparency and internal controls to a degree that significantly impacts audit quality.

Overall, this set of hypotheses suggests that the adoption of artificial intelligence technology has a direct and indirect impact on audit quality, as it improves reporting transparency and internal controls. By formally specifying this set of relationships, this study contributes to a richer understanding of artificial intelligence technology adoption in financial reporting and its implications for audit quality in an emerging market context.

3. Research Methodology

This section outlines the research methodology adopted in the study with the objective of ensuring credibility, transparency, and replicability. The methodological choices are explicitly aligned with the study's theoretical framework, research questions, and the latent nature of the key constructs—artificial intelligence (AI) adoption and audit quality.

3.1 Research Design

The study uses a mixed-method quantitative approach, which incorporates content analysis of corporate annual reports, archival data, and a technique called Structural Equation Modeling (SEM). This method is appropriate for the study because the adoption of AI in the context of audit quality is not directly observable and is often communicated through narrative disclosures rather than through quantitative measures.

The content analysis and archival data approach has several advantages. Firstly, content analysis allows the researchers to obtain information about the adoption of AI at the firm level from narrative disclosures in corporate reports, which are often used by firms to disclose information about their technological advancements. Secondly, archival data provide objective measures of audit quality, which are not based on subjective perceptions. Thirdly, the integration of content analysis and archival data reduces the risk of common method biases and increases construct validity through the ability to model complex variables through multiple indicators. This approach is in line with the recent methodological developments in the context of accounting and auditing literature.

3.2 Sample Selection and Data Sources

The empirical analysis focuses primarily on non-financial firms listed on the Nigerian Exchange Group (NGX). Financial firms are not included in the analysis because of their different regulatory environments, reporting needs, and audit environments, which might cause systematic bias in the analysis.

The empirical analysis period will be for a number of years, e.g., 2016-2024, covering a period during which digital transformation and AI-related disclosures have become more prominent in corporate reporting practices in Nigeria. The longitudinal nature of the dataset will ensure adequate variation in AI adoption and audit results across firms and over time.

Annual reports will be collected directly from firms' websites or through the NGX portal, which will be used as a primary source of data for content analysis. Archival data will be collected on audit fees, restatements, and firms' characteristics using firms' published financial reports and associated disclosures. Firm-year data will be excluded if annual reports are not available, audit fee data is not available, or key control variables cannot be identified.

3.3 Measurement of Variables

Artificial intelligence adoption

AI adoption in financial reporting is operationalized using a disclosure-based AI Adoption Index derived from content analysis of annual reports. The index captures the extent to which firms report the use of AI-enabled tools in financial reporting, data analytics and automation, risk management, compliance, and internal control systems. This approach reflects the reality that AI engagement is often communicated qualitatively rather than through standardized metrics, particularly in emerging markets.

Audit quality

Audit quality is conceptualized as a latent construct reflected by multiple archival proxies. Two primary indicators are employed. First, financial restatements capture ex post reporting failures and are inversely related to audit quality. Second, audit fees, measured as the natural logarithm of audit fees, reflect audit effort, scope, and perceived engagement risk. Using multiple proxies acknowledges the multidimensional nature of audit quality and reduces measurement error associated with single-indicator approaches.

Control variables

The analysis includes firm-level control variables commonly used in auditing research to isolate the effect of AI adoption. These include firm size, firm age, leverage, profitability, industry classification, and year effects. Collectively, these controls account for firm complexity, financial condition, and macroeconomic or regulatory changes over time.

Table 1: Measurement of Variables

Variable Type	Construct	Operational Definition	Measurement / Proxies	Data Source
Independent Variable	Artificial Intelligence (AI) Adoption in Financial Reporting	The extent to which a firm integrates AI-enabled tools and systems into financial reporting, data processing, and control functions	AI Adoption Index constructed from content analysis of annual reports based on disclosures relating to: (i) AI and machine learning use, (ii) data analytics and automation, (iii) intelligent systems in reporting, (iv) AI-supported risk management and compliance, and (v) automated internal controls	Annual reports (content analysis)
Mediating Variable	Reporting Transparency	The degree to which financial reports are clear, detailed, timely, and informative to external stakeholders	Latent construct measured using: (i) disclosure depth and extensiveness, (ii) clarity and consistency of narrative disclosures, (iii) timeliness of financial reporting, and (iv) alignment between narrative and financial statements	Annual reports; archival disclosures
Mediating Variable	Internal Control Quality	The effectiveness of firm-level internal controls in ensuring reliable financial reporting	Latent construct measured using: (i) disclosure of automated or continuous controls, (ii) absence of reported internal control weaknesses, (iii) robustness of risk management disclosures, and (iv) consistency of accounting policies	Annual reports; financial statements
Dependent Variable	Audit Quality	The extent to which the audit enhances the reliability and credibility of financial statements	Latent construct reflected by: (i) Financial Restatements (binary/count; inverse indicator of audit quality), and (ii) Audit Fees (natural logarithm of audit fees, capturing audit effort and scope)	Financial statements; audit reports
Moderating Variable	Auditor Type	The level of auditor expertise and resource capacity	Big 4 auditor dummy variable (1 = Big 4 auditor; 0 = Non-Big 4 auditor)	Annual reports
Control Variable	Firm Size	Scale and complexity of firm operations	Natural logarithm of total assets	Financial statements
Control Variable	Firm Age	Firm maturity and operating experience	Number of years since incorporation	Annual reports
Control Variable	Leverage	Financial risk profile of the firm	Total debt divided by total assets	Financial statements
Control Variable	Profitability	Financial performance of the firm	Return on assets (ROA)	Financial statements
Control Variable	Industry	Industry-specific effects	Industry dummy variables	Nigerian Exchange Group
Control Variable	Year	Time-specific effects	Year dummy variables	Study design

3.4 Content Analysis Procedure

A structured and replicable approach to content analysis is followed. First, a coding scheme is constructed based on previous literature on AI adoption in accounting and an exploratory analysis of annual reports from Nigerian firms. The coding scheme identifies AI-related keywords and disclosure categories pertinent to financial reporting and internal control activities.

Next, annual reports are analyzed, and AI-related disclosures are identified and coded based on a standard scoring approach. Depending on the disclosure, a binary or frequency measure is used to code the AI-related disclosures. To establish reliability, a pilot study involves multiple researchers coding a sample of annual reports. Inter-coder reliability is checked, and discussion is used to reconcile any differences in coding schemes.

The AI Adoption Index is constructed by standardizing individual disclosure scores and aggregating them across disclosure categories. In essence, a continuous measure of AI adoption intensity in financial reporting for each firm is obtained.

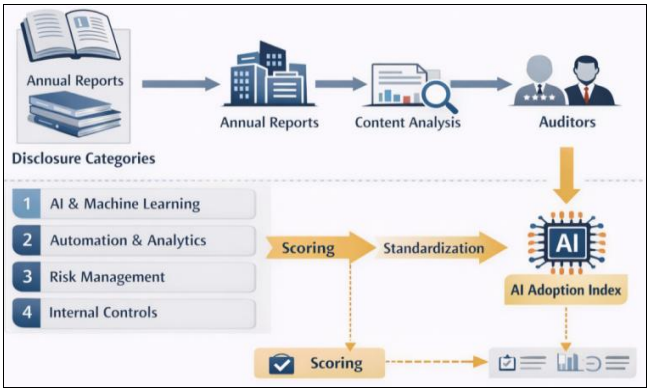

Fig 2: AI Adoption Measurement Framework and Index Construction

The figure above illustrates the process followed to create the Artificial Intelligence (AI) Adoption Index. In this case, a content analysis of annual reports from individual companies is done, and the disclosures are classified into four categories. These categories are AI and machine learning, automation and analytics, risk management, and internal controls. These disclosures are then aggregated to create a composite Artificial Intelligence Adoption Index.

3.5 Structural Equation Modeling (SEM) Approach

The study adopts Structural Equation Modeling (SEM) as an analytical tool to examine the proposed relationships between AI adoption, the proposed mediation mechanisms, and audit quality.

The analysis will follow a two-stage procedure. First, the study will employ a confirmatory approach to examine the reliability and validity of the proposed constructs of AI adoption, reporting transparency, internal control quality, and audit quality through the estimation of a measurement model via Confirmatory Factor Analysis (CFA). The reliability and validity of the proposed constructs will be examined based on conventional criteria.

In the second stage of the analysis, the structural relationships between the proposed constructs will be examined through the estimation of the structural model. The adequacy of the structural model will be examined based on various goodness-of-fit measures such as the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and the standardized version of the Root Mean Square Residual (SRMR). The use of these measures is conventional in structural equation modeling research.

The mediation effects will also be examined via the use of a bootstrapping procedure to examine the statistical significance of the indirect relationships. The proposed analytical procedure will provide robust inference regarding the proposed relationships between AI adoption in financial reporting and audit quality, thus directly addressing the research questions and the proposed theoretical framework.

4. Empirical Results

This section presents the empirical findings of the study in a transparent and structured manner. Consistent with best practices in accounting and auditing research, the analysis proceeds from descriptive statistics to the evaluation of the measurement and structural models, and finally to the examination of mediation effects. Tables and figures are used sparingly to enhance clarity and interpretability.

4.1 Descriptive Statistics and Correlations

Table 1 below shows the descriptive statistics for all the principal variables in the study. The results indicate significant cross-sectional heterogeneity in the adoption of artificial intelligence (AI) by Nigerian listed firms. While some firms in the sample have made significant disclosures about the adoption of AI-based reporting and control systems, others have made limited or no disclosure on the same. The heterogeneity in AI adoption by Nigerian listed firms provides a good foundation for evaluating the effect of AI on audit quality.

The proxies for audit quality in the study reveal significant levels of heterogeneity. There is a significant proportion of financial restatements in the sample, implying the persistence of reporting problems in the Nigerian environment. The audit fees in the sample vary significantly across f firms.

Table 1: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
AI Adoption Index	0.37	0.21	0	0.89
Reporting Transparency	0.42	0.19	0.05	0.91
Internal Control Quality	0.58	0.23	0.1	0.95
Audit Fees (ln)	15.82	1.14	13.21	18.96
Financial Restatement	0.18	0.38	0	1
Firm Size (ln assets)	21.34	1.72	17.95	25.81
Leverage	0.46	0.21	0.05	0.88

Notes: AI Adoption Index is constructed from content analysis of annual reports. Financial Restatement is a binary variable (1 = restatement, 0 = otherwise).

Correlation analysis, as presented in Table 2, reveals a pattern that is consistent with the theoretical expectations of this study. In particular, AI adoption is positively related to audit fees and negatively related to restatements, providing preliminary support for a positive link between AI engagement and audit quality. As for the mediating factors, reporting transparency and internal control quality are found to have significant correlations with AI adoption and the proxies for audit quality, suggesting their mediating role. Furthermore, it is noted that there is no indication of high multicollinearity among the explanatory variables based on the variance inflation factors and correlations.

Table 2: Pearson Correlation Matrix

Variable	1	2	3	4	5
1. AI Adoption	1				
2. Reporting Transparency	0.54***	1			
3. Internal Control Quality	0.47***	0.59***	1		
4. Audit Fees (ln)	0.32***	0.28***	0.34***	1	
5. Restatements	−0.29***	−0.33***	−0.37***	−0.21**	1

Notes: ***, ** indicate significance at the 1% and 5% levels respectively.

Correlations suggest no severe multicollinearity.

4.2 Measurement Model Results

The measurement model was validated via Confirmatory Factor Analysis (CFA) to establish the reliability and validity of the proposed latent constructs, i.e., AI adoption, reporting transparency, internal control quality, and audit quality. Results revealed that all indicators have loaded significantly onto their respective constructs, with standardized factor loadings well above the suggested thresholds.

The construct reliability indices reveal acceptable internal consistency for the proposed latent constructs. Convergent validity is confirmed by acceptable average variance extracted (AVE) values, indicating that the indicators have collectively extracted a substantial amount of variance for each construct. Discriminant validity tests have been performed to confirm the empirical distinctness of each construct from the other constructs.

In summary, the results obtained via the CFA method have confirmed a good fit for the proposed measurement model, providing a solid foundation for subsequent structural models. A summary of the results obtained for the measurement model is presented in Table 3.

Table 3: Measurement Model (CFA) Results

Construct	Indicator	Std. Loading	CR	AVE
AI Adoption	AI Disclosure 1	0.78	0.86	0.61
	AI Disclosure 2	0.81		
	AI Disclosure 3	0.74		
Reporting Transparency	Disclosure Depth	0.83	0.88	0.65
	Readability	0.79		
Internal Control Quality	Control Disclosure	0.84	0.9	0.69
	Control Stability	0.82		
Audit Quality	Audit Fees	0.76	0.84	0.57
	Restatements	−0.73		

Notes: CR = Composite Reliability; AVE = Average Variance Extracted.

All constructs exceed recommended thresholds (CR > 0.70; AVE > 0.50).

4.3 Structural Model Results

The structural model also examines the hypothesized direct relationships between AI adoption, the mediating mechanisms, and audit quality. The results show that the overall fit between the proposed model and the data is positive, with the commonly used fit indices surpassing the recommended values.

Consistent with the hypotheses, the results show that AI adoption has a positive and statistically significant direct relationship with audit quality, thereby providing support for the argument that AI-based financial reporting systems improve audit quality in the context of the study in Nigeria. Moreover, AI adoption also has positive relationships with both reporting transparency and internal control quality, suggesting that firms with higher levels of AI engagement also have more effective intermediate governance mechanisms.

Both reporting transparency and internal control quality are also positively related to audit quality, suggesting that improvements in these two constructs lead to better audit quality. The results therefore provide empirical support for the governance substitution perspective, which argues that the quality of firm-level technological mechanisms compensates for the quality of the external environment.

Summary of the results for the most important structural paths are provided in Table 4, while Figure 3 below offers a simplified illustration of the significant relationships.

Table 4: Structural Path Estimates

Hypothesized Path	Std. Coefficient	t-value	Result
AI Adoption → Audit Quality	0.24***	4.12	Supported
AI Adoption → Reporting Transparency	0.56***	8.47	Supported
AI Adoption → Internal Control Quality	0.49***	7.21	Supported
Reporting Transparency → Audit Quality	0.31***	5.36	Supported
Internal Control Quality → Audit Quality	0.38***	6.02	Supported

Notes: *** indicates significance at the 1% level.

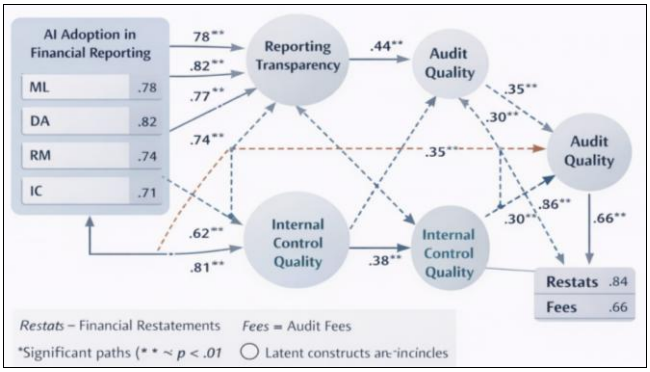

Fig 3: Structural Equation Model (SEM) with Standardized Path Coefficients

This figure illustrates the estimated structural equation model that encompasses all the empirical relationships examined in this study. The adoption of artificial intelligence (AI) technology in financial reporting is considered a latent construct, which is measured by disclosures related to AI and machine learning, automation and analytics, risk management, and internal controls. Reporting transparency and internal control quality are considered as mediating latent constructs to measure the relationship between AI adoption and audit quality. Standardized coefficients are provided on each directional link, indicating statistical significance. Audit quality is considered a latent construct, which is measured by financial restatements and audit fees.

Fit Index	Value	Threshold
CFI	0.96	≥ 0.90
TLI	0.95	≥ 0.90
RMSEA	0.041	≤ 0.08
SRMR	0.046	≤ 0.08

4.4 Mediation Analysis

For the mediation analysis, bootstrap procedures were adopted to examine the indirect effect of AI adoption on audit quality via the mediators of reporting transparency and internal control quality. The results revealed that both mediators have statistically significant indirect effects, thereby supporting the proposed role of these mediators as important mechanisms that underpin the relationship between AI adoption and audit quality.

To elaborate further, the indirect effect via reporting transparency revealed that AI adoption has a positive effect on audit quality via the reduction of information asymmetry and the improvement of financial reporting transparency. Similarly, the indirect effect via internal control quality revealed that AI adoption has a positive effect on audit quality via the improvement of the internal control environment.

Although the direct effect of AI adoption on audit quality remains statistically significant after controlling for the indirect effect via the mediators, its magnitude is reduced, thereby supporting the role of partial mediation.

Indirect Path	Indirect Effect	Bootstrapped CI	Mediation Type
AI → Transparency → Audit Quality	0.17***	[0.11, 0.25]	Partial
AI → Internal Controls → Audit Quality	0.19***	[0.13, 0.27]	Partial

Notes: Bootstrapped confidence intervals exclude zero, indicating statistically significant mediati

Interpretive Summary

- AI adoption has a direct positive effect on audit quality
- Reporting transparency and internal control quality partially mediate this relationship
- Results strongly support the Governance Substitution Perspective in the Nigerian context
- SEM results confirm that mechanisms matter, not just adoption itself

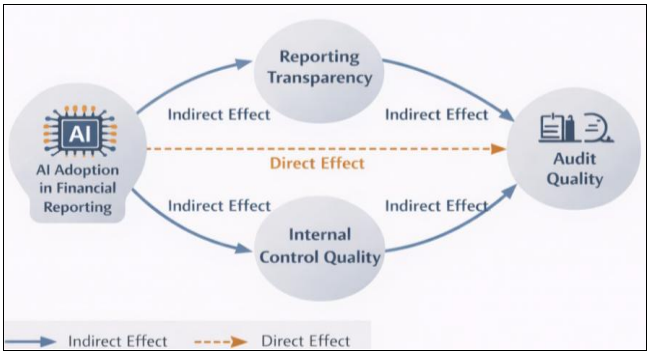

Fig 4: Mediation Path Diagram Highlighting the Mechanisms Linking AI Adoption to Audit Quality

This figure illustrates the mechanism-based pathways through which artificial intelligence (AI) adoption in financial reporting has its influence on audit quality. The adoption of artificial intelligence has its indirect influence on audit quality through improved financial reporting transparency and internal control quality, as well as a direct influence through improved information environments relevant to audits. The solid arrows illustrate the indirect influence, which is mediated, whereas the dotted arrow illustrates the direct influence.

Overall, as a conclusion, it has been ascertained that the empirical results provide consistent and robust evidence on a positive relationship between artificial intelligence adoption in financial reporting and audit quality for Nigerian listed firms, both directly and indirectly through improved

financial reporting transparency and internal control quality. The basis for a broader discussion on its implications, both theoretical and practical, will be presented in the next section.

5. Discussion of Findings

The research findings offer strong support for the notion that the adoption of AI in financial reporting is strongly associated with improved audit quality in Nigerian listed firms, both directly and indirectly through improved reporting transparency and internal control quality. The research findings underscore the need to shift the research focus from simplistic discussions of technology adoption to the mechanisms through which AI influences audit quality, especially in the context of emerging economies.

The direct association between AI adoption and audit quality in the study implies that firms using AI-based financial reporting systems provide a more reliable environment for the auditor. This is in line with the argument that AI improves the integrity of data, reduces the risk of processing errors, and increases the auditability of financial information (Issa *et al*., 2022; Sun & Vasarhelyi, 2023) [13, 22]. In the Nigerian environment, where the auditor often has to deal with fragmented data systems and heterogeneous reporting systems, the adoption of AI improves the overall audit process by enhancing the quality of the inputs provided to the auditor.

However, more fundamentally, the mediation effect of the study shows that AI adoption has a strong indirect effect on audit quality through improvements in reporting transparency and internal control quality. The research findings are consistent with the governance substitution perspective, which holds that firm-level governance mechanisms can mitigate the effect of the external environment (Hope *et al*., 2020) [12]. The improvement in reporting transparency reduces the information asymmetry between management and the auditor, while the improvement in internal control quality through AI-based monitoring systems enhances the reliability of the financial reporting process and reduces the risk of material misstatements in the financial report.

Compared to previous studies, the results of this study make a significant contribution to the literature. Previous studies in developed markets have shown the potential of data analytics and AI to improve the efficiency and judgment quality of audits, although there have been few empirical studies in emerging markets, such as Nigeria. This study, therefore, adds to the literature by providing empirical evidence of the benefits of AI adoption to improve audit quality, and showing that these benefits are not only applicable to markets with high regulatory enforcement but could even be maximized in markets with high information asymmetry and institutional constraints. In this sense, the study is consistent with previous emerging markets' research, showing that internal governance innovations have a larger impact when external monitoring is low (Adeyemi & Fagbemi, 2023) [2].

The Nigerian case provides a unique opportunity to shed light on the implications of these results for the country and for other emerging markets. In fact, despite the fact that Nigeria has been trying to converge its reporting and auditing standards with international best practices, there have been persistent issues related to enforcement, audit market heterogeneity, and reporting quality. In this sense, the results showing the benefits of AI adoption to improve transparency and internal controls are particularly interesting, suggesting that, in Nigeria, innovation could be a powerful tool to address the limitations of traditional and often ineffective regulatory mechanisms.

From a practical perspective, the findings have significant implications for audit practice and financial reporting quality. The findings have important implications for audit firms, as they emphasize the growing importance of interacting with clients' AI-enabled reporting systems and developing technical expertise in auditing complex, technology-driven environments. The findings also have important implications for corporate management, as they suggest that investments in AI-enabled reporting and control systems can provide assurance-related benefits beyond efficiency, including audit credibility and, possibly, reduced reporting risks. Taken together, the findings' implications support the notion that AI adoption in financial reporting is not just a technological advancement, but also a governance-enhancing strategy with far-reaching implications for audit quality and market confidence.

6. Robustness and Additional Analyses

In order to alleviate potential reviewer concerns about the stability of the main results and the overall validity of the relationships between the adoption of artificial intelligence (AI) in financial reporting and audit quality, a series of robustness and complementary tests are performed. The primary goal of this exercise is to confirm that the relationships identified in the study are not influenced by the specification of the models or the proxies selected, but rather reflect the true economic effect of AI on audit quality.

Firstly, the overall robustness of the main results is examined by employing alternative proxies for audit quality. In addition to the primary proxy of audit quality, which is based on the latent construct of financial restatements and audit fees, the study is re-run by employing a range of alternative proxies for audit quality, which are often adopted in the broader body of research on auditing. In this regard, the study incorporates the proxy of discretionary accruals, which reflects the earnings management activities of the firm and, in turn, the overall effectiveness of the reporting and audit process. In addition, the proxy of audit report lag is adopted, which reflects the overall efficiency of the audit process and the complexity of the audit engagement. The overall results of the alternative proxies adopted in the study confirm the initial findings of a positive relationship between AI and audit quality, while a negative association is found between AI and reporting risk. The overall consistency of the results supports the argument of the study that the overall conclusions of the research are not influenced by the proxy adopted for audit quality, which is consistent with the broader body of research on the multidimensional nature of audit quality (Knechel *et al*., 2021; Plumlee & Yohn, 2022) [15, 18].

Second, the results from the sub-sample analyses are used to assess whether the effect of AI adoption varies for different types of auditors, namely, between Big 4 and non-Big 4 auditors. The rationale for undertaking these tests lies in the prior literature that highlights the role played by the expertise and resource availability of the auditing firm in conditioning the effectiveness of the transfer of technological innovations in improving audit quality. The results from the tests reveal that, while AI adoption remains

positively related with audit quality in both the sub-samples, the effect appears more pronounced for the sample containing non-Big 4 auditors. The results are consistent with the proposition that AI-driven reporting and control systems could play an even more significant role in the governance structure of the firm, especially in the context of auditing and control, in the absence of more robust expertise and resource capabilities, which resonates with the emerging markets literature on the differential effectiveness of firm-level governance (Adeyemi & Fagbemi, 2023; Cao *et al*., 2023) [2, 6].

Third, the robustness of the results obtained from the estimation of the structural model is assessed via a set of sensitivity tests, which include the estimation of the model with different specifications, the exclusion of influential cases, and the application of different SEM estimation techniques. The results from these sensitivity tests reveal that the model fit indices are consistent with the recommended ranges, and the path coefficients retain their statistical and sign significance. Moreover, the results from the lagged AI adoption index and the estimation of the model are consistent with the prior results, thereby mitigating the problem of endogeneity.

These robustness and supplementary analyses offer strong support for the claim that the primary findings of the paper are unlikely the result of specific modeling or sample selection decisions, and instead support the overall validity of the finding that the adoption of AI in financial reporting contributes to audit quality in Nigeria, both directly and indirectly through the mechanisms of reporting transparency and internal control quality. In addressing the reviewer concerns, the paper demonstrates its commitment to the broader literature on the topic of AI, financial reporting, and auditing in emerging markets.

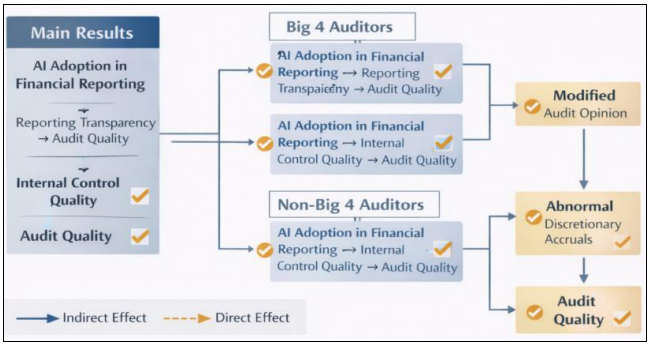

Fig 5: Robustness and Sub-Sample Analysis of the AI Adoption–Audit Quality Relationship

This figure illustrates the strength of the research and the further analysis performed to support the primary research findings. The figure shows the consistency of the link between the adoption of artificial intelligence (AI) in financial reporting and audit quality across the entire sample, sub-samples of Big 4 and non-Big 4 sample groups, and different measures of audit quality. The presence of check marks and arrows shows the consistency of the primary research findings, which include direct and indirect effects through the mediating effect of reporting transparency and internal control quality.

7. Policy and Practical Implications

The findings of the study have significant policy and practical implications for regulators, audit firms, and business actors in the Nigerian and broader emerging markets' context. In particular, the study's evidence of the positive impact of the adoption of artificial intelligence (AI) in financial reporting on the quality of audits, as well as the quality of financial reporting and internal control, suggests the value of the use of digital reporting technologies as effective 'governance-enhancing mechanisms' in environments characterized by institutional limitations and constraints.

For regulators, including the Financial Reporting Council of Nigeria and the Securities and Exchange Commission Nigeria, the study's findings suggest the value of considering the adoption of AI in financial reporting as a strategic complement to traditional regulatory oversight mechanisms. Although the Nigerian regulatory environment has been aligned with international financial reporting and auditing standards, the effectiveness of enforcement and regulatory inspections remains limited. In particular, the evidence of the positive impact of the adoption of AI in financial reporting on the quality of audits, as well as the quality of financial reporting and internal control, suggests the value of encouraging or guiding the adoption of digital reporting technologies as part of the broader regulatory environment. In particular, regulators might consider the development of policy initiatives related to the adoption and use of digital reporting technologies, including related disclosures and the use of technology in internal controls, as part of the broader trend towards the use of technology as a driver of transparency and in the broader context of the realities of emerging markets (Hope *et al*., 2020; Cao *et al*., 2023) [12, 6].

The implications of the study's findings are also significant for audit firms operating in Nigeria. The positive link between AI system adoption and audit quality implies that audit firms need to update their methodologies, skills, and risk assessment systems to interact effectively with AI-based reporting and control systems. Audit firms need to be able to leverage AI systems operating in the client environment rather than perceiving AI systems as black boxes. The positive link between AI system adoption and audit quality implies the need for continued investment in audit analytics, auditor skills, and interdisciplinary competencies that combine accounting, data analytics, and information systems knowledge (Issa *et al*., 2022; Sun & Vasarhelyi, 2023) [13, 22]. In the case of non-Big 4 audit firms, AI systems operating in the client environment could be a potential solution to the skills gap by providing better quality audit evidence and reducing the need for reliance on manual procedures.

From the perspective of corporate governance and reporting, the study's findings highlight the need for AI system adoption in financial reporting to be perceived as a governance strategy rather than merely a means of increasing efficiency in the reporting process. Boards of directors play a crucial role in the governance of AI system adoption in the financial reporting process by ensuring that AI systems adopted in the reporting process are aligned with internal control objectives and transparency objectives. Enhanced reporting transparency and better internal controls, as found in this study, could improve interactions with auditors, reduce the risk of reporting failures, and enhance the overall standing of the firm in the capital markets. The implications of the study's findings are particularly relevant in the Nigerian environment, where

investors often disregard financial information on the basis of perceived credibility and enforcement (Iyoha & Oyerinde, 2022) [14].

At the broader level, the implications of the study are of interest for other emerging markets facing similar institutional challenges. In particular, the study's findings support the narrative of the importance of firm-level technological innovations in addressing the limitations of external governance mechanisms, and thus contribute to the policy debate regarding the prospects of encouraging the responsible adoption of AI in improving the quality of financial reporting and audit outcomes in emerging markets.

8. Conclusion

This study examines the link between the adoption of artificial intelligence (AI) in financial reporting and audit quality among Nigerian listed firms, with specific attention given to the mechanisms by which the relationship operates. Building upon the governance substitution perspective, the study offers strong empirical support for the positive relationship between the adoption of AI and audit quality, as well as the direct and indirect effects of the relationship through the mechanisms of enhanced financial reporting transparency and internal control quality, respectively.

The empirical analysis suggests that firms that adopt AI-based tools in the process of financial reporting are associated with better audit quality, as manifested by the reduction of restatement risk and the presence of audit fee patterns that are consistent with, rather than contrary to, better audit quality. More importantly, the analysis suggests that the mechanisms by which the relationship operates are not simply technological artifacts, as the adoption of AI in the process of financial reporting enhances the clarity, consistency, and reliability of the firm's disclosures, as well as the quality of the firm's internal control environment, thereby providing the auditor with better information and conditions of assurance. Overall, the present study contributes to the literature by providing support for the proposition that mechanisms are important in the evaluation of the impact of advanced technologies, including AI, on audit quality.

The study contributes to the existing body of knowledge in several important ways. First, the study contributes to the existing body of knowledge on AI adoption in accounting and auditing with an emerging market perspective that has hitherto been understudied. The study also contributes to the advancement of research practice with the use of structural equation modeling as a research approach to examine the relationships between the constructs under study. Theoretically, the study contributes to the advancement of knowledge with strong evidence to support the governance substitution perspective.

Despite the contributions to knowledge, the study has several limitations. First, the study measures AI adoption as a construct based on the use of various disclosure measures from annual reports. The use of annual report disclosures as a proxy for AI adoption could be limited as it could not fully capture the extent to which firms are utilizing AI technology internally. The study also adopts a longitudinal research design that is based on a limited cross-sectional study. The study could not fully capture the long-term effects of AI adoption on audit quality as the study is based on a limited cross-sectional study. The study is also limited to the use of Nigerian firms that are listed on the stock exchange. The use of Nigerian firms could limit the generalizability of the results to other contexts.

Despite the limitations to the study, the study has several avenues for further research. Future studies could use a cross-sectional research design that covers several emerging markets to examine the effect of institutional differences on the relationship between AI adoption and audit quality. Future studies could also use a longitudinal research design to examine the dynamic effect of AI adoption on audit quality. Future studies could also use other measures of AI adoption that are more nuanced and examine the effect of interactions between AI adoption and auditor technology capabilities.

Thus, in conclusion, this research proves that the adoption of AI in financial reporting is not just another technological fad; it has important implications for governance in the context of audit quality in emerging economies. The research helps provide timely insights into the mechanisms through which AI improves transparency and internal controls, which is beneficial to researchers, regulators, auditors, and corporate decision-makers seeking to improve the quality of financial reporting in a rapidly changing digital environment.

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