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Regulatory and Ethical Governance Framework for Implementing Artificial Intelligence in External Auditing: A Systematic Literature Review

Fony Abdullah[1)*], Herwin Mopangga[2)], Silveny Ismail[)3], Yasir M. Pidu[4)]

[1*)] Doctoral Student in Economics, Postgraduate Program, Gorontalo State University.
[2)] Doctoral Program in Economics, Postgraduate Program, Gorontalo State University.
[3)] Doctoral Student in Economics, Postgraduate Program, Gorontalo State University.
[4)] Universitas Terbuka, Gorontalo.

Abstract
This research aims to identify regulatory and ethical challenges in the application of artificial intelligence (AI) to external audit practices, as well as to develop a governance framework that ensures transparency, accountability, and algorithmic fairness. Using the Systematic Literature Review (SLR) approach based on the PRISMA 2020 model, this study examined 21 Scopus indexed scientific articles for the period 2020–2025 that were relevant to the issues of regulation, governance, and AI auditing policies. The selection process involves identifying, screening, assessing the eligibility, and inclusion of articles that fit the thematic criteria. Data analysis was carried out through thematic synthesis to group the findings into four main themes: (1) regulatory and ethical challenges, (2) gaps in international audit standards, (3) regulatory governance mechanisms, and (4) trustworthy and explainable AI policy drafts. The results show that although AI improves audit efficiency, there is no legal and professional framework capable of regulating the complexity of algorithmic decisions. In addition, auditors still face moral dilemmas and the risk of algorithmic bias due to delays in updating global audit standards. The study concludes that AI-assisted audit governance should be integrative, balancing technological efficiency and ethical responsibility through a co-auditing model that combines human oversight and algorithmic system transparency.

Keywords: *Artificial Intelligence, External Audit, Regulatory Governance, Professional Ethics, Explainable AI, Algorithmic Accountability.*

Introduction

The development of artificial intelligence (AI) technology has brought about a fundamental transformation in the external audit profession, changing the way auditors gather evidence, assess risks and compile professional opinions. The adoption of AI in auditing practices has been shown to improve the efficiency, accuracy as well as speed of financial data analysis as revealed by Kokina et al. (2025) which found that most large firms, including the Big Four group have leveraged AI at the risk analysis and anomaly detection stages. However, behind this progress comes regulatory ambiguity regarding legal responsibility for algorithm-based audit results. Boland et al. (2024) highlighting that until now supervisory agencies such as the PCAOB do not have technical guidelines governing the use of AI in the public audit process. Meanwhile, the international standard auditing (ISA) has not explicitly accommodated the new reality of smart technology-assisted auditing practices. This situation raises a professional dilemma between pursuing digital efficiency and maintaining audit integrity based on prudence and ethical responsibility.

The tension between technological innovation and legal certainty is increasingly evident in the context of global audit governance. Lehner et al. (2022) outlines that the use of AI in audit decision-making presents complex moral challenges, including algorithmic bias, auditor moral responsibility as well as social justice in machine-generated decisions. Explainable Artificial Intelligence (XAI) system as introduced by Zhang et al. (2022) seeks to bridge this gap by providing a transparent explanation of the algorithmic decision logic. However, this concept can only be effective if it is supported by a regulatory framework that ensures model openness, verification of results and professional responsibility. Research Gaebler et al. (2024) shows that AI systems even outside of the financial context can reproduce social biases based on race

and gender. This signifies that without strong ethical oversight mechanisms, AI-based audit systems risk expanding discrimination and inequality in the decision-making process. From this fact, it appears that regulatory issues are not just technical problems but epistemological and moral issues that are fundamental in the era of audit automation.

The delay of regulatory agencies in adjusting audit standards to AI developments has also worsened the situation. Boland et al. (2024) indicates that the PCAOB has only arrived at a conceptual discussion in the absence of operational guidelines that ensure the validity of the audit algorithm. Kokina et al. (2025) affirms that International Standards on Auditing (ISA) still adheres to the principles of independence and professional skepticism but has not established specific provisions regarding the role of AI-based tools. A similar thing happens at the international level in Saudi Arabia that although business organizations have a strong IT governance structure, there is no external regulatory support that is adaptive to the application of AI in audits (Abdullah & Almaqtari, 2024; Almaqtari, 2024). Research Perramon et al. (2024) in Spain shows that companies' digital readiness and government policy support are decisive factors for the success of the transformation towards continuous auditing while Amoozad Mahdiraji et al. (2022) in Iran proves that proper regulation can strengthen the link between disruptive technologies and organizational sustainability. All of these findings indicate that while AI offers high efficiency and accuracy, regulatory lags actually create legal and professional uncertainties that can threaten the credibility of external audits at the global level.

From the perspective of governance and accountability, a number of studies have confirmed the importance of multi-level oversight mechanisms that include the dimensions of technology, ethics and professionalism. Lehner et al. (2022) highlighting the need for independent testing of algorithms, documentation of system decisions and the involvement of professional ethics in the audit process. Han et al. (2023) also shows that the integration of blockchain and AI is capable of strengthening audit transparency through an immutable track record of data strengthening the principles of traceability and public trust. Almaqtari (2024) also emphasized that organizational readiness in information technology governance is the main factor in the success of AI implementation. While research Musa & Lefkir (2024) emphasized that the perception of usefulness and policy support has a direct effect on the level of auditors' acceptance of new technologies. However, without regulatory clarity, all of this potential is not enough to guarantee algorithmic accountability that is in line with the ethical responsibility of the auditor profession. Therefore, the main challenge is no longer about technological capabilities but how to create regulatory governance that can maintain a balance between innovation and public trust in audit results.

In the midst of these changes, the relationship between human judgment and algorithmic decisions has become an inevitable epistemological issue. Goto (2023) suggests that AI adoption is shifting the role of the auditor from a technical implementer to a data-driven strategic analyst, demanding the ability to assess and oversee machine-generated outcomes. However, this shift raises the risk of diminishing auditors' professional autonomy if regulations do not establish a clear boundary between AI recommendations and human decisions. Rikhardsson et al. (2022) found that even though auditors recognize the benefits of AI, they still need human validation of system decisions in order for audit results to be trusted. At the international level, it appears that regulatory agencies in seven countries are still imitating traditional audit structures to maintain independence but have not adapted these principles to the autonomous character of AI systems (Schiff et al., 2024). This condition underscores the need for policy design that allows *for co-auditing models* in which AI serves as a supporter of supervised decisions rather than a substitute for auditors' professional judgment.

Data privacy and security issues are also important dimensions in AI-assisted audit governance. Liu et al. (2024) Developing a model *Privacy-Preserving Dynamic Auditing* which emphasizes the balance between system efficiency and user privacy protection. This approach shows that regulation should not only be oriented towards the accuracy of results but also on fairness and individual rights to data. Research Xie & Zhang (2022) The developer of an intelligent data-driven risk analysis system asserts that although the AI model is capable of detecting financial irregularities in real-time, but without regulation of algorithm validation, the risk of misclassification remains high. Automated audits based on the SURF algorithm can also speed up error detection but need to be tested in a real regulatory context so as not to threaten the integrity of the audit process (Ding, 2022). These studies confirm that modern audit governance requires synergy between technological innovation, professional accountability and public ethics to ensure the sustainability of digital audit systems.

The success of AI adoption in audits is also influenced by policy readiness and inter-agency coordination. The integration of AI in the strategic management of companies can expand the risk surveillance space and strengthen organizational efficiency but will only be effective if it is supported by clear cross-sector policies (Pereira et al., 2021). Understanding of technology, managerial support and regulatory clarity are key factors in the successful implementation of *AI-enabled auditing techniques* (Hu et al., 2021). The same was found by Hooda et al. (2020) which emphasizes the importance of regulatory validation of fraud prediction models so as not to cause bias or legal implications. From these studies, it can be seen that AI-based audit systems demand adaptive policies that not only highlight aspects of efficiency but also ensure integrity, transparency and algorithmic fairness.

Based on the overall findings and gaps in the literature that have been identified, this study is directed to develop a regulatory governance framework that is able to balance the advances of artificial intelligence with the principles of ethics, transparency and accountability of the audit profession. This study seeks to answer a number of key questions that reflect the complexity of the relationship between technology, law, and the profession. First, this study examines the regulatory and ethical challenges that hinder the implementation of AI in external audit practices, including algorithmic bias and moral responsibility for machine decisions. Furthermore, this study evaluates the extent to which existing audit standards such as *the International Standards on Auditing* (ISA), PCAOB and IAI are able to accommodate AI-based audits or actually leave gaps in professional settings. The study also examines the governance mechanisms needed to ensure accountability and transparency and analyzes how regulators and professional institutions can harmonize human judgment with algorithmic decision-making. This research explores policy designs that support the application of *trustworthy* and *explainable AI* in external audits so that audit results are not only technologically efficient but also ethically and legally accountable. Thus, this research positions itself as a conceptual and systematic effort to bridge the gap between AI advances and the need for adaptive regulatory governance in the contemporary audit profession.

Research Methods

This study applies the design of *Systematic Literature Review (SLR)* with reference to the guidelines of PRISMA 2020 *(Preferred Reporting Items for Systematic Reviews and Meta-Analyses)* to ensure transparency, replication and validity of the research process (Page et al., 2021). This approach is used to critically review the literature that addresses regulatory, governance and ethical challenges in the application of artificial intelligence (AI) to external audits.

Data is obtained from the Scopus database as a primary source due to its excellence in indexing reputable international academic publications (Okoli & Schabram, 2010). The search was conducted using a combination of keywords: artificial intelligence external auditing, machine learning external audit, regulatory and governance issues, AI governance auditing, data governance auditing, intelligent audit system, assisted auditing, ethics audit, and artificial auditing intelligence.

The identification process resulted in 201 articles, then filtered to remove duplication (n=3), publications outside the 2020–2025 range (n=72), journals outside the Q1–Q4 indexed category (n=19), and articles without abstracts (n=2). The screening stage left 105 articles, which were then evaluated for their suitability with the research focus and produced 50 articles for further study. After going through the feasibility assessment stage, 19 articles were declared to meet the main criteria and 2 other articles were added from the *backward citation tracing method*, so that a total of 21 articles were analyzed in depth.

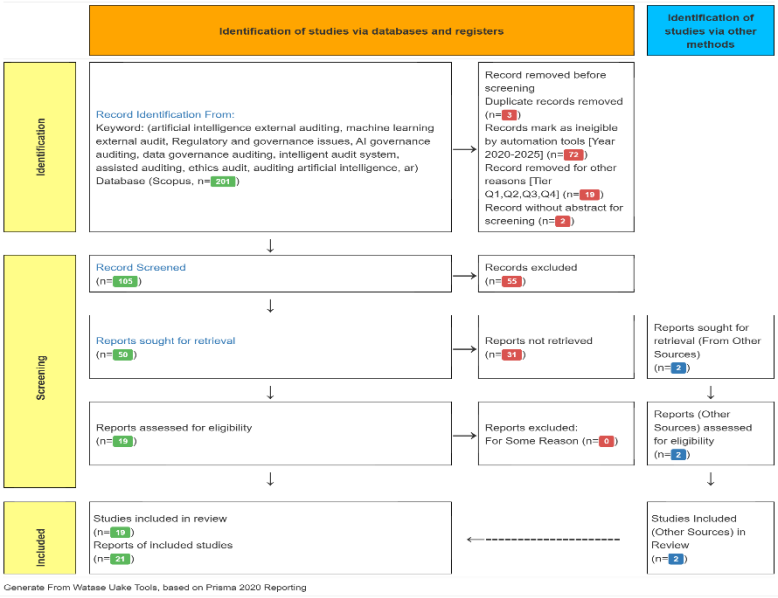

Figure 1. Literature Selection Flowchart Using PRISMA 2020 (Created with Watase Uake Tools)

The research instrument in the form of a data extraction form is used to record variables such as the theory used, the research method, location, results and limitations of each study (Okoli & Schabram, 2010). The data collection procedure is carried out through four main stages according to the PRISMA flow: identification, screening, feasibility assessment and inclusion as depicted in the PRISMA diagram (Page et al., 2021).

Data analysis was carried out with a thematic approach and a thematic *synthesis* that allowed researchers to group findings into major themes based on meaning and conceptual patterns (Thomas & Harden, 2008). This process includes three main stages: *line-by-line coding*, development *of descriptive themes*, and the formation of *analytical themes* to produce a thematic structure that represents the integration of various studies.

The four main themes identified in this study are: (1) regulatory challenges, (2) ethical and accountability dimensions, (3) governance mechanisms and (4) AI-assisted auditing policy frameworks. This thematic analysis approach is in line with the *qualitative systematic review* method as explained by Snyder (2019) which emphasizes transparency, replication and traceability of processes in formulating research themes.

This analysis process is supported by publication trend graphs that show a significant increase in the 2022–2025 period, indicating that the issue of AI governance in external audits is a rapidly growing field and is relevant to be studied in more depth (Snyder, 2019).

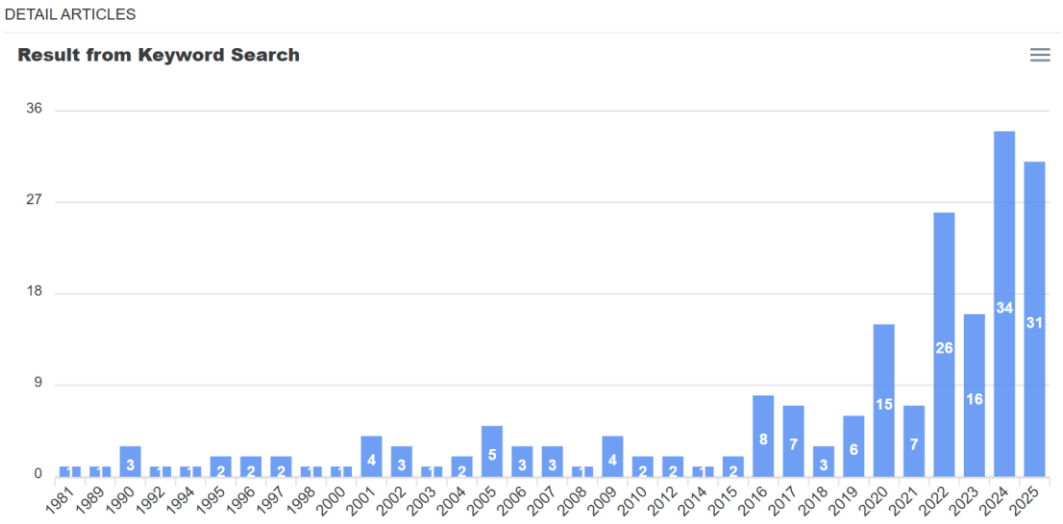

Figure 2. Publication Distribution Graph by Year (Keyword search results with Watase Uake Tools)

By following systematic, explicit and replicable methodological principles as suggested by Okoli & Schabram (2010) and PRISMA 2020 (Page et al., 2021) This study ensures the validity of the findings and makes a methodological contribution to the development of regulatory policy and ethical studies of AI in the context of external audits.

Results And Discussion

Based on the results of the selection through the *Systematic Literature Review (SLR)* stage with the PRISMA 2020 model, 21 scientific articles were obtained that met the inclusion criteria and were relevant to the topics of regulatory governance, ethics, and policies in the application of artificial intelligence (AI) for external audits. The initial identification process found 201 articles in the Scopus database, then filtered for duplication, publications outside the analysis period, and articles without abstracts, until 19 main articles and 2 additional ones from *the backward citation tracing* method remained, resulting in a total of 21 final studies analyzed. The distribution of publications shows a significant increase since 2020 with a peak of publication in 2024 of 34 articles, and this trend continues until 2025 (31 articles), illustrating the increasing academic attention to the integration of AI in external audits.

From the overall study, the results show that there are four main categories of findings that consistently emerge, namely: (1) regulatory and ethical challenges of AI application in external audits, (2) gaps and weaknesses of international audit standards for AI-based audit practices, (3) the need for regulatory governance that ensures algorithmic transparency and accountability, and (4) the design of policy frameworks to support *trustworthy* and *trustworthy AIexplainable*). These four themes are produced through a thematic synthesis process of research data coded based on theories, methods, results, and their contribution to regulatory issues.

In the first findings, namely regulatory and ethical challenges, research by Kokina et al., (2025) found that most major audit firms, including *the Big Four*, have adopted AI at the evidence gathering and risk analysis stages. However, the auditors revealed that there is no clarity regarding legal responsibility for the results of the algorithm-influenced audit. Similar conditions are described by Boland et al. (2024) which highlights the lack of specific guidelines from the PCAOB regarding the use of AI in the public audit process. From an ethical point of view, Lehner et al. (2022) identifies five key challenges in AI-based decision-making, namely algorithmic bias, moral responsibility, decision fairness, system transparency, and social implications for the auditor profession. The research of Gaebler et al. (2024) adds empirical evidence that Large Language Models (LLM)-based algorithms can reproduce racial and gender discrimination, reinforcing the importance of regulatory frameworks that guarantee the fairness and auditability of AI systems. Zhang et al. (2022) introduced the concept of Explainable AI (XAI) as an approach that can explain algorithmic decision logic to be more transparent, signaling the need for regulatory standards that support system openness.

The results of the synthesis of these studies show that the issue of the application of AI in external audits is rooted in the tension between technological advances and regulatory delays. The study emphasizes that while AI has improved the efficiency and speed of audit evidence collection and detection of financial anomalies, there is no legal and professional framework that can keep pace with the acceleration of these changes. Kokina et al. (2025) and Boland et al. (2024) show that neither the PCAOB nor the ISA have adequate technical guidelines to regulate the use of AI-based systems in public audits. This situation poses a dilemma for auditors who on the one hand are required to adopt cutting-edge technology for efficiency but on the other hand must maintain ethical responsibility for audit results. Therefore, it can be concluded that audit professionalism is still measured through conventional standards that have not been adjusted to the role of algorithms in modern audit decision-making.

The second theme relates to the gap in international audit standards for AI-based audit practices. The study by Boland et al. (2024) states that the PCAOB is still at the normative discussion stage without technical guidelines for the validation of audit algorithms. Kokina et al. (2025) found that ISA has not explicitly regulated the use of AI-based tools. Meanwhile, in seven countries, it was revealed that global audit regulatory bodies still mimic traditional audit principles without taking into account the autonomous nature of AI systems (Schiff et al., 2024). This condition is reinforced by the findings of Abdullah & Almaqtari (2024); Almaqtari (2024) which shows that although companies in Saudi Arabia have a strong IT governance structure, there are no external policies that support the integration of AI effectively. Perramon et al. (2024) emphasized the importance of regulatory and public policy support in the success of digital

transformation towards sustainable audits, while Amoozad Mahdiraji et al. (2022) added that good regulation is a determining factor in the relationship between disruptive technologies and business sustainability. These findings suggest that existing professional standards, such as the ISA, PCAOB, and IAI, are still inadequate to govern the complexity of AI-based audits across the board.

Cross-country comparisons in the Schiff et al. (2024) study confirm the lack of a global consensus on AI-based audit regulation. In Japan, Goto (2023) found that the role of auditors has shifted from technical implementers to data-driven strategic analysts but professional regulation has not adjusted to these epistemological changes. Auditors must now understand how machine learning models work and the risks of algorithmic bias but remain subject to the principles of professional prudence. Rikhardsson et al. (2022) reinforce these findings by stating that although AI strengthens efficiency, human validation is still necessary to maintain public trust. The asynchrony between technological advances and regulatory updates suggests that harmonization between human judgment and algorithmic decisions is the most crucial aspect of future audit reform. Regulations that place too much emphasis on efficiency risk sacrificing ethics, while regulations that are too conservative will stifle innovation.

The third theme, namely the mechanism of regulatory governance and algorithmic accountability, is the most prominent aspect in the current literature. Research by Lehner et al. (2022) confirms the importance of multi-level monitoring mechanisms including independent testing of algorithms and documentation of system decisions. Han et al. (2023) found that the integration between blockchain and AI can strengthen the principle of transparency through an immutable track record of audit data. Almaqtari (2024) emphasizes the role of IT governance in ensuring organizational readiness. Meanwhile, Musa & Lefkir (2024) show that policy support and perception of the usefulness of technology increase auditors' acceptance of AI. The use of AI in strategic risk surveillance can expand the scope of governance but potentially blur the boundaries of human responsibility (Pereira et al., 2021). Liu et al. (2024) propose a Privacy-Preserving Dynamic Auditing model to ensure a balance between technological efficiency and user privacy protection. This shows that AI-based audit systems require a transparent, integrative and adaptive governance structure to ensure algorithmic accountability across organizational lines.

A number of studies have also identified the need for synergy between technological and ethical approaches in the design of AI-based audit systems. Han et al. (2023) emphasize that the integration of blockchain with AI can strengthen audit transparency through immutable records and traceability. Meanwhile, Lehner et al. (2022) state that professional ethics must be integrated directly into algorithm design. This approach has led to the emergence of a new paradigm of responsibility-based auditing that places the balance between humans and machines at the core of modern accountability. Audits no longer only serve to check compliance, but also ensure moral and social integrity in algorithmic decisions.

The fourth theme focuses on the design of a policy framework for *trustworthy* and *explainable AI.* XAI-based auditing systems can increase auditors' confidence if policies require that every algorithmic decision can be logically explained by a human (Zhang et al., 2022). Lehner et al. (2022) reinforcing these findings by stating that trust in AI depends on the system's conformity to moral and ethical social norms. The synergy between blockchain and AI creates transparent audits through *a data immutability* system but security and privacy remain key factorsi (Han et al., 2023). Liu et al. (2024) emphasize the importance of regulations that balance privacy and data verification. Hu et al. (2021) found that regulatory clarity and managerial support were the dominant factors for the successful adoption of AI-enabled auditing techniques. While a Hooda et al. (2020) highlight the need for regulatory validation to avoid misuse of machine learning algorithms. This shows that trustworthy AI auditing requires a policy that brings together three main aspects: technology, regulation and professional ethics. In line with these findings, Leocádio et al. (2024) through their conceptual study developed an AI-based audit framework that emphasizes four main pillars, namely digital transformation, technological advancement, innovation and ethical considerations. This model shows the shift in the role of the auditor from a retrospective function to a proactive agent of real-time monitoring that oversees the integrity of algorithmic systems. The study also highlights the importance of integrating transparency and trustworthiness through the case study of MindBridge AI which is able to improve the efficiency and accuracy of the audit process. Thus, this research reinforces the urgency of establishing a policy framework that governs accountability and ethical responsibility in AI-based audit practices at the global level.

In terms of publication trends, temporal analysis shows that research on AI-based audits has increased sharply since 2020 with a peak in productivity in 2024. The increase reflects global awareness of

regulatory governance and professional ethics issues amid advances in audit technology. Most of the research comes from countries with well-established audit systems such as the United States, the United Kingdom, Japan and South Korea as well as developing countries such as Saudi Arabia, Iran and China that are beginning to integrate AI into external audit processes. Based on the methodological approach, 47% of the research is quantitative, 33% qualitative, and 20% conceptual or SLR-based, with dominant theories such as *UTAUT, TOE Framework*, *Resource-Based View*, and *Rest's Four-Component Model of Ethical Decision-Making*.

The overall integration of the literature shows a consistent pattern: the success of AI-based audits is determined by a balance between algorithmic accountability and human oversight. Goto (2023) shows that auditors in Japan are now playing the role of strategic analysts who work side by side with AI. Meanwhile, Rikhardsson et al. (2022) emphasized the importance of human validation of algorithmic results. This collaborative model is known as co-auditing or a system in which humans and AI work together in harmony within the framework of ethical and professional oversight. This approach reinforces the idea that AI should be seen as a collaborative partner rather than a substitute for human auditors so that audit decisions can still be morally and legally accountable.

The results of this SLR indicate that research in the field *of AI auditing* is still in the transition stage to a comprehensive regulatory system. Most previous studies have focused on aspects of technological efficiency, but not many have integrated the ethical and governance dimensions into an integrated conceptual framework. This research fills this gap by developing an ethics and transparency-based regulatory governance framework that can be implemented across jurisdictions. This model places technology as a tool, ethics as a guiding principle, and regulation as a guarantor of sustainability and public trust in AI-based audits. Thus, this research not only enriches the existing literature but also provides a new direction for the formation of an adaptive, fair and responsible audit policy in the era of artificial intelligence.

Conclusions And Suggestions

This study concludes that the application of artificial intelligence (AI) in external auditing is a transformational phenomenon that changes the structure, function and ethical value of the audit profession at the global level. Based on the synthesis of twenty-one studies, it can be concluded that the efficiency and precision presented by AI have not been fully balanced by the readiness of regulations and professional ethics. Delays in updating audit standards, such as the ISA, PCAOB and IAI create gray space in the determination of professional responsibility for audit results generated by algorithmic systems. This condition shows that technological progress is moving faster than the policies that govern it, thus raising the risk of algorithmic bias, legal uncertainty and moral dilemmas in AI-based audit practices.

The findings of this study also confirm that the audit governance mechanism in the digital era must be integrative, combining technological, ethical and regulatory dimensions in a balanced manner. Human auditors remain in the primary role as professional supervisors responsible for the interpretation and validation of AI-based audit results. AI technology is supposed to serve as a *co-auditor* that expands the capacity of human analysis without replacing its professional autonomy. Thus, the governance of future audits demands a balance between *algorithmic accountability* and *human oversight*, where technological systems are overseen in layers through the principles of transparency, fairness, and moral accountability. Governance models like this allow AI to work effectively while maintaining the ethical values that are at the core of the audit profession.

The main contribution of this research to the scientific field lies in the formulation of a conceptual framework of regulatory governance for AI-assisted external audits based on the principles *of trustworthy* and *explainable AI.* The framework integrates three key elements: technological efficiency, ethical responsibility and regulatory certainty. This multidimensional approach expands academic discourse from a technical focus to a governance paradigm oriented towards algorithmic fairness and transparency. In practical terms, the results of this study provide a new direction for regulators, professional associations and audit institutions in developing policies that are able to anticipate the dynamics of AI development without sacrificing public trust in the audit process.

For further research, it is recommended that an empirical study be conducted to test the effectiveness of the proposed regulatory framework through cross-country and cross-sectoral studies. Researchers also need to develop evaluative instruments to measure the level of transparency, accountability and reliability of

AI systems in real audit practices. In addition, the incorporation of blockchain technology and *Explainable AI (XAI)* principles can be used as a new focus to build an audit system that is not only efficient but also trustworthy and accountable legally and ethically. With this approach, future research is expected to strengthen the position of external audit as an instrument of public accountability that is adaptive to technological disruption and oriented towards social benefits in the era of artificial intelligence.

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