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Big Data Integration in Auditing: Technological, Institutional, and Ethical Perspectives

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ABSTRACT

The increasing adoption of Big Data technologies has significantly reshaped auditing practices; however, existing scholarship on Big Data auditing remains fragmented and lacks an integrated conceptual perspective. This study aims to systematically examine how Big Data influences audit practices and audit quality across technological, institutional, and epistemic dimensions. Using a Systematic Literature Review (SLR) based on the PRISMA protocol, this study synthesizes evidence from 30 peer-reviewed journal articles indexed in Scopus and Web of Science published between 2015 and 2025. The analysis identifies three dominant research clusters: (1) technological capability, reflecting the development of analytics-driven, continuous, and predictive auditing tools; (2) institutional readiness, highlighting regulatory gaps, organizational resistance, and skill asymmetry; and (3) epistemic transformation, concerning changes in professional judgment, algorithmic transparency, and accountability structures. The findings reveal a progressive datafication of auditing, characterized by a shift from traditional ex-post verification toward real-time and predictive assurance. Although Big Data improves audit efficiency, analytical scope, and risk detection capability, its implementation remains constrained by governance uncertainty and uneven organizational capabilities. To synthesize these insights, this study proposes the Big Data Auditing Framework (BDAF), which conceptualizes audit transformation as the dynamic interaction between Technological Infrastructure, Institutional Adaptation, and Epistemic Governance, moderated by Ethical and Regulatory Oversight. This framework contributes to the literature by offering an integrative perspective on how technological and institutional factors jointly shape the evolution of data-driven auditing and provides practical implications for regulators, educators, and audit firms in strengthening technological capacity, institutional preparedness, and ethical governance in digital audit environments.

1. Introduction

Auditing practices have undergone substantial transformation as a result of rapid technological advancements. Among these developments, Big Data has emerged as one of the most influential innovations, reshaping how auditors collect, process, and evaluate audit evidence. Traditionally, auditors relied primarily on sampling techniques and manual verification procedures to assess the reliability of financial information. However, the increasing availability of digital data sources, including internal enterprise systems, electronic transactions, and social media has enabled auditors to analyze large volumes of structured and unstructured data in real time. This development offers significant opportunities to enhance audit quality, expand audit coverage, and improve risk detection capabilities (Isa & Subramanian, 2024).

Despite these opportunities, the adoption of Big Data in auditing also introduces

significant challenges. Technical complexity, data quality concerns, and privacy considerations remain critical issues that auditors must address when integrating data analytics into audit procedures. In practice, many public accounting firms still struggle to effectively implement data analytics in their audit processes. While large firms may possess sufficient resources to develop internal analytics infrastructures, smaller firms often face financial and technical constraints that limit their ability to adopt advanced analytical tools (Saud et al., 2025). As a result, disparities in technological capability have emerged across the auditing profession.

Beyond technical constraints, the integration of Big Data also raises institutional and professional challenges. Auditors must develop the ability to interpret complex analytical outputs while maintaining professional judgment and compliance with auditing standards. However, current regulatory guidance remains relatively limited in addressing the practical implementation of data analytics. For example, the International Standards on Auditing (ISA) acknowledge the relevance of data analytics but provide only general guidance on its application in audit procedures (Sofyani et al., 2025). This situation may create a gap between technological adoption and professional accountability.

At a deeper level, the rise of Big Data also challenges the epistemological foundations of auditing. Traditionally, audit evidence was derived from physical documentation, confirmations, and observable transactions that auditors could directly verify. In contrast, contemporary auditing increasingly relies on digital evidence generated through algorithms, predictive models, and automated analytics. While these technologies significantly enhance analytical capabilities, auditors may not always fully understand the mechanisms through which algorithmic outputs are generated. Consequently, the nature of professional judgment is gradually shifting from direct observation toward the interpretation of complex data patterns.

This transformation also raises important questions about accountability and responsibility in algorithm-assisted auditing environments. When audit conclusions rely partly on algorithmic analysis, determining responsibility for potential errors becomes increasingly complex. Responsibility may be distributed among auditors, system developers, and organizations providing the underlying data. These issues highlight a broader shift in audit epistemology the way auditors generate, interpret, and validate knowledge in increasingly data-driven environments.

Although research on Big Data and auditing has grown rapidly in recent years, the literature remains fragmented. Many studies focus on specific analytical tools, technological applications, or individual case contexts, but relatively few integrate technological, institutional, and epistemic perspectives within a coherent analytical framework. Moreover, theoretical engagement remains limited. Existing studies rarely employ broader theoretical lenses such as Institutional Theory to explain how professional norms, regulatory structures, and organizational pressures influence the adoption and governance of Big Data in auditing.

This fragmentation creates an important gap in the literature. Without an integrative perspective, discussions on Big Data auditing risk remaining predominantly technical, emphasizing analytical tools rather than the broader institutional and epistemic implications for the auditing profession. A more comprehensive framework is therefore needed to understand how technological capabilities interact with institutional readiness and ethical governance in shaping the transformation of auditing practices.

To address this gap, this study conducts a systematic literature review (SLR) of research on Big Data auditing published between 2015 and 2025. Using a structured review approach, the study synthesizes existing research to examine how Big Data reshapes auditing practices across technological, institutional,

and epistemic dimensions. Specifically, the study is guided by three research questions: (1) how Big Data influences audit methods and professional judgment; (2) what institutional and ethical challenges arise from its implementation; and (3) how existing auditing theories can be extended to explain these transformations.

This study contributes to the literature in two ways. First, it provides a comprehensive synthesis of the evolving research landscape on Big Data auditing, identifying key trends, research gaps, and emerging themes. Second, the study proposes the Big Data Auditing Framework (BDAF), a conceptual model that integrates technological infrastructure, institutional adaptation, and epistemic governance in explaining the transformation of auditing practices in data-intensive environments.

Ultimately, this study argues that the adoption of Big Data in auditing represents not merely a technological advancement but a structural transformation in how audit knowledge is produced, interpreted, and validated. The role of auditors is gradually evolving from traditional verification toward the interpretation of complex data ecosystems, highlighting the need for stronger institutional frameworks, professional competencies, and ethical governance in the era of data-driven auditing.

2. Literature Review

2.1 Conceptual and Theoretical Foundations

2.1.1 Big Data and the Transformation of Auditing

The auditing profession has historically been grounded in a verification-based logic in which assurance relies on sampling techniques, documentary evidence, and ex post evaluation of financial transactions. However, the emergence of Big Data has fundamentally challenged this paradigm by expanding both the volume and velocity of audit-relevant information. Recent literature conceptualizes Big Data in auditing through the widely recognized 5V framework (volume, velocity, variety, veracity, and value) each of which reshapes the nature of audit evidence and the exercise of professional judgment (Biglari & Pourabedin, 2022; Tang & Karim, 2018; Warren et al., 2023).

Recent empirical research suggests that Big Data enables a shift from traditional sample-based audits toward population-level analysis and continuous assurance models. Dong et al. (2024), for instance, demonstrate that advanced analytics allow auditors to detect anomalies in real time, thereby reducing detection risk and improving audit coverage. Similarly, Yuan and Huang (2024) argue that algorithmic assurance mechanisms transform audit evidence from static documentation into probabilistic signals derived from complex data patterns. While these developments improve analytical efficiency and expand audit scope, scholars increasingly emphasize that such transformations introduce new epistemic challenges. In particular, auditors may rely on algorithmic outputs whose underlying logic is not always transparent, raising concerns about explainability and professional skepticism.

Systematic and scoping reviews published in recent years further highlight that Big Data does not simply enhance existing audit procedures but fundamentally reshapes the logic of assurance. Ali and Noor (2024) and Isa & Subramanian (2024) conclude that Big Data auditing represents a qualitative transformation in the audit process, redefining what constitutes sufficient and appropriate audit evidence. Consequently, recent scholarship increasingly calls for theoretical perspectives that move beyond efficiency-oriented interpretations and instead recognize auditing as a socio-technical process involving interactions between auditors, data infrastructures, and intelligent systems.

2.1.2 Artificial Intelligence and Generative Technologies in Audit Practice

Building upon Big Data analytics, Artificial Intelligence (AI) has emerged as a critical enabler of advanced audit applications. Contemporary research distinguishes between

rule-based automation, machine learning systems, and generative AI, each representing increasing levels of cognitive delegation in auditing processes (J. Santos & Leite, 2023). Within the past five years, particular attention has been directed toward Large Language Models (LLMs), such as ChatGPT, due to their ability to assist in generating audit documentation, interpreting accounting standards, and supporting analytical reasoning.

Empirical findings regarding the effectiveness of AI in auditing, however, remain mixed. Mistry and Gupta (2025) find that generative AI tools perform relatively well in structured accounting tasks governed by clear IFRS rules but demonstrate weaker performance when applied to judgment-intensive scenarios under GAAP. Similarly, Nguyen and Pham (2024) report that while LLMs can reproduce standard-based reasoning in IAS 37 cases, they struggle with contextual interpretation and ethical nuance. These findings suggest that AI systems are highly effective at pattern recognition and syntactic reasoning but remain limited in replicating the deeper conceptual reasoning associated with professional skepticism.

From a theoretical perspective, recent literature increasingly conceptualizes AI not as a replacement for auditors but as a mechanism of cognitive augmentation. Warren et al. (2023) argue that AI shifts the auditor's role from direct verifier toward interpreter of algorithmic outputs. This transformation introduces new professional risks, particularly automation bias, whereby auditors may over-rely on system-generated conclusions. Tang and Karim (2024) provide empirical evidence supporting this concern, demonstrating that auditors are significantly less likely to challenge audit conclusions when results are labeled as "AI-verified." These findings highlight the need to reconsider the boundaries between human judgment and algorithmic authority in contemporary auditing environments.

2.1.3 Institutional Adaptation: Education, Regulation, and Professional Structures

Despite rapid technological innovation, institutional adaptation within the auditing profession has progressed at a slower pace. Recent studies consistently report a growing misalignment between technological capability and institutional readiness. Hassan and Al-Qudah (2024), examining emerging economies, find that the adoption of AI in accounting practices is frequently driven by legitimacy-seeking behavior rather than substantive capability development. This phenomenon suggests that technological adoption may serve symbolic purposes, allowing organizations to signal innovation without fundamentally transforming audit methodologies.

Educational systems represent a major bottleneck in addressing this gap. Rahman and Abdullah (2024) and Kim and Yoon (2024) show that most accounting curricula remain heavily oriented toward procedural compliance and traditional auditing techniques, providing limited exposure to data analytics, algorithmic reasoning, or AI ethics. As a result, newly qualified auditors may possess strong technical accounting knowledge but lack the competencies required to critically interpret AI-generated outputs. This skills gap may increase reliance on technological systems while simultaneously weakening the profession's capacity for independent judgment.

Regulatory frameworks further complicate institutional adaptation. Although international auditing standards have begun acknowledging the relevance of data analytics, explicit guidance on the use of AI-generated audit evidence remains limited. Power (2024) argues that regulators face a structural dilemma: rapidly evolving technologies make detailed regulation difficult, yet regulatory silence creates ambiguity regarding accountability and professional responsibility. In response, emerging research on AI governance suggests that assurance practices may need to extend beyond auditing financial data to include the auditing of algorithmic systems themselves (Mökander, 2024).

2.1.4 Epistemic and Ethical Governance in Data-Driven Auditing

Recent literature increasingly emphasizes the epistemic and ethical implications of AI-driven auditing. Scholars argue that algorithmic assurance introduces what (Power, 2024) describes as an "epistemic inversion," where auditors no longer directly observe audit evidence but instead rely on representations generated through algorithmic models. This shift challenges fundamental assumptions about audit objectivity, independence, and professional skepticism.

Ethical governance has therefore become a central concern in discussions of data-driven auditing. Wu and Zhang (2023) propose that auditing systems in the AI era must incorporate principles of transparency, explainability, and accountability within their technological architecture. Without such safeguards, audit processes risk becoming opaque and difficult to challenge, potentially undermining public trust in the auditing profession. Similarly, Salar and Umer (2024) highlight growing concerns regarding data privacy and informed consent, particularly when audits rely on external and non-financial data sources.

Recent conceptual frameworks advocate embedding ethical oversight directly into audit infrastructures rather than treating it as an ex post control mechanism. Santos and Pereira (2024) argue that ethical reflexivity must become an integral component of audit system design, ensuring that technological innovation remains aligned with institutional responsibilities and societal expectations.

2.1.5 Conceptual Synthesis and Research Gap

Synthesizing the recent literature reveals that research on Big Data and AI in auditing remains fragmented across three primary dimensions: technological capability, institutional readiness, and epistemic governance. While technological studies primarily focus on analytical tools and efficiency gains, institutional research emphasizes regulatory challenges and skill development, and ethical discussions concentrate on accountability and transparency concerns. However, relatively few studies integrate these dimensions within a unified analytical framework.

This fragmentation suggests that current research often treats technological adoption as a purely technical process, overlooking the broader socio-technical dynamics that shape the evolution of auditing practices. In particular, limited attention has been devoted to understanding how technological infrastructures interact with institutional structures and ethical governance mechanisms in transforming professional judgment and audit accountability.

Responding to this gap, the present study proposes the Big Data Auditing Framework (BDAF), which conceptualizes audit transformation as the dynamic interaction between Technological Infrastructure, Institutional Adaptation, and Epistemic Governance, moderated by Ethical and Regulatory Oversight. By synthesizing insights from recent Scopus-indexed studies, this framework provides an integrative theoretical perspective for understanding how Big Data reconfigures auditing practices, professional judgment, and accountability in the digital era.

2.2 Review of Empirical Studies

Recent empirical studies demonstrate that Big Data enables a transition from traditional sample-based auditing toward population-level analysis and continuous assurance. Dong et al. (2024) find that advanced analytics allow real-time anomaly detection, thereby reducing detection risk and improving audit coverage. Similarly, Yuan and Huang (2024) show that audit evidence is increasingly derived from probabilistic signals generated through complex data models.

However, empirical findings on AI effectiveness remain mixed. Mistry and Gupta (2025) report that generative AI performs well in structured, rule-based accounting tasks but shows limitations in judgment-intensive contexts. Nguyen and Pham (2024) similarly

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find that while AI can replicate standard-based reasoning, it struggles with contextual interpretation and ethical nuance. These findings indicate that AI excels in pattern recognition but remains limited in supporting deeper professional skepticism.

Other studies highlight behavioral implications. Tang and Karim (2024) provide evidence of automation bias, where auditors are less likely to challenge conclusions labeled as AI-generated. This raises concerns about over-reliance on algorithmic outputs and reduced critical judgment.

At the institutional level, empirical research reveals a persistent gap between technological advancement and readiness. Rahman and Abdullah (2024) and Kim and Yoon (2024) show that accounting education remains focused on procedural compliance, limiting exposure to data analytics and AI ethics. Furthermore, regulatory ambiguity persists, as standards provide limited guidance on AI-generated audit evidence (Power, 2024).

Despite these insights, prior studies tend to focus on isolated dimensions—either technological performance, human behavior, or institutional constraints—without integrating them into a comprehensive analytical framework.

2.3 Identification of the Research Gap

The synthesis of recent literature reveals a significant fragmentation across three primary dimensions: technological capability, institutional adaptation, and epistemic governance. While technological studies emphasize efficiency and analytical improvements, institutional research focuses on regulatory and educational challenges, and ethical discussions highlight transparency and accountability concerns.

However, limited research integrates these dimensions into a unified perspective. Existing studies often treat technological adoption as a purely technical process, overlooking the broader socio-technical interactions that shape audit transformation. In particular, insufficient attention has been given to how technological infrastructures interact with institutional structures and ethical governance mechanisms in redefining professional judgment and audit accountability.

This gap indicates the need for an integrative framework that captures the dynamic interplay between technology, institutions, and governance in contemporary auditing environments.

2.4 Development of the Conceptual Framework

Based on the identified gap, this study proposes the Big Data Auditing Framework (BDAF), which conceptualizes audit transformation as a dynamic interaction among three core dimensions:

- **Technological Infrastructure**
  Refers to the adoption of Big Data analytics and AI systems that enhance audit efficiency, enable real-time analysis, and expand audit scope.
- **Institutional Adaptation**
  Encompasses the readiness of education systems, regulatory frameworks, and professional structures to support technological integration.
- **Epistemic Governance**
  Relates to how audit knowledge is generated, validated, and interpreted in algorithm-driven environments, including issues of transparency, explainability, and accountability.

These relationships are further influenced by Ethical and Regulatory Oversight, which acts as a moderating mechanism ensuring that technological adoption aligns with professional standards and societal expectations. The framework emphasizes that audit transformation is not driven solely by technology but emerges from the interaction between technological capabilities, institutional readiness, and governance structures.

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2.5 Hypotheses Development (Research Propositions)

Based on the conceptual framework, this study proposes the following research propositions:

P1: Technological Infrastructure significantly transforms auditing practices by enabling data-driven, real-time, and population-level audit processes.

P2: Institutional Adaptation influences the effectiveness of technology adoption in auditing by shaping auditors' competencies and organizational readiness.

P3: Epistemic Governance affects how auditors interpret and validate AI-generated audit evidence, particularly in relation to professional judgment and skepticism.

P4: Ethical and Regulatory Oversight moderates the relationship between technological infrastructure and audit outcomes by ensuring transparency, accountability, and trust.

3. Research Methods

3.1 Research Design

This study employs a Systematic Literature Review (SLR) approach to consolidate and critically examine how Big Data has been integrated into auditing as both a technological tool and an epistemic transformation. The SLR design is particularly suitable for this study because research on Big Data auditing remains conceptually fragmented across accounting, information systems, and organizational studies.

The study adopts an interpretivist epistemological perspective, recognizing that knowledge about Big Data auditing is constructed through academic discourse, professional practices, and regulatory developments rather than discovered as purely objective facts (Creswell, 2014). Accordingly, this research does not aim to estimate statistical relationships but to interpret conceptual developments and theoretical implications regarding how Big Data reshapes assurance practices.

3.2 Research Context and Setting

The study is situated within the domain of auditing and assurance in the digital era, focusing on the intersection of Big Data, artificial intelligence, and audit practices. Rather than being limited to a specific organization or geographical area, this research draws from global scholarly discourse, particularly from high-quality international journals indexed in Scopus and related databases.

This broad context is appropriate because the transformation of auditing driven by Big Data is a global phenomenon, affecting professional standards, regulatory frameworks, and audit practices across jurisdictions.

3.3 Population and Sample / Research Participation

The population of this study consists of academic publications addressing Big Data, data analytics, artificial intelligence, and auditing. The sample was selected using a purposive sampling technique based on predefined inclusion and exclusion criteria. The initial search identified 96 publications published between 2015 and 2025. After applying the screening process, 43 studies were shortlisted, and further full-text evaluation resulted in 30 core articles included in the final analysis. This sample size is considered sufficient for thematic synthesis, as it captures a diverse range of conceptual and empirical perspectives relevant to Big Data auditing.

3.4 Data Sources and Data Collection

Data were collected from multiple reputable academic databases to ensure comprehensive coverage and minimize publication bias. These databases include:

- Scopus
- Web of Science
- ScienceDirect (Elsevier)
- Emerald Insight
- Taylor & Francis Online
- American Accounting Association (AAA)

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Library

The search strategy employed Boolean keyword combinations:
("Big Data" or "data analytics" or "AI" OR "digital audit") and ("audit" OR "assurance" OR "auditing" OR "internal audit")

The selection process followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses**)** framework, consisting of identification, screening, eligibility, and inclusion stages. Only peer-reviewed journal articles written in English and available in full text were included.

3.5 Measurement of Variabels and Research Instruments

Rather than using numerical variables, this study operationalizes key concepts through thematic constructs derived from prior literature. Each selected article was coded based on four analytical dimensions:

- Bibliographic information
- Research objectives and scope
- Methodological characteristics
- Underlying theoretical perspectives

A coding matrix developed in Microsoft Excel was used as the primary analytical instrument. The coding process followed a two-cycle approach, involving initial identification of keywords and subsequent grouping into higher-order conceptual categories.

3.6 Data Analysis Techniques

The study employs a thematic synthesis approach following Thomas and Harden (2008), which consists of three stages:

- Extracting relevant findings from each study
- Organizing findings into descriptive categories
- Developing higher-level analytical themes

This process resulted in three dominant themes:

- Technological Transformation
- Institutional Adaptation
- Epistemic and Ethical Governance

These themes were further integrated with theoretical perspectives such as Institutional Theory and Critical Realism to develop the Big Data Auditing Framework (BDAF).

3.7 Validity, Reliability, and Trustworthiness

To ensure research quality, several strategies were applied:

- **Credibility**: Achieved through systematic selection using PRISMA and inclusion of peer-reviewed journal articles.
- **Dependability**: Ensured by a transparent and replicable coding procedure.
- **Confirmability**: Strengthened through iterative recoding and cross-checking of thematic classifications.

Additionally, a quality appraisal was conducted based on journal reputation (SJR and ABS rankings), methodological rigor, and citation relevance. Out of 30 articles, 21 were published in Q1–Q2 journals, ensuring high-quality evidence.

3.8 Ethical Considerations

This study relies exclusively on secondary data from published academic sources, and therefore does not involve human participants. Nonetheless, ethical standards are maintained by ensuring proper citation, avoiding plagiarism, and accurately representing the findings of prior studies.

3.9 Research Procedure

The research process was conducted in several stages:

- Formulation of research objectives and questions
- Systematic literature search across selected databases
- Screening and selection using PRISMA guidelines
- Data extraction and coding using a structured matrix
- Thematic synthesis and interpretation
- Development of the conceptual framework (BDAF)

This structured procedure ensures transparency and replicability.

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3.10 Methodological Limitations

Despite its rigor, this study has several limitations:

- The review includes only English-language, peer-reviewed articles, potentially excluding relevant non-English or practitioner-based insights.
- The dominance of studies from developed countries may introduce contextual bias, limiting generalizability to emerging economies.
- The interpretivist approach involves subjective interpretation, meaning that alternative researchers may derive different thematic classifications.

However, these limitations are consistent with qualitative interpretive research and do not undermine the study's theoretical contribution.

4. Results and Discussion

4.1 Research Results

4.1.1 Sample Description and Descriptive Overview

The final dataset consists of 30 peer-reviewed articles published between 2015 and 2025. These studies were selected through a systematic screening process based on PRISMA guidelines. The distribution of studies reflects the growing scholarly attention to Big Data and AI in auditing, particularly after 2020.

The reviewed articles were categorized into three main analytical themes:

- Technological Transformation (12 studies; 40%)
- Institutional Adaptation (9 studies; 30%)
- Epistemic and Ethical Governance (9 studies; 30%)

This distribution indicates that technological aspects dominate current research, while institutional and governance dimensions receive comparatively less attention.

4.1.2 Data Quality and Preliminary Analysis

All selected articles met the inclusion criteria of being peer-reviewed, written in English, and published in reputable journals. A quality appraisal showed that:

- 21 articles were published in Q1–Q2 journals
- 9 articles were conceptual or emerging contributions

The coding process demonstrated consistency through iterative validation, ensuring reliability in thematic classification.

4.1.3 Main Analytical Results

The thematic synthesis identified three dominant patterns:

1) Technological Transformation

The literature shows a transition from traditional audit tools toward advanced analytics, machine learning, and generative AI. Auditing has shifted from sample-based verification to population-level analysis and continuous auditing systems.

2) Institutional Adaptation

Studies reveal uneven adaptation across firms, educational institutions, and regulatory bodies. Large firms lead technological adoption, while smaller firms face resource constraints. Educational and regulatory systems lag behind technological developments.

3) Epistemic and Ethical Governance

The findings highlight increasing concerns about transparency, accountability, and professional skepticism in AI-assisted auditing. Issues such as automation bias and lack of explainability emerge as critical risks.

4.1.4 Key Findings

Based on the analysis, the study identifies several key findings:

- Big Data and AI significantly transform auditing practices by enabling real-time, data-driven analysis.
- Institutional readiness remains insufficient to fully support technological transformation.
- AI introduces epistemic challenges that affect professional judgment and skepticism.
- Ethical and regulatory mechanisms are not yet fully developed to govern AI-based auditing.

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4.1.5 Visual Presentation of Results

Figure 1 presents the distribution of reviewed studies across the three research themes (2015–2025), showing the dominance of technological research.

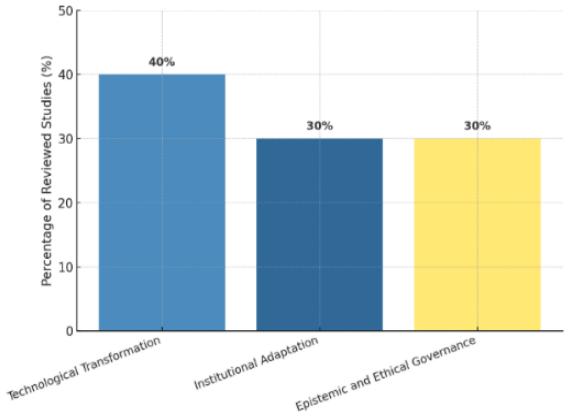

Figure 1. Distribution of Reviewed Studies by Research Theme (2015–2025)

Table 1. summarizes the Big Data Auditing Framework (BDAF)

Pillar	Core Functions	Risks When Weak
Technological Capability	Infrastructure, data integration, AI application	Bias, inefficiency, opacity
Institutional Readiness	Education, standards, culture	Symbolic adoption, legitimacy issues
Epistemic Governance	Skepticism, transparency, ethics	Trust erosion, accountability gaps

4.2 Research Discussion

4.2.1 Interpretation of Key Findings

The findings of this study indicate that the transformation of auditing driven by Big Data and artificial intelligence (AI) extends beyond procedural efficiency toward a fundamental reconfiguration of the epistemic foundations of assurance. Traditionally, auditing has been grounded in a verification-based paradigm relying on sampling, documentary evidence, and retrospective validation. However, recent developments demonstrate a shift toward data-intensive, real-time, and predictive auditing practices (Dong et al., 2024; Yuan & Huang, 2024).

This transformation introduces what Power (2024) conceptualizes as an epistemic inversion, in which auditors no longer directly observe audit evidence but instead interpret representations generated through algorithmic systems. As highlighted by Warren et al. (2023), AI transforms the auditor's role from a verifier of transactions into an interpreter of algorithmic outputs. Consequently, audit evidence is increasingly constructed through probabilistic models and analytical systems rather than direct observation.

The emergence of generative AI further intensifies this shift. Studies show that tools such as ChatGPT are capable of generating audit documentation, interpreting accounting standards, and supporting analytical reasoning (Leocádio et al., 2025; Eulerich et al., 2024). However, empirical evidence also reveals that while these systems can simulate reasoning, they lack deeper conceptual understanding, particularly in judgment-intensive contexts (Fabio et al., 2024; Leitner-Hanetseder et al., 2025). This finding underscores that technological advancement fundamentally alters not only audit procedures but also the nature of professional judgment.

4.2.2 Comparison with Previous Studies

The results of this study are consistent with prior research emphasizing the efficiency gains enabled by Big Data and analytics in auditing (Appelbaum et al., 2017; Tang & Karim, 2018). These studies demonstrate how data analytics expands audit coverage, enhances anomaly detection, and supports automation of routine processes.

More recent studies reinforce this perspective by showing that AI enables real-time analysis and predictive capabilities (Dong et al., 2024; Yuan & Huang, 2024). However, this study extends the literature by identifying emerging tensions that accompany these technological advancements.

Specifically, empirical evidence highlights the risk of automation bias, where

auditors are less likely to challenge conclusions labeled as AI-generated (Brown-Liburd & Vasarhelyi, 2023; Tang & Karim, 2024). This finding is consistent with concerns raised by Nguyen and Pham (2024), who report that AI systems struggle with contextual interpretation and ethical nuance despite strong performance in rule-based tasks.

Furthermore, case-based evidence such as the Uniper case demonstrates that while generative AI can improve efficiency in documentation, it also introduces risks of hallucination and misinterpretation (Ballantine et al., 2024). Collectively, these findings suggest that technological advancements simultaneously enhance audit capabilities while introducing new vulnerabilities related to opacity, reliability, and professional skepticism.

4.2.3 Theoretical Contributions

This study contributes to the literature by advancing the Big Data Auditing Framework (BDAF) as an integrative socio-technical model. The framework synthesizes three key dimensions identified in prior research:

- Technological Capability, reflecting the role of Big Data, analytics, and AI in transforming audit processes (Appelbaum et al., 2017; Dong et al., 2024)
- Institutional Readiness, encompassing education, regulation, and professional structures that shape technology adoption (Hassan & Al-Qudah, 2024; Kim & Yoon, 2024)
- Epistemic Governance, addressing how knowledge is generated, interpreted, and validated in algorithm-driven environments (Power, 2024; Wu & Zhang, 2023)

The findings demonstrate that these dimensions are interdependent rather than independent. Technological advancements without institutional support may lead to superficial adoption, while the absence of epistemic governance undermines trust and accountability.

By integrating these dimensions, the BDAF extends prior research that has largely treated technological, institutional, and ethical aspects in isolation (Ali & Noor, 2024; Isa & Subramanian, 2024). This study therefore provides a more comprehensive theoretical explanation of how auditing evolves as a socio-technical system.

4.2.4 Practical and Policy Implications

The findings of this study have important implications for practitioners, educators, and regulators.

For audit practitioners, the results emphasize the need to balance technological adoption with professional skepticism. While AI enhances analytical capabilities, over-reliance on algorithmic outputs may weaken critical judgment. As noted by Tang and Karim (2024), auditors are less likely to challenge AI-generated results, highlighting the need for enhanced vigilance.

For educational institutions, the findings confirm the existence of a significant skills gap. Studies show that accounting curricula remain heavily oriented toward procedural compliance, with limited emphasis on data analytics and AI ethics (Rahman & Abdullah, 2024; Kim & Yoon, 2024). This gap may lead to increased dependence on technology without sufficient understanding of its limitations.

For regulators, the study highlights the lack of clear guidance on AI-generated audit evidence. Power (2024) argues that regulatory ambiguity creates uncertainty regarding accountability, particularly in algorithmic contexts. Emerging research further suggests the need to extend assurance practices to include the auditing of algorithmic systems themselves (Mökander, 2024).

These implications indicate that effective audit transformation requires coordinated development across technology, institutions, and governance frameworks.

4.2.5 Integration with the Research Gap

This study directly addresses the research gap identified in the literature review, namely the fragmentation of research across technological, institutional, and ethical

dimensions. Previous studies have tended to focus on these aspects separately, limiting their ability to explain the complexity of audit transformation (Ali & Noor, 2024; Isa & Subramanian, 2024).

By synthesizing these perspectives, this study demonstrates that auditing must be understood as a multi-dimensional socio-technical phenomenon, where outcomes are shaped by interactions between systems, structures, and knowledge practices. This integrative approach provides a more robust explanation of how Big Data and AI reshape auditing practices and professional judgment.

4.2.6 Acknowledgement of Study Limitations

While the findings provide important insights, they should be interpreted with caution. The analysis is based on a limited set of 30 articles, which may not fully capture all developments in Big Data auditing. Additionally, the interpretive nature of the study means that alternative analytical perspectives may yield different conclusions.

However, these limitations are consistent with interpretive research and do not diminish the study's contribution in providing a theoretically grounded synthesis of the literature.

5. Conclusion

5.1 Summary of Key Findings

This study systematically examined how Big Data and advanced analytics are transforming auditing practices, professional judgment, and institutional accountability. By synthesizing evidence from thirty peer-reviewed journal articles published between 2015 and 2025, the study demonstrates that the digital transformation of auditing represents not merely a technological enhancement but a broader institutional and epistemic shift within the profession.

The findings reveal three key patterns. First, auditing is increasingly shifting from traditional sample-based verification toward data-driven and continuous assurance models. Big Data analytics and artificial intelligence enable auditors to perform population-level testing and detect anomalies in near real time, significantly expanding audit scope and analytical capacity. Second, institutional adaptation remains uneven. While technological capabilities continue to develop rapidly, educational systems, professional training, and regulatory frameworks have not progressed at the same pace, resulting in capability gaps and regulatory ambiguity. Third, the literature highlights emerging epistemic and ethical challenges. As algorithmic systems increasingly mediate audit evidence and professional judgment, auditors face new risks related to automation bias, transparency, and accountability.

5.2 Theoretical Contributions

This study contributes to the literature by proposing the Big Data Auditing Framework (BDAF) as an integrative conceptual model that links technological capability, institutional readiness, and epistemic governance. By synthesizing these dimensions within a unified perspective, the study extends prior research that has largely examined technological, institutional, and ethical aspects in isolation.

The findings demonstrate that auditing transformation should be understood as a socio-technical and epistemic process, rather than a purely technological development. In particular, the inclusion of epistemic governance as a core dimension provides a novel contribution by emphasizing how audit knowledge is constructed, interpreted, and validated in algorithm-driven environments. This perspective refines existing theoretical frameworks and addresses the research gap related to the fragmentation of prior studies.

5.3 Practical and Policy Implications

The findings of this study offer several important implications for practice and policy.

For audit firms, the results highlight the need to integrate technological innovation with strong professional judgment and governance mechanisms. The adoption of AI-supported audit procedures should be accompanied by

safeguards to mitigate automation bias and ensure transparency in decision-making processes.

For educational institutions, the study underscores the urgency of reforming accounting and auditing curricula. Integrating data analytics, artificial intelligence literacy, and ethical reasoning is essential to prepare future auditors for increasingly complex and data-driven environments.

For regulators and standard-setters, the findings suggest the importance of developing clearer guidance regarding the use of AI-generated audit evidence and the governance of algorithmic systems. Establishing standards that address accountability, explainability, and validation of AI outputs is critical to maintaining trust in the auditing profession.

5.4 Limitations of the Study

This study acknowledges several limitations that may affect the interpretation and generalizability of the findings. The review focuses on peer-reviewed journal articles published between 2015 and 2025 and therefore may not fully capture emerging practices that have not yet been documented in academic literature.

In addition, the predominance of studies conducted in technologically advanced contexts may limit the applicability of the findings to developing economies, where institutional readiness, regulatory frameworks, and technological infrastructure may differ significantly. These limitations suggest that the findings should be interpreted within the context of the available literature rather than as universally generalizable conclusions.

5.5 Directions for Future Research

Future research should extend this study by exploring Big Data auditing practices across diverse institutional and geographical contexts, particularly in emerging economies where technological adoption may follow different trajectories.

Further studies are also encouraged to employ empirical methodologies such as field studies, experiments, or longitudinal analyses to examine how auditors interact with algorithmic systems in real-world settings. Such approaches would provide deeper insights into behavioral dynamics, decision-making processes, and the practical implications of AI integration in auditing.

Additionally, future research may investigate the development of governance frameworks for AI in auditing, including mechanisms for ensuring transparency, accountability, and ethical compliance. Expanding the theoretical and empirical understanding of these issues will be essential for supporting the sustainable evolution of auditing in data-intensive environments.

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