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Critical Evaluation of the Use of Artificial Intelligence in Auditing: A Systematic Literature Review of Research Trends, Methodological Approaches, and Gaps

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Abstract

This study aims to analyze the development, trends, methodological approaches, and research gaps related to the use of Artificial Intelligence (AI) in auditing through a systematic literature review. The study employs the Systematic Literature Review (SLR) method following PRISMA guidelines, using data retrieved from the Scopus database based on keywords related to AI and auditing. The selection process resulted in 28 articles, which were analyzed using descriptive and thematic approaches. The findings indicate that the use of AI in auditing has increased significantly since 2020, with a primary focus on fraud detection, risk assessment, predictive analytics, and enhancing audit quality. The dominant approach is quantitative, particularly those based on machine learning, complemented by qualitative, mixed-methods, and conceptual studies. In addition, several key challenges were identified, including ethical concerns, transparency issues, data quality, and methodological limitations. Furthermore, this study reveals gaps in the integration of technical, behavioral, and regulatory aspects within the existing literature. In conclusion, AI plays a strategic role in the transformation of modern auditing; however, its implementation still requires further strengthening in methodological, ethical, and practical dimensions.

Keywords: Artificial Intelligence, Audit, Machine Learning, Systematic Literature Review,

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Quality Audit, Research Gap

INTRODUCTION

The development of digital technology, particularly Artificial Intelligence (AI), has brought significant transformations across various fields, including accounting and auditing. In recent years, the role of AI in auditing has evolved from a supporting tool into a strategic component that enhances the efficiency, accuracy, and overall quality of audit processes. Prior studies indicate that AI enables auditors to process large volumes of data rapidly and accurately, while also facilitating predictive analytics that were previously difficult to achieve using conventional methods (Huang et al., 2022). For instance, machine learning and data analytics allow auditors to perform full-population testing, thereby replacing traditional sampling approaches.

Moreover, the concept of Technological Process Reframing, introduced by Issa et al., (2016), suggests that AI has shifted the audit paradigm from a retrospective approach toward a real-time, data-driven process. This transformation is further supported by Abdo-Salloum & Chehade (2026), who find that AI significantly improves financial reporting quality and fraud detection capabilities. Therefore, AI not only enhances operational efficiency but also transforms the auditor's role into a more strategic and analytical function. These developments indicate that AI has become an essential element in modern auditing practices. Consequently, studying the use of AI in auditing is increasingly important for understanding its dynamics and implications.

Alongside these developments, research on AI in auditing has become increasingly complex and multidimensional. Existing studies show that AI is not only used to improve efficiency but also to support audit decision-making through predictive analytics and risk detection. For example, studies by Zhang (2022), Fang (2022), and Mabelane et al. (2023) demonstrate that machine learning improves accuracy in fraud detection and audit outcome prediction. Similarly, Wang & Yan (2025) show that AI can identify opinion shopping practices with high accuracy. Other studies, such as those by Spinelli et al. (2025) and Allozi et al. (2025), highlight the positive impact of AI on audit quality and tax compliance.

On the other hand, studies by Rikhardsson et al. (2022) and Estep et al. (2024) emphasize the importance of human factors, such as auditor perception and trust, in the successful implementation of AI. This indicates that AI research in auditing encompasses not only technical aspects but also behavioral and organizational dimensions. As a result, current research trends reflect a shift toward a more holistic perspective that integrates technology, human factors, and organizational contexts. Therefore, a systematic review is necessary to identify patterns and

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directions in this evolving body of literature.

Despite the significant benefits identified, several challenges and limitations remain. One of the primary concerns relates to ethical and transparency issues in AI implementation. Research by Munoko et al. (2020) highlights risks such as algorithmic bias, lack of explainability, and accountability issues in audit decision-making. Similarly, Lehner et al. (2022) and Schiff et al. (2024) note that low transparency in AI models may reduce auditors' trust. Data quality and model complexity also pose significant challenges, as the accuracy of AI outcomes heavily depends on the quality of input data (Kokina et al., 2025; Zhang, 2022; Fang, 2022).

Furthermore, prior studies point to methodological limitations, including insufficient transparency and reproducibility (Destefanis et al., 2026; Prokofieva, 2023). Concerns also arise regarding the impact of AI on the auditing profession, particularly the potential displacement of human roles and the need for new competencies. Thus, while AI offers substantial potential, its implementation in auditing continues to face complex technical, ethical, and methodological challenges.

In addition to these challenges, there remains a significant research gap in the existing literature. One key gap is the limited integration between technical and behavioral perspectives. Most studies focus on developing machine learning models to improve audit accuracy but pay limited attention to human factors such as auditor perception, trust, and readiness. Conversely, studies that emphasize behavioral aspects often lack an in-depth discussion of technical implementation. Moreover, many studies are conducted within specific contexts—such as particular industries or countries—thereby limiting the generalizability of findings (Allozi et al., 2025; Musa & Lefkir, 2024).

Conceptual studies also remain limited in empirical validation (Leocádio et al., 2024). Additionally, the integration of ethical and governance aspects has not been comprehensively addressed, despite partial discussion in several studies (Han et al., 2023; Lehner et al., 2022; Munoko et al., 2020). Therefore, there is a need for research that integrates these diverse dimensions within a comprehensive analytical framework.

Given these research gaps, this study is important for providing a more comprehensive understanding of AI use in auditing. This study aims to systematically examine the development, trends, and focus of AI research in auditing, as well as to evaluate the methods and approaches employed. Furthermore, it identifies key challenges, limitations, and research gaps and proposes directions for future research. By adopting a systematic literature review approach, this study synthesizes prior findings to identify patterns and relationships across studies. This approach also

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enables an evaluation of the quality and methodological consistency of existing research. Ultimately, this study contributes to the advancement of both academic literature and practical applications of technology-driven auditing.

METHODS

This study employs a Systematic Literature Review (SLR) approach to comprehensively identify, evaluate, and synthesize the existing literature on the use of Artificial Intelligence (AI) in auditing. The research design follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure transparency and replicability of the review process.

The research sample consists of scientific articles retrieved from the Scopus database using the keywords “Artificial Intelligence Auditing” and “Machine Learning Audit.” The initial search yielded 117 articles, which were subsequently filtered using predefined inclusion and exclusion criteria, including publication year, journal quality (Q1 and Q2), and availability of abstracts. After excluding irrelevant studies and those that did not meet the quality criteria, 28 articles were selected as the final sample. This selection process ensures that the analyzed literature is both academically rigorous and relevant to the research topic. Moreover, this approach aligns with prior studies emphasizing the importance of transparency and reproducibility in AI-based research (Destefanis et al., 2026).

The research instrument used in this study is an SLR protocol, which includes inclusion and exclusion criteria, data extraction forms, and a thematic analysis framework. Data extracted from each article include publication year, research method, type of AI used, audit context, key findings, and study limitations. The data collection procedure follows a structured process consisting of identification, screening, eligibility, and inclusion stages, in accordance with the PRISMA framework. During the screening stage, articles are evaluated based on titles and abstracts to ensure relevance. Subsequently, full-text reviews are conducted during the eligibility stage to confirm alignment with the research objectives and questions. This iterative process minimizes selection bias and ensures consistency in study selection.

The data analysis employs both descriptive and thematic approaches to identify patterns, trends, and research gaps. Descriptive analysis examines the distribution of studies by publication year, methodology, and research focus, revealing a notable increase in AI-related auditing research in recent years. Meanwhile, thematic analysis is applied to categorize findings into key themes, including AI application trends, methodological approaches, and emerging challenges and

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research gaps.

RESULTS

1. Distribution and General Characteristics of Research

The identification process yielded a total of 117 articles from the Scopus database. Following the screening stage based on predefined inclusion and exclusion criteria, 28 studies were selected for the final analysis. The distribution of publications over time indicates that research on AI in auditing has increased significantly since 2020. During the early period (2012–2017), the number of publications was limited and sporadic. A gradual increase began in 2019 and 2020, reflecting growing scholarly interest in the application of AI in auditing. This trend became more pronounced between 2022 and 2025, with the number of publications rising consistently each year. Notably, 2025 recorded the highest number of publications during the observed period. These findings suggest a substantial growth in academic interest in AI-driven auditing in recent years. Furthermore, most of the selected studies were published in highly reputable journals classified in the Q1 and Q2 categories, indicating the strong academic quality of the literature analyzed.

2. Research Methods and Approaches

The synthesis results indicate that research on AI in auditing employs a wide range of methodological approaches. Quantitative methods, particularly those based on machine learning, represent the most dominant approach in the analyzed studies. Several studies utilize algorithms such as neural networks, random forests, and support vector machines to analyze audit data (Zhang, 2022; Fang, 2022; Mabelane et al., 2023; Wang & Yan, 2025). In addition, some studies apply traditional statistical techniques, such as logistic regression, for audit-related analysis. Qualitative approaches are also used in several studies, including interviews and surveys (Kokina et al., 2025; Rikhardsson et al., 2022). Mixed-methods approaches are identified in studies that combine surveys and experimental designs. Conceptual studies develop theoretical frameworks related to the use of AI in auditing (Estep et al., 2024; Leocádio et al., 2024; Han et al., 2023). Other studies employ multi-criteria decision-making techniques (Hu et al., 2021).

3. Types of Artificial Intelligence Technology Used

he results show that various types of AI technologies are used in auditing contexts. Machine learning is the most widely applied technology in the analyzed studies. Commonly used algorithms include artificial neural networks, decision trees, random forests, support vector machines, and logistic regression. In addition, data analytics represents a key component in the

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application of AI in auditing. Several studies also employ data mining techniques and Bayesian networks for risk analysis (Zhang, 2022; Hedback, 2025). The use of natural language processing (NLP) is identified in studies that analyze audit report texts. Furthermore, some studies integrate AI with other technologies, such as blockchain (Han et al., 2023). The application of deep learning remains relatively limited and is largely still in the development stage. Additionally, some studies adopt hybrid approaches that combine multiple algorithms to improve accuracy.

4. Focus and Areas of AI Application in Auditing

The synthesis results show that AI is applied across various areas of auditing. One of the primary applications is fraud and anomaly detection in financial statements (Mabelane et al., 2023; Wang & Yan, 2025). In addition, AI is used for risk assessment and the prediction of audit outcomes data (Zhang, 2022; Fang, 2022). The use of AI in tax audits is identified in studies reporting improvements in tax compliance (Spinelli et al., 2025; Hedback, 2025). AI is also applied in audit opinion analysis and in improving the quality of financial reporting (Allozi et al., 2025). Furthermore, several studies highlight the use of AI in continuous auditing and real-time auditing (Huang et al., 2022). AI is also utilized for data extraction and the automation of audit processes (Kokina et al., 2025).

5. Findings Related to Audit Quality and Effectiveness

The results show that the use of AI in auditing is associated with improvements in audit quality and effectiveness. Several studies indicate that AI enhances the accuracy of audit data analysis (Huang et al., 2022). In addition, AI enables auditors to conduct full-population testing, replacing traditional sampling methods. AI also improves audit efficiency through the automation of routine tasks. Furthermore, it facilitates the faster identification of risks and anomalies. Some studies report that AI enhances the quality of financial reporting (Allozi et al., 2025). In addition, AI is applied to improve tax compliance (Spinelli et al., 2025). Other studies show that AI supports audit decision-making through predictive analytics and allows auditors to process large volumes of data more efficiently. These findings indicate a relationship between the use of AI and improved audit performance.

6. Challenges and Limitations in the Use of AI

The synthesis results show that the use of AI in auditing involves various challenges. One of the main challenges relates to the quality of data used in AI models. In addition, issues of transparency and explainability in machine learning models have been identified (Lehner et al., 2022; Munoko et al., 2020). Research also indicates the risk of algorithmic bias, which may affect the accuracy of analytical results. Furthermore, challenges related to data privacy and information

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security are frequently reported. Some studies highlight that the implementation of AI can be costly (Kokina et al., 2025). There are also concerns regarding auditors' reliance on technology. In addition, limitations in AI's ability to support ethical decision-making have been identified. Challenges related to the lack of clear regulatory frameworks governing the use of AI are also evident

7. Research Gap

The results show that several gaps exist in the AI-related auditing literature. One of the primary gaps is the limited integration between technical and behavioral research aspects. In addition, research contexts remain restricted to specific sectors and regions, such as banking and SMEs. Existing studies also indicate that many conceptual works lack empirical validation. Furthermore, gaps are identified in the examination of ethical and governance aspects related to the use of AI. Methodological limitations are also evident, particularly in terms of transparency and reproducibility (Destefanis et al., 2026). In addition, cross-country and cross-sectoral studies remain limited. Gaps are also observed in the integration of AI technologies with existing audit systems, as well as in the development of comprehensive conceptual frameworks.

8. Further Research Direction

The synthesis results indicate several potential directions for future research. One key direction is the integration of technical and behavioral aspects in the use of AI. Future studies should also examine ethical and regulatory aspects in greater depth. Cross-sectoral and cross-country studies are needed to improve the generalizability of findings. In addition, there is a need to develop more robust and transparent research methods, as well as more comprehensive conceptual frameworks. Future research should further investigate the real-world implementation of AI in auditing practice. There is also a need to improve the quality of data used in AI models and to enhance auditors' competencies in applying AI technologies.

DISCUSSION

Developments, Trends, and Focus of AI Research in Auditing

The findings indicate that the use of Artificial Intelligence (AI) in auditing has increased significantly, particularly after 2020, as reflected by the growing number of publications and diversification of research topics. This finding is consistent with Issa et al. (2016), who anticipated the transformation of auditing through the concept of Technological Process Reframing, where technologies such as AI shift audit processes toward data-driven and real-time approaches. Furthermore, Huang et al. (2022) support this by demonstrating that AI enables full population

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testing, improving audit coverage and accuracy compared to traditional sampling methods. The results are also aligned with Abdo-Salloum & Chehade (2026), who highlight that AI has shifted auditing from a retrospective approach to a more proactive one in detecting risks and fraud.

Moreover, the findings reveal that the focus of AI research in auditing has evolved from operational efficiency to enhancing audit quality and predictive analytical capabilities. Studies by Zhang (2022) and Fang (2022) show that machine learning improves accuracy in risk detection and audit outcome prediction. Additionally, Mabelane et al. (2023) and Wang & Yan (2025) demonstrate that AI can effectively detect fraud and audit opinion shopping through complex data pattern analysis. These findings are further supported by Spinelli et al. (2025) and Allozi et al. (2025), who show that AI positively impacts audit quality and tax compliance. Therefore, AI is not merely a technical tool but a strategic factor in improving audit quality.

On the other hand, the findings also indicate a shift toward integrating technological aspects with human and organizational factors. Studies by Rikhardsson et al. (2022) and Estep et al. (2024) emphasize that auditors' perceptions, trust, and readiness significantly influence AI implementation. Similarly, Abdullah & Almaqtari (2024) highlight the importance of organizational readiness and perceived usefulness in AI adoption. These results suggest that AI research in auditing has become increasingly multidimensional.

The significance of these findings lies in providing a comprehensive understanding of the evolution of AI research in auditing, showing a transition from a purely technical focus to a more holistic perspective. This is important because it highlights the need for future research to integrate technological, human, and organizational dimensions. Thus, this study contributes to strengthening the understanding of technology-driven audit transformation.

Research Methods, Approaches, and Quality

The findings reveal a wide range of methods and approaches used in AI auditing research, reflecting the complexity and multidisciplinary nature of the topic. Quantitative approaches based on machine learning dominate the literature, as shown in studies by Zhang (2022), Fang (2022), and Mabelane et al. (2023), which employ algorithms such as neural networks, random forests, and support vector machines. In addition, Wang and Yan (2025) demonstrate that traditional statistical methods, such as logistic regression, remain relevant in certain contexts. This indicates that AI auditing research utilizes both advanced and conventional methods.

Qualitative and mixed-method approaches are also used to explore behavioral and organizational aspects. Kokina et al. (2025) use interviews to identify implementation challenges,

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while Rikhardsson et al., (2022) employ surveys to examine auditors' perceptions. Estep et al. (2024) show that combining methods provides a more comprehensive understanding. Conceptual studies, such as those by Leocádio et al. (2024) and Han et al. (2023), offer important theoretical frameworks, while Hu et al. (2021) demonstrate the use of multi-criteria decision-making methods to analyze AI adoption factors.

However, the findings also highlight issues related to methodological quality and consistency. Destefanis et al. (2026) show that many machine learning studies suffer from poor reporting quality and limited reproducibility. Additionally Destefanis et al. (2026) and Muñoz-Izquierdo et al. (2022) indicate that research outcomes are highly dependent on data quality. This suggests that despite AI's potential, methodological rigor remains a major challenge. Therefore, stricter methodological standards are needed to improve research validity and reliability.

The significance of these findings lies in emphasizing the importance of methodological quality in AI research. This is crucial because audit decisions based on AI must be scientifically reliable. Furthermore, the findings suggest that a multidisciplinary approach combining quantitative and qualitative methods can provide more comprehensive insights. Thus, this study contributes to improving research quality in AI auditing.

Challenges, Limitations, and Research Gaps

The findings identify several challenges and limitations in the use of AI in auditing. One major challenge relates to ethical issues and transparency. Studies by Muñoz-Izquierdo et al. (2022), Lehner et al. (2022), and Schiff et al. (2024) highlight concerns about algorithmic bias and lack of transparency in decision-making. Additionally, Kokina et al. (2025) emphasize that limited explainability can reduce auditors' trust in AI systems. These findings indicate that ethical considerations are central challenges in AI adoption in auditing.

Another limitation is the lack of integration between technical and behavioral aspects. Technical studies such as Zhang (2022) and Fang (2022) often overlook human factors, while behavioral studies like Rikhardsson et al. (2022) do not deeply address technical implementation. This reflects a gap between technological and behavioral perspectives. Moreover, studies by Allozi et al. (2025) and Musa & Lefkir (2024) show that many studies are context-specific, limiting generalizability. Conceptual studies such as Leocádio et al. (2024) and Han et al. (2023) also require stronger empirical validation.

The findings also reveal gaps in integrating ethical and governance aspects within AI research. Although Munoko et al. (2020) and Lehner et al. (2022) discuss ethical issues, these

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discussions remain general. Furthermore, Destefanis et al. (2026) highlight the overall low methodological quality in AI studies. This indicates a need for more rigorous and integrated research frameworks.

The significance of these findings lies in providing a foundation for future research. The results suggest that future studies should integrate technical, behavioral, and ethical aspects into a comprehensive framework. Additionally, cross-sectoral and cross-country studies are needed to improve generalizability. Thus, this study contributes to identifying research gaps and future research directions.

LIMITATIONS OF THE RESEARCH

This study has several limitations. First, it relies solely on the Scopus database, which may exclude relevant studies from other sources. Second, the study is limited to selected articles based on specific criteria, which may not represent the entire body of literature. Third, the SLR approach depends on the quality of the analyzed studies. Additionally, variations in methods and research contexts may influence the synthesis results. Therefore, future research should expand data sources and adopt more diverse approaches.

CONCLUSION

This study concludes that the use of Artificial Intelligence (AI) in auditing has developed significantly and reflects a fundamental transformation in modern auditing practices. Based on the systematic literature review, AI not only enhances the efficiency and accuracy of audit processes but also expands the scope of analysis through data-driven and real-time approaches, as highlighted by Issa et al. (2016) and Huang et al. (2022). Furthermore, AI has been shown to improve audit quality through predictive analytics, fraud detection, and more accurate risk identification, as supported by Zhang (2022), Fang (2022), Mabelane et al. (2023), and Wang and Yan (2025). The findings also indicate that AI has shifted the role of auditors from traditional functions to data-driven strategic analysts, consistent with Abdo-Salloum & Chehade (2026) and Leocádio et al. (2024). However, this study also identifies several challenges, including ethical concerns, algorithmic bias, lack of transparency, and methodological limitations, as discussed by Munoko et al. (2020), Lehner et al. (2022), and Destefanis et al. (2026). Therefore, this study provides an important contribution by integrating existing literature into a comprehensive understanding of AI in auditing. Its main contribution lies in identifying research trends, evaluating methodological quality, and systematically mapping research gaps, thereby offering a strong

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foundation for future research in technology-driven auditing.

Based on these findings, this study proposes several directions for future research to enrich both the literature and practice of AI-based auditing. First, future studies should integrate technical and behavioral approaches within a comprehensive research framework, as current research tends to treat these aspects separately. Second, cross-sectoral and cross-country studies are needed to enhance the generalizability of findings, given that many existing studies are limited to specific contexts such as banking or SMEs, as noted by Allozi et al. (2025) and Musa & Lefkir (2024). Third, future research should place greater emphasis on ethical, governance, and regulatory aspects of AI, particularly concerning transparency and accountability in audit decision-making. Fourth, improvements in methodological rigor are necessary, including better data transparency, reproducibility, and the use of more robust methods, as emphasized by (Destefanis et al., 2026). In addition, future studies should examine the practical implementation of AI in auditing to provide stronger empirical insights. Finally, developing auditors' competencies in AI technologies is also a critical research area, as highlighted by Prokofieva (2023), to ensure effective and sustainable digital transformation in auditing. Overall, future research is expected to provide deeper and more practical contributions to the advancement of AI-based auditing.

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