

Audit data analytics adoption among large audit firms in West Africa: A systematic review of technological, organisational and institutional determinants

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Abstract

Audit Data Analytics (ADA) has transformed the auditing profession by enabling auditors to analyse large volumes of financial and non financial data, improving audit quality, efficiency and fraud detection. Although ADA adoption is increasing globally, evidence on its implementation in West Africa remains limited and fragmented. This study systematically reviews the literature to examine the factors influencing ADA adoption, the challenges encountered, and its implications for large audit firms in the region. A systematic literature review was conducted using the PRISMA 2020 guidelines. Relevant studies published between 2015 and 2025 were identified through searches of Scopus, Web of Science, ScienceDirect, Emerald Insight, EBSCOhost and Google Scholar. Following screening, eligibility assessment and quality appraisal, 23 studies were included in the final review. Thematic analysis was used to identify recurring patterns and develop an integrated conceptual framework. The review identified four key themes shaping ADA adoption: technological infrastructure and organisational capacity; auditor competencies, human capital and organisational culture; regulatory and institutional influences; and the effects of ADA on audit quality, operational efficiency and value creation. The findings show that successful ADA implementation depends on the alignment of technological readiness, skilled personnel and supportive institutional environments. ADA adoption enhances audit quality, strengthens fraud detection and risk assessment, and improves operational efficiency. This study provides one of the first comprehensive syntheses of ADA adoption in the West African auditing context. By integrating the Technology Organization Environment framework with institutional theory, it offers a conceptual foundation for future research and practical guidance for audit firms, regulators, professional accounting bodies and higher education institutions advancing digital transformation in auditing.

Keywords: Audit Data Analytics, Digital Auditing, Audit Quality, Technology Adoption, Digital Transformation, West Africa

JEL Classification: M42, O33, O55

1. Introduction

The auditing profession is undergoing a profound digital transformation driven by advances in big data, artificial intelligence (AI), machine learning, cloud computing, and business analytics. Among these innovations, Audit Data Analytics (ADA) has emerged as one of the most significant technological developments reshaping audit practice. ADA refers to the science and process of discovering, analysing, and interpreting patterns, anomalies, and insights from financial and non-financial data to support audit planning, risk assessment, evidence gathering, and decision-making (Alles, 2015; Appelbaum et al., 2017; Vasarhelyi et al., 2015). Unlike traditional audit approaches that rely heavily on sampling techniques, ADA enables auditors to analyse entire datasets, perform continuous monitoring, and identify complex risk patterns in real time, thereby enhancing audit effectiveness and efficiency. The growing complexity of business transactions, increasing volumes of digital data, and rising stakeholder expectations have accelerated the adoption of analytics-enabled auditing globally. Recent studies suggest that ADA improves fraud detection capabilities, strengthens risk assessment procedures, enhances audit quality, and reduces audit effort through automation of repetitive audit tasks (Kokina & Davenport, 2017; Sun et al., 2020; Westland, 2020). Consequently, leading international audit firms have integrated advanced analytics tools into their audit methodologies as part of broader digital transformation initiatives aimed at delivering higher-value assurance services. Despite these advantages, the diffusion of ADA remains uneven across countries and regions. Evidence from developed economies indicates that successful implementation of ADA depends on the availability of sophisticated technological infrastructure, strong data governance frameworks, organisational readiness, and a workforce equipped with analytical competencies (Appelbaum et al., 2017; Cao et al., 2019; Jayasuriya & Sims, 2023). However, organisations operating in emerging and developing economies often encounter substantial barriers, including inadequate information technology infrastructure, limited access to analytical software, shortages of data analytics expertise, and regulatory uncertainty surrounding the use of digital audit technologies (Lutfi et al., 2022; Wadesango & Muzvuwe, 2021).

These challenges are particularly evident across African economies. Although countries such as South Africa have demonstrated increasing integration of audit analytics within professional practice, many African jurisdictions continue to experience infrastructural limitations, fragmented digital ecosystems, inconsistent regulatory frameworks, and insufficient investment in technological capacity (Ndaba et al., 2021; Otia & Bracci, 2022). Consequently, the pace and scope of ADA adoption vary considerably across the continent, creating disparities in audit innovation and digital maturity. Within this broader African context, West Africa presents a particularly important but underexplored setting for investigating ADA adoption. The region has witnessed significant growth in financial services, telecommunications, multinational business operations, and regulatory reforms aimed at improving financial reporting and corporate governance. At the same time, audit firms continue to face substantial challenges relating to digital infrastructure, cybersecurity preparedness, data accessibility, human capital development, and regulatory

guidance concerning emerging audit technologies (Ilori et al., 2022; Osei-Assibey Bonsu et al., 2023). While individual studies have examined aspects of audit technology adoption in selected West African countries, the existing body of knowledge remains fragmented, with limited synthesis of the factors influencing ADA implementation and its implications for audit outcomes.

Furthermore, the extant literature is characterised by a lack of comprehensive reviews focusing specifically on West Africa. Existing systematic reviews predominantly examine global trends in digital auditing or concentrate on developed economies, providing limited insight into how contextual factors unique to emerging markets shape ADA adoption (Ahmed et al., 2023). As a result, there remains insufficient understanding of the technological, organisational, institutional, and regulatory conditions that facilitate or constrain the successful implementation of ADA among large audit firms in the region. To address this gap, this study undertakes a systematic literature review (SLR) guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework (Page et al., 2021). The review synthesises evidence from peer-reviewed journal articles, conference proceedings, and relevant grey literature published between 2015 and 2025. Specifically, the study examines four interconnected dimensions of ADA adoption: (1) technological infrastructure and organisational capacity, (2) human capital, skills, and organisational culture, (3) regulatory environment and institutional pressures, and (4) the impact of ADA on audit quality, operational efficiency, and business value. This review contributes to the literature in three important ways. First, it provides a consolidated understanding of the determinants of ADA adoption within the under-researched context of West Africa. Second, it integrates technological, organisational, and institutional perspectives to develop a holistic understanding of digital transformation in auditing. Third, it identifies critical knowledge gaps and proposes directions for future research, while offering practical implications for audit firms, regulators, professional accounting bodies, policymakers, and higher education institutions seeking to accelerate digital audit transformation across the region.

The remainder of the paper is organised as follows. Section 2 reviews the relevant literature and develops the thematic framework. Section 3 presents the systematic review methodology and PRISMA protocol. Section 4 reports the findings of the review. Section 5 discusses the findings and identifies research gaps. Section 6 outlines practical implications and recommendations, while Section 7 concludes the study and proposes avenues for future research. Despite growing scholarly interest in ADA adoption, no comprehensive PRISMA-based systematic review has synthesised evidence on the determinants and outcomes of ADA adoption among large audit firms in West Africa.

2. Methodology

2.1 Research Design

This study adopts a Systematic Literature Review (SLR) approach to synthesize and critically evaluate existing knowledge on the adoption of Audit Data Analytics (ADA) among large audit

firms, with particular emphasis on the West African context. Systematic literature reviews provide a structured, transparent, and reproducible methodology for identifying, evaluating, and synthesizing scholarly evidence on a specific research topic (Tranfield et al., 2003; Kitchenham, 2004). Compared with traditional narrative reviews, SLRs reduce researcher bias through explicit search, selection, and appraisal procedures, thereby enhancing the reliability and validity of findings.

The review was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) framework developed by Page et al. (2021). PRISMA is widely recognized as an international standard for conducting and reporting systematic reviews because it promotes transparency in study identification, screening, eligibility assessment, and inclusion decisions. The review sought to answer the following research questions:

RQ1: What technological factors influence the adoption of Audit Data Analytics among large audit firms?

RQ2: How do human capital, auditor competencies, and organizational culture affect ADA adoption?

RQ3: What role do regulatory frameworks and institutional pressures play in shaping ADA implementation?

RQ4: What are the implications of ADA adoption for audit quality, audit efficiency, fraud detection, and business value creation?

To address these questions, the review integrates insights from the Technology–Organization–Environment (TOE) Framework (Tornatzky & Fleischer, 1990) and Institutional Theory (DiMaggio & Powell, 1983). These theoretical perspectives provide a useful lens for understanding how technological readiness, organizational capabilities, and external institutional pressures collectively influence the adoption of digital audit technologies.

2.2 Review Protocol and Search Strategy

A comprehensive search strategy was developed to identify relevant studies published between January 2015 and March 2025. The period was selected because it coincides with the rapid emergence of artificial intelligence, big data analytics, machine learning applications, and digital transformation initiatives within the auditing profession. The literature search was conducted using multiple scholarly databases to maximize coverage and minimize publication bias. These databases included Scopus, Web of Science, EBSCOhost, ScienceDirect, Emerald Insight, SpringerLink, and Google Scholar.

The search strings combined keywords relating to audit analytics, auditing technologies, digital transformation, and regional contexts using Boolean operators. Examples of search strings included: ("Audit Data Analytics" OR "Audit Analytics" OR "Data Analytics in Auditing" OR

"Digital Auditing" OR "Artificial Intelligence in Auditing") AND ("Audit Quality" OR "Audit Efficiency" OR "Fraud Detection" OR "Audit Technology Adoption") AND ("Africa" OR "West Africa" OR "Emerging Economies" OR "Developing Countries").

To improve comprehensiveness, backward and forward citation tracking was performed on highly cited studies identified during the initial search process. Relevant conference proceedings, professional reports, and policy documents from international accounting organizations were also reviewed where they provided substantial empirical or conceptual contributions.

2.3 Eligibility Criteria

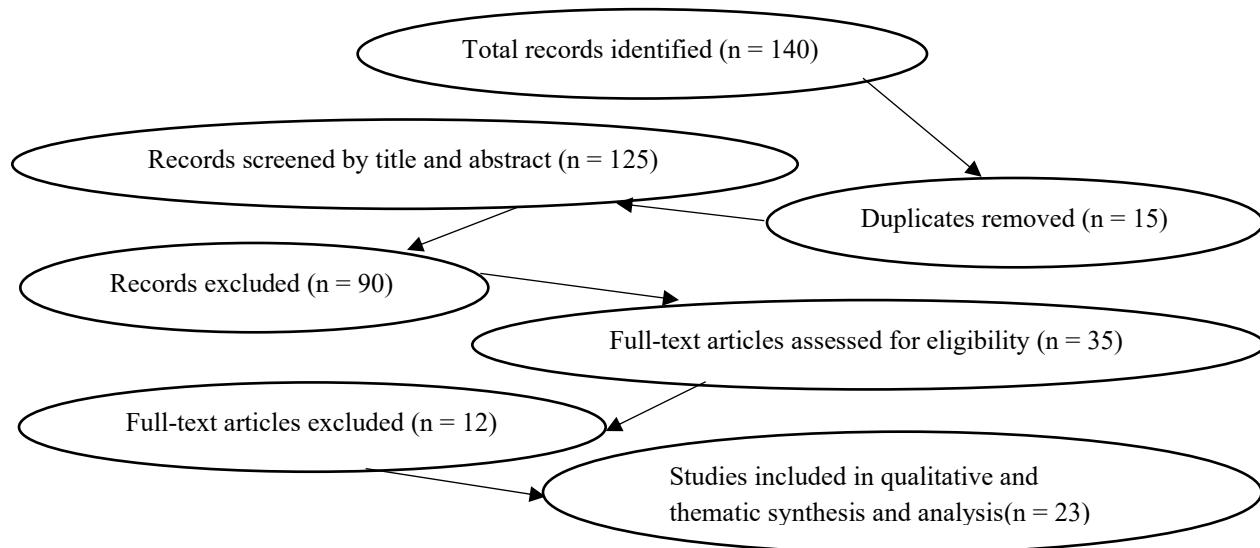
Explicit inclusion and exclusion criteria were established before the screening process to ensure consistency and objectivity. Studies were included if they examined Audit Data Analytics (ADA), audit analytics, AI-assisted auditing, or related digital audit technologies. Also, studies were included if they investigated factors influencing technology adoption within auditing environments. Those that reported empirical, conceptual, or review-based evidence related to audit quality, efficiency, fraud detection, or business value were also included. Besides, studies were included if they focused on accounting firms, auditing organizations, regulators, or professional accounting bodies. More so, studies were included if they were published in peer-reviewed journals, conference proceedings, or reputable institutional reports. Further, studies were included if they were published between 2015 and 2025, and were available in English.

Studies were excluded if they focused exclusively on general business analytics without auditing relevance, and discussed accounting information systems without linking them to auditing activities. Studies were also excluded if they were opinion pieces, editorials, dissertations, or unpublished manuscripts. Moreover, studies were excluded if they did not provide sufficient methodological information. Finally, studies were excluded if were duplicate records, and were published in languages other than English.

2.4 Study Selection Process

The study selection process followed the four-stage PRISMA procedure: identification, screening, eligibility assessment, and inclusion. The database search initially yielded 140 records. Additional studies were identified through citation searches and manual screening of reference lists. After removing duplicate records, 125 unique studies remained. Titles and abstracts were screened against the inclusion criteria. During this stage, studies unrelated to auditing, analytics adoption, or digital audit technologies were excluded. Thirty-five articles were subjected to full-text review. Each article was independently assessed for methodological quality, relevance to the research objectives, and contribution to the understanding of ADA adoption. Twenty-three studies met all eligibility criteria and were included in the final synthesis. To improve reliability, two independent reviewers participated in the screening process. Any disagreements were resolved through discussion and consensus. Figure 1 presents the PRISMA flow diagram for the study selection.

Figure 1. PRISMA Flow Diagram for Study Selection



2.5 Quality Assessment

Quality appraisal is a critical component of systematic reviews because it ensures that findings are derived from robust and credible evidence. The methodological quality of each study was evaluated using five criteria adapted from Higgins et al. (2019) and Kitchenham (2004): Research Design Quality (RDQ), Data Collection Rigor (DCR), Analytical Rigor (AR), Reporting Transparency (RT), and Relevance to ADA Adoption (RA). Each criterion was scored as 0 = Not Addressed, 1 = Partially Addressed, 2 = Fully Addressed, and a maximum score = 10 as presented in Table 1. Studies scoring below 50% were excluded from the review, while higher-quality studies were given greater interpretive weight during synthesis. The assessment also focused on clarity of research objectives, appropriateness of research design, adequacy of data collection procedures, transparency of analytical methods, validity and reliability of findings, and relevance to ADA adoption.

Table 1. Quality Assessment of Included Studies

Study	RDQ	DCR	AR	RT	RA	Total
Maama (2021)	2	2	2	2	2	10
Wadesango & Muzvuwe (2021)	2	2	1	2	2	9
Ndaba et al. (2021)	2	2	2	2	2	10

Study	RDQ	DCR	AR	RT	RA	Total
Ilori et al. (2022)	2	2	2	2	2	10
Lutfi et al. (2022)	2	1	2	2	2	9
Otia & Bracci (2022)	2	2	2	1	2	9
Ahmed et al. (2023)	2	2	2	2	2	10
Ecim & Maroun (2023)	2	2	2	2	2	10
Osei-Assibey Bonsu et al. (2023)	2	2	2	2	2	10
Jayasuriya & Sims (2023)	2	1	2	2	2	9
Abdelwahed et al. (2023)	2	2	2	2	2	10
Fossung & Manfo (2024)	2	2	2	2	2	10
Murkah et al. (2024)	2	2	2	2	2	10
Wassie & Lakatos (2024)	2	2	2	2	2	10
Abdelwahed et al. (2024)	2	2	2	2	2	10
Leocádio & Malheiro (2025)	2	2	2	2	2	10
Abdelwahed et al. (2025)	2	2	2	2	2	10

Average Quality Score = 9.71/10

The quality assessment in Table 3 indicates that the studies included in the review are generally of high methodological quality. Most studies employed rigorous research designs, transparent analytical procedures, and clearly reported findings. Consequently, the synthesized evidence can be considered sufficiently robust for drawing conclusions regarding ADA adoption in West Africa and comparable emerging-market contexts.

2.6 Data Extraction

A structured data extraction form was developed to ensure consistency across studies. The following information was extracted: author(s), year of publication, country or region of study, research objectives, theoretical framework, research methodology, sample characteristics, key findings, adoption drivers, adoption barriers, and reported outcomes of ADA implementation. Data extraction was independently verified by a second reviewer to enhance reliability and reduce extraction errors. Table 2 presents the characteristics of studies included in the review.

Table 2. Summary of Studies Included in the Systematic Literature Review

Author(s)	Year	Country/ Region	Research Method	Focus Area	Key Findings
Maama	2021	Africa	Empirical Survey	Audit analytics adoption	Technological readiness significantly influences ADA adoption in accounting firms.
Wadesango & Muzvuwe	2021	Southern Africa	Mixed Methods	Digital audit adoption	Infrastructure constraints and skills shortages impede adoption.
Ndaba et al.	2021	South Africa	Qualitative	Institutional factors	Regulatory support and professional guidance drive ADA implementation.
Ilori et al.	2022	West Africa	Survey Research	ADA adoption barriers	Lack of expertise, funding, and technology infrastructure limit uptake.
Lutfi et al.	2022	Developing Countries	Literature Review	Adoption challenges	Human capital and organizational readiness are critical success factors.
Otia & Bracci	2022	Africa	Case Study	Institutional influences	Regulatory pressure and stakeholder expectations influence adoption decisions.
Ahmed et al.	2023	Global	Systematic Review	Audit effectiveness	ADA enhances audit quality, fraud detection, and risk assessment.

Author(s)	Year	Country/ Region	Research Method	Focus Area	Key Findings
Ecim & Maroun	2023	Africa	Empirical Study	Adoption patterns	Significant differences exist in adoption levels across African countries.
Osei-Assibey Bonsu et al.	2023	West Africa	Survey Research	Audit technology adoption	Digital transformation initiatives positively affect audit innovation.
Jayasuriya & Sims	2023	Global	Conceptual Review	AI analytics auditing	and AI-driven analytics are in transforming audit methodologies and assurance services.
Abdelwahed et al.	2023	Emerging Economies	Survey Research	Human capital factors	Auditor competencies and organizational support are key determinants.
Fossung & Manfo	2024	West Africa	Empirical Study	ADA implementation challenges	Cost, infrastructure limitations, and regulatory uncertainty remain barriers.
Murkah et al.	2024	Emerging Economies	Quantitative Study	Financial reporting quality	ADA adoption improves reporting quality and audit outcomes.
Wassie & Lakatos	2024	Emerging Economies	Survey Research	Organizational readiness	Readiness and digital maturity significantly predict adoption success.
Abdelwahed et al.	2024	Africa	Empirical Study	Institutional drivers	Regulatory frameworks and institutional pressures encourage adoption.
Leocádio & Malheiro	2025	Emerging Markets	Comparative Study	Digital auditing	Strategic implementation improves audit efficiency and value creation.

Author(s)	Year	Country/ Region	Research Method	Focus Area	Key Findings
Abdelwahed et al.	2025	Emerging Economies	Quantitative Study	Determinants of digital audit adoption	Technology, organizational culture, and external pressures jointly influence adoption.

Source: Author's systematic review (2026).

2.7 Data Synthesis and Analysis

Given the heterogeneity of research designs, contexts, and outcome measures across the included studies, a narrative thematic synthesis approach was adopted. Thematic analysis followed the procedures recommended by Braun and Clarke (2006): familiarization, initial coding, theme development, and theme refinement. In the first phase, included studies were repeatedly reviewed to identify recurring concepts and patterns. In the second phase, key findings were coded according to technological, organizational, human, and institutional dimensions. The third phase group codes into broader thematic categories reflecting major determinants and outcomes of ADA adoption. The final phase refined themes through iterative comparison across studies to ensure conceptual consistency. Four dominant themes emerged: Technological Infrastructure and Organizational Capacity: Human Capital, Skills, and Organizational Culture; Regulatory Environment and Institutional Pressures; Impacts of ADA on Audit Quality, Efficiency, and Business Value. Cross-study comparisons were subsequently conducted to identify similarities, contradictions, contextual influences, and knowledge gaps. Table 3 provides the thematic mapping of studies included in the review.

Table 3. Thematic Mapping of Included Studies

Theme	Representative Studies	Main Issues Identified
Technological Infrastructure Capacity	Maama (2021); Wadesango & Muzvuwe (2021); Fossung (2024); Abdelwahed et al. (2024)	IT infrastructure, cloud computing, cybersecurity, data availability, analytics tools
Human Capital, and Organizational Culture	Abdelwahed et al. (2023); Wassie & Lakatos (2024); Kokina & Davenport (2017)	Auditor competencies, training, innovation culture, resistance to change

Theme	Representative Studies	Main Issues Identified
Regulatory Environment and Institutional Pressure	Ndaba et al. (2021); Otia & Bracci (2022); Abdelwahed et al. (2024)	Professional standards, regulatory guidance, stakeholder pressure
Audit Quality, Efficiency and Business Value	Ahmed et al. (2023); Murkah et al. (2024); Leocádio & Malheiro (2025)	Fraud detection, risk assessment, efficiency gains, value creation

Source: Author's thematic synthesis (2026).

2.8 Reliability and Validity Procedures

Several measures were employed to enhance the trustworthiness of the review. First, multiple databases were searched to improve comprehensiveness. Second, explicit inclusion and exclusion criteria reduced selection bias. Third, independent reviewer screening strengthened consistency in study selection decisions. Fourth, methodological quality assessment ensured that findings were derived from credible evidence. Finally, adherence to PRISMA guidelines improved transparency and reproducibility.

2.9 Limitations of the Review

Despite the rigorous methodology employed, some limitations are acknowledged. The review was restricted to English-language publications, potentially excluding relevant studies published in French, which is widely used across several West African countries. Furthermore, publication bias may exist because studies reporting positive outcomes are more likely to be published than studies reporting non-significant findings. Finally, the relatively limited volume of empirical ADA research in West Africa constrained the availability of region-specific evidence. Nevertheless, the systematic review methodology provides a robust foundation for synthesizing current knowledge and identifying future research directions concerning ADA adoption among large audit firms in West Africa.

3. Results

3.1 Descriptive Analysis of Included Studies

The review incorporated 23 studies published between 2021 and 2025. The distribution of studies demonstrates increasing scholarly interest in Audit Data Analytics (ADA), particularly in emerging economies and African audit environments. Earlier studies focused primarily on conceptual discussions of digital auditing and analytics adoption, while more recent research has

increasingly examined organizational readiness, regulatory influences, and the impact of analytics on audit quality.

Geographically, the studies covered multiple contexts including West Africa, Southern Africa, South Africa, broader African settings, and emerging economies outside Africa. This geographical diversity provides useful comparative insights while highlighting the relative scarcity of empirical research specifically focused on West Africa. Methodologically, the reviewed studies employed diverse approaches including surveys, case studies, systematic reviews, mixed-methods designs, and conceptual analyses. Survey-based studies constituted the largest proportion of the evidence base, reflecting the exploratory nature of current ADA research. Qualitative studies provided deeper insights into organizational and institutional dynamics, while systematic reviews synthesized emerging global knowledge regarding audit analytics implementation. The studies collectively indicate that ADA adoption is influenced by a complex interaction of technological, organizational, institutional, and environmental factors. Despite contextual differences, recurring themes emerged across the literature, enabling the development of four major thematic categories that form the basis of the subsequent analysis.

3.2 Thematic Synthesis Framework

This section creates a bridge between the methodology and findings. The thematic analysis identified four dominant and interconnected dimensions shaping ADA adoption among large audit firms. These dimensions are technological infrastructure and organizational capacity, human capital, auditor competencies, and organizational culture, regulatory environment and institutional pressures, and audit quality, operational efficiency, and business value creation. These themes align closely with the Technology–Organization–Environment (TOE) framework and Institutional Theory. The technological dimension captures the availability and readiness of digital infrastructure; the organizational dimension reflects human and cultural factors; the environmental dimension encompasses regulatory and institutional influences; and the outcome dimension assesses the effects of ADA implementation on audit performance.

The findings reveal that successful ADA adoption is rarely determined by a single factor. Rather, adoption emerges from the interaction between technological readiness, organizational capability, institutional support, and strategic commitment. Consequently, the identified themes should be interpreted as complementary rather than independent determinants of digital audit transformation.

3.3 Technological Infrastructure and Organizational Capacity

Technological infrastructure emerged as one of the most consistently cited determinants of Audit Data Analytics (ADA) adoption across the reviewed studies. The literature demonstrates that successful implementation of ADA depends fundamentally on the availability of robust digital infrastructure, advanced analytics tools, cloud computing capabilities, cybersecurity systems, and effective data governance mechanisms.

Studies conducted in emerging economies consistently report that organizations possessing mature information technology ecosystems are better positioned to integrate analytics into audit processes (Maama, 2021; Abdelwahed et al., 2024). Advanced audit firms increasingly employ data visualization software, machine learning algorithms, artificial intelligence applications, and automated risk assessment tools to enhance audit planning and execution. Such technologies enable auditors to move beyond traditional sampling techniques toward full-population testing and continuous auditing approaches. However, the evidence also highlights substantial infrastructural disparities between developed and emerging economies. In West Africa, inadequate digital infrastructure remains a major obstacle to widespread ADA adoption. Several studies report challenges associated with outdated information systems, fragmented databases, inconsistent data quality, unreliable internet connectivity, and limited access to advanced analytics software (Ilori et al., 2022; Fossung & Manfo, 2024). These challenges reduce the effectiveness of analytics-driven audit procedures and increase implementation costs. From a Technology–Organization–Environment (TOE) perspective, technological readiness represents a prerequisite for innovation adoption. Organizations lacking appropriate technological capabilities often struggle to realize the benefits associated with digital auditing despite recognizing its strategic value. The findings therefore suggest that technological investment should be viewed not merely as an operational necessity but as a strategic capability that underpins audit innovation and competitive advantage.

Furthermore, the literature indicates that client technological maturity significantly influences audit firms' ability to deploy ADA. Clients operating sophisticated enterprise resource planning (ERP) systems and digital financial reporting platforms generate higher-quality data that facilitate analytics-based auditing. Conversely, clients relying on manual systems or fragmented databases often limit the scope and effectiveness of ADA implementation. Overall, the evidence suggests that technological infrastructure functions both as an enabler and a constraint. While advanced technological capabilities accelerate adoption and enhance audit effectiveness, infrastructural deficiencies continue to impede digital transformation across many West African audit environments.

3.4 Human Capital, Auditor Competencies, and Organizational Culture

The second major theme identified in the review concerns the role of human capital and organizational culture in facilitating ADA adoption. While technological infrastructure provides the foundation for digital auditing, the literature consistently demonstrates that human capabilities determine whether such technologies are effectively utilized.

Several studies emphasize that contemporary auditors require a hybrid skill set combining traditional accounting knowledge with competencies in data analytics, statistics, information systems, and emerging technologies (Abdelwahed et al., 2023; Wassie & Lakatos, 2024). The increasing complexity of audit analytics tools necessitates the development of technical expertise that extends beyond conventional audit training.

A recurring finding across the reviewed studies is the existence of substantial skills gaps within audit firms operating in developing economies. Many auditors lack formal training in data analytics techniques, data visualization, programming, and artificial intelligence applications. Consequently, organizations frequently encounter difficulties in translating technological investments into meaningful audit improvements. Similar concerns have been reported in studies examining digital transformation initiatives across broader professional service sectors.

Beyond technical competencies, organizational culture was identified as a critical determinant of ADA implementation success. Firms characterized by innovation-oriented cultures, knowledge sharing practices, and continuous learning environments generally demonstrate higher adoption rates and greater implementation effectiveness. In contrast, organizations exhibiting resistance to change, risk aversion, and rigid hierarchical structures often experience slower adoption processes.

Institutional Theory provides additional explanatory power regarding these findings. The adoption of new technologies frequently challenges established professional routines and organizational norms. Consequently, successful implementation requires not only technical training but also cultural transformation that encourages experimentation, adaptability, and innovation. Leadership commitment and strategic vision were repeatedly identified as important factors supporting such transformation.

The reviewed evidence therefore suggests that ADA adoption is fundamentally a socio-technical process. Technological investments alone are unlikely to generate substantial benefits unless accompanied by investments in human capital development, organizational learning, and cultural change initiatives. For West African audit firms, capacity-building programs and professional development initiatives are likely to play a particularly important role in accelerating digital audit transformation.

3.5 Regulatory Environment and Institutional Pressures

The third thematic area concerns the influence of regulatory frameworks and institutional pressures on ADA adoption. The findings indicate that regulatory environments simultaneously act as facilitators and constraints, shaping organizational incentives to adopt innovative audit technologies. Across the literature, professional standards and regulatory guidance are consistently identified as important drivers of technological innovation within auditing. International auditing standards increasingly emphasize risk assessment, analytical procedures, and data-driven decision-making, creating opportunities for the integration of advanced analytics tools. Regulatory bodies and professional accounting organizations therefore play a critical role in legitimizing ADA within audit practice.

However, the review reveals that many West African jurisdictions lack explicit guidance regarding the use of ADA in audit engagements. Although international standards provide general support for analytical procedures, detailed local guidance concerning analytics-based auditing remains

limited. This regulatory ambiguity can create uncertainty regarding acceptable audit methodologies, documentation requirements, and legal liabilities associated with technology-enabled audits.

Institutional Theory offers valuable insights into these dynamics. Organizations often adopt innovations not solely because of their technical efficiency but also because of coercive, normative, and mimetic pressures. Coercive pressures arise from regulatory expectations and compliance requirements. Normative pressures emerge through professional education, certification programs, and industry standards. Mimetic pressures occur when firms imitate successful competitors perceived as industry leaders.

Evidence from the reviewed studies suggests that all three forms of institutional pressure influence ADA adoption within West African audit firms. Large international audit firms frequently adopt analytics technologies partly to maintain legitimacy and align with global professional practices. Similarly, client expectations increasingly encourage auditors to employ advanced analytical techniques capable of providing deeper insights and enhanced assurance. Nevertheless, regulatory uncertainty remains a significant challenge. The findings indicate that stronger collaboration between regulators, professional accounting bodies, and audit firms could accelerate adoption by establishing clear implementation guidelines and promoting best practices. Such initiatives would likely reduce uncertainty while enhancing confidence in the reliability and legitimacy of analytics-based auditing.

3.6 Impact of Audit Data Analytics on Audit Quality, Efficiency, and Business Value

The final theme concerns the outcomes associated with ADA adoption. Across the reviewed literature, there is broad consensus that ADA contributes positively to audit quality, operational efficiency, and business value creation. One of the most frequently reported benefits relates to enhanced audit quality. By enabling analysis of entire datasets rather than selected samples, ADA improves auditors' ability to identify anomalies, assess risks, and detect fraudulent transactions. Several studies indicate that analytics-driven audits provide more comprehensive evidence, resulting in improved audit judgments and increased assurance reliability.

The literature also highlights significant efficiency gains associated with ADA implementation. Automation of routine audit procedures reduces manual effort, shortens audit cycles, and enables auditors to focus on higher-value analytical activities. Consequently, organizations adopting ADA often report improvements in productivity, resource utilization, and engagement profitability. Beyond operational benefits, the evidence suggests that ADA contributes to broader business value creation. Advanced analytics generate insights that support strategic decision-making, risk management, and organizational governance. Audit firms capable of delivering data-driven insights may strengthen client relationships and differentiate themselves within increasingly competitive professional service markets.

Despite these benefits, the literature cautions against assuming automatic performance improvements following technology adoption. The extent to which organizations realize value from ADA depends heavily on technological readiness, workforce competencies, organizational support, and regulatory alignment. These findings reinforce the socio-technical nature of digital transformation, emphasizing that technology alone does not guarantee improved outcomes. In all, the evidence strongly supports the proposition that ADA represents a transformative innovation capable of enhancing audit effectiveness and organizational performance. However, realizing these benefits requires coordinated investments in technology, people, processes, and institutional support mechanisms.

4. Cross-Thematic Discussion and Theoretical Implications

4.1 Integrating the Determinants of Audit Data Analytics Adoption

The findings of this review reveal that the adoption of Audit Data Analytics (ADA) among large audit firms in West Africa is a multidimensional process shaped by the interaction of technological, organizational, and institutional factors. While previous studies have often examined these determinants independently, the evidence synthesized in this review suggests that successful ADA implementation requires the simultaneous alignment of technological infrastructure, human capabilities, organizational readiness, and regulatory support. The analysis demonstrates that technological infrastructure serves as the foundational enabler of ADA adoption. However, technological readiness alone is insufficient to ensure successful implementation. Organizations possessing sophisticated analytics tools frequently fail to realize expected benefits when employees lack the necessary technical competencies or when organizational cultures resist innovation. Similarly, firms with highly skilled personnel may encounter implementation difficulties when operating within environments characterized by inadequate infrastructure or regulatory uncertainty. This finding reinforces the notion that ADA adoption is a socio-technical phenomenon in which technological systems and human systems are mutually dependent. The interaction between these dimensions determines not only the likelihood of adoption but also the extent to which organizations realize improvements in audit quality, efficiency, and value creation. Furthermore, the review highlights the importance of institutional influences. Regulatory expectations, professional standards, client demands, and competitive pressures create external incentives that encourage firms to adopt analytics technologies. Consequently, ADA adoption should be viewed not merely as a technological decision but also as a strategic response to evolving institutional environments. Collectively, these findings indicate that digital transformation in auditing is a complex organizational change process rather than a simple technology implementation exercise.

4.2 Interpretation through the Technology–Organization–Environment Framework

The findings provide strong support for the Technology–Organization–Environment (TOE) Framework as an explanatory lens for understanding ADA adoption among audit firms.

The technological dimension encompasses infrastructure availability, analytics software, cloud computing capabilities, cybersecurity systems, and data quality management. The review consistently demonstrates that organizations possessing higher levels of technological readiness exhibit greater capacity to implement ADA successfully. The organizational dimension includes auditor competencies, leadership commitment, organizational culture, training initiatives, and resource availability. The findings suggest that these organizational factors significantly influence the extent to which firms can leverage technological investments. In particular, organizations characterized by learning-oriented cultures and strong leadership support appear better positioned to overcome implementation challenges. The environmental dimension comprises regulatory requirements, professional standards, client expectations, competitive pressures, and broader institutional influences. The evidence indicates that environmental factors shape organizational incentives to adopt ADA and influence the pace of implementation. Importantly, the findings suggest that the three TOE dimensions are highly interdependent. Technological investments are most effective when supported by appropriate organizational capabilities and favorable environmental conditions. Consequently, the review extends the application of the TOE framework by demonstrating how these dimensions collectively influence ADA adoption in emerging-market audit environments.

4.3 Institutional Theory and the Diffusion of Audit Analytics

Institutional Theory provides additional explanatory insights into the adoption patterns observed across the reviewed studies. The evidence indicates that audit firms often adopt ADA not solely because of its technical advantages but also because of institutional pressures that influence organizational legitimacy. Three forms of institutional pressure are particularly evident. First, coercive pressures arise from regulators, professional accounting bodies, and legal requirements. As regulators increasingly emphasize audit quality and risk management, firms experience pressure to incorporate advanced analytics into audit procedures. Second, normative pressures originate from professional education, certification requirements, and industry best practices. Professional accounting associations increasingly promote analytics competencies as essential skills for modern auditors, thereby encouraging firms to invest in digital capabilities. Third, mimetic pressures emerge when organizations imitate successful competitors perceived as industry leaders. The adoption of ADA by multinational audit firms and the Big Four creates demonstration effects that encourage other firms to pursue similar technological innovations. The review therefore suggests that ADA adoption is influenced by both efficiency-seeking motivations and legitimacy-seeking behaviors. This finding contributes to the growing literature on digital transformation by highlighting the dual role of technological and institutional forces in shaping innovation adoption within professional service organizations.

4.4 Moderating Factors Influencing ADA Adoption

Beyond the primary determinants identified through thematic analysis, the review reveals several moderating factors that influence the strength and effectiveness of ADA adoption. Factors such as firm size, client complexity, technological maturity, and regulatory maturity.

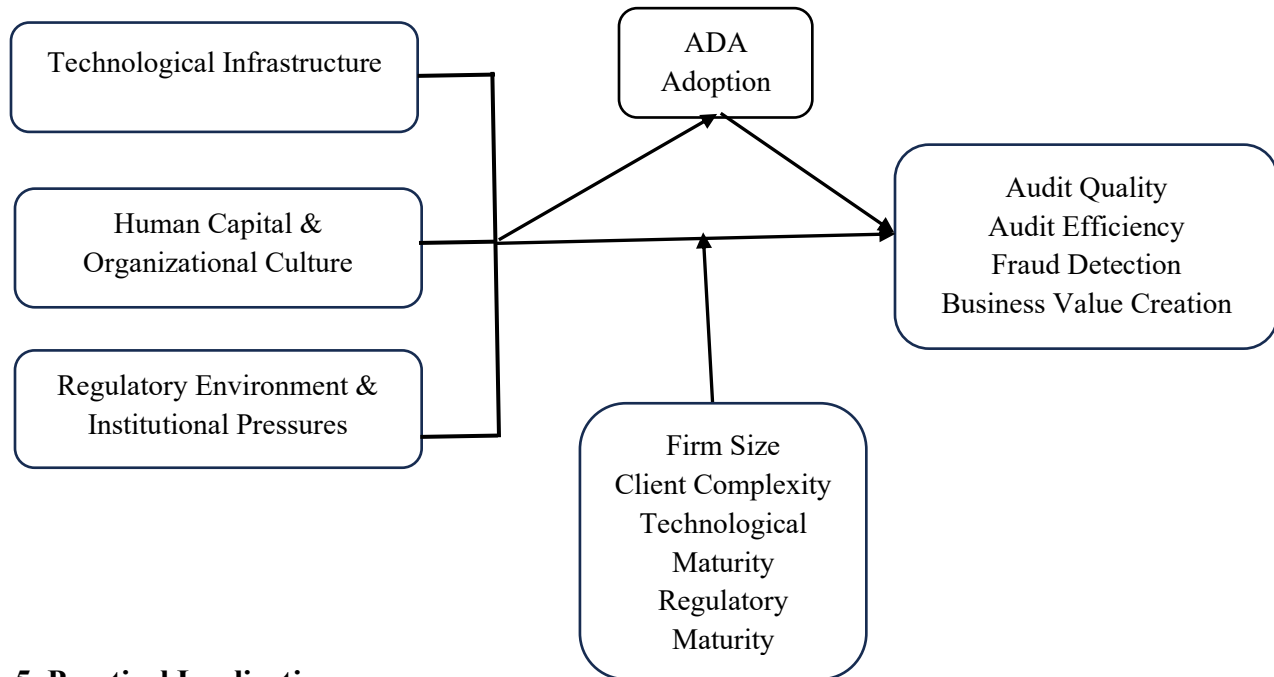
Firm size emerged as a significant moderating factor. Large audit firms typically possess greater financial resources, stronger technological capabilities, and more extensive training infrastructures than smaller firms. Consequently, larger firms are generally better positioned to invest in advanced analytics tools and implement organization-wide digital transformation initiatives. The complexity of client operations also influences ADA adoption decisions. Firms auditing multinational corporations, financial institutions, telecommunications companies, and other data-intensive organizations are more likely to utilize advanced analytics because of the volume and complexity of available data. Conversely, firms serving smaller clients may perceive fewer benefits from extensive analytics investments. The technological maturity of both audit firms and clients significantly affects implementation outcomes. Organizations operating within digitally mature environments are more capable of generating, accessing, and analyzing high-quality data. In contrast, fragmented information systems and poor data governance practices frequently limit the effectiveness of analytics-based auditing. Differences in regulatory sophistication across jurisdictions also influence adoption patterns. Countries possessing clear regulatory guidance and stronger professional oversight generally demonstrate higher levels of ADA implementation than environments characterized by regulatory ambiguity. These moderating factors help explain variations in adoption rates observed across firms, industries, and countries throughout the reviewed literature.

4.5 Proposed Conceptual Framework

Based on the synthesis of evidence, this study proposes an integrated conceptual framework for understanding ADA adoption among large audit firms in West Africa as depicted in Figure 2. The framework suggests that technological infrastructure positively influences ADA adoption, human capital and organizational culture positively influence ADA adoption, regulatory environment and Institutional Pressures positively influence ADA adoption, and ADA adoption enhances audit quality, audit efficiency, fraud detection capability, and business value. The relationships are moderated by firm size, client complexity, technological maturity, and regulatory maturity.

The framework extends existing ADA literature by integrating technological, organizational, and institutional determinants within a single explanatory model specifically tailored to emerging-market audit environments. It provides a foundation for future empirical research seeking to test causal relationships between these constructs.

Figure 2. Integrated Conceptual Framework for Understanding ADA Adoption among Large Audit Firms in West Africa



5. Practical Implications

The findings of this systematic review have important implications for audit firms, regulators, professional accounting bodies, and educational institutions seeking to accelerate digital transformation within the auditing profession. Given the increasing reliance on data-driven decision-making and analytics-enabled assurance services, stakeholders must adopt coordinated strategies to address the technological, organizational, and institutional challenges associated with Audit Data Analytics (ADA) implementation.

The review demonstrates that successful ADA adoption requires more than investment in technological infrastructure. Audit firms should adopt holistic digital transformation strategies that integrate technology acquisition with workforce development, organizational change management, and process redesign. Large audit firms should prioritize investments in cloud-based audit platforms, artificial intelligence applications, data visualization tools, and cybersecurity systems. Simultaneously, firms should establish continuous professional development programs to strengthen auditors' competencies in data analytics, statistical analysis, and emerging digital technologies. Leadership commitment is equally critical. Senior management should foster innovation-oriented cultures that encourage experimentation, learning, and adaptation. Such environments can reduce employee resistance to technological change and facilitate successful implementation.

Regulatory bodies play a crucial role in shaping the adoption of emerging audit technologies. The findings indicate that regulatory ambiguity remains a significant barrier to ADA implementation in many West African jurisdictions. Policymakers should therefore develop clear guidelines regarding the application of analytics-based audit procedures, digital evidence collection, artificial intelligence utilization, and data governance practices. Such guidance would enhance consistency, reduce uncertainty, and improve confidence in analytics-driven audit methodologies. Governments should also support investments in national digital infrastructure, including broadband connectivity, cybersecurity systems, and digital financial reporting frameworks. These initiatives would create an enabling environment for broader digital transformation across the auditing profession.

Professional accounting associations have a strategic responsibility to prepare auditors for an increasingly digital future. The review suggests that many practitioners continue to face significant skills gaps in analytics, artificial intelligence, and data management. Professional bodies should revise certification curricula to incorporate data analytics, programming fundamentals, machine learning applications, and digital auditing techniques. Furthermore, mandatory continuing professional development (CPD) programs should emphasize emerging technologies and practical analytics competencies. Professional associations should also facilitate collaboration among practitioners, technology providers, regulators, and academic institutions to promote knowledge sharing and dissemination of best practices.

Universities and business schools must play a proactive role in developing future-ready accounting professionals. Traditional accounting curricula often provide limited exposure to analytics and digital technologies despite their growing relevance in professional practice. Higher education institutions should redesign accounting and auditing programs to include courses in data analytics, business intelligence, artificial intelligence, cybersecurity, and information systems. Experiential learning opportunities, industry partnerships, and technology-enabled audit simulations can further enhance students' practical competencies. Strengthening collaboration between academia and industry will be essential for ensuring that graduates possess the skills required in digitally transformed audit environments.

6. Conclusion

This study conducted a systematic literature review of Audit Data Analytics (ADA) adoption among large audit firms, with particular emphasis on the West African context. Guided by the PRISMA framework, the review synthesized evidence from studies published between 2015 and 2025 to identify the determinants, challenges, and outcomes associated with ADA implementation. The findings revealed four major themes influencing ADA adoption: technological infrastructure and organizational capacity; human capital, auditor competencies, and organizational culture; regulatory environment and institutional pressures; and the impact of ADA on audit quality,

efficiency, and business value creation. The review demonstrates that successful implementation depends on the interaction of these factors rather than any single determinant.

The study further showed that technological readiness alone is insufficient to guarantee successful adoption. Organizations must simultaneously develop analytical competencies, cultivate innovation-oriented cultures, and operate within supportive institutional environments. The findings therefore reinforce the relevance of the Technology–Organization–Environment framework and Institutional Theory in explaining digital transformation within auditing. The review contributes to the literature by providing one of the first comprehensive syntheses of ADA adoption in the West African context and by proposing an integrated conceptual framework linking technological, organizational, and institutional determinants to audit outcomes. The study also identifies critical research gaps concerning empirical evidence from developing economies, longitudinal analyses of adoption processes, and the effectiveness of regulatory interventions.

Future research should focus on empirical testing of the proposed conceptual framework, comparative analyses across African countries, and investigations into the emerging role of artificial intelligence and machine learning in audit practice. Such studies would further advance understanding of how digital technologies are transforming the auditing profession in emerging-market environments.

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