

Audit in the Era of Digital Transformation: Challenges in the Evolution from Audit 4.0 to Audit 5.0

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Abstract. *The accelerated transition towards the use of advanced digital technologies in auditing activities leads to a profound reconfiguration of the profession. Traditional models such as Audit 4.0, centered on automation, advanced data analytics, and digitalization, are being surpassed through the adoption of a new paradigm—Audit 5.0—focused on human–machine collaboration, the use of augmented intelligence, and the strengthening of stakeholders’ trust in audit processes. This paper aims to conduct a critical analysis of the most significant challenges generated by this transition for the audit profession and its practitioners, through changes in professional roles and competencies within the auditing field. The methodology employed consists of a conceptual analysis and a scoping review of relevant scientific literature published in recent years. The literature review reveals that existing research emphasizes the increasing role of artificial intelligence, while also highlighting the limitations of predominantly technology-driven approaches characteristic of Audit 4.0. The literature on Audit 5.0 remains emergent and requires conceptual systematization. The contribution of this paper lies in proposing a structured overview of the main challenges of Audit 5.0, offering relevant directions for professional practice as well as for future research.*

Keywords: Audit 5.0, transition, ethics, challenges, continuous audit, auditor competency, audit profession.

Introduction

This paper aims to explore how the transition from Audit 4.0 to Audit 5.0 influences the exercise of the auditing profession, particularly in terms of the major challenges it generates. The research problem stems from the absence of a systemic approach to the transition toward Audit 5.0, as the existing literature predominantly focuses on the technological dimension, without coherently integrating its institutional, ethical, and regulatory implications. Accordingly, the study seeks to investigate the extent to which this emerging paradigm leads to a structural reconfiguration of the auditing profession. The methodology used consists of a conceptual analysis and an analysis of relevant scientific literature published in recent years, through a search in the Web of Science Core Collection database and the Google Scholar platform.

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The primary objective of this research is to provide a comprehensive literature analysis addressing current trends, the regulatory framework, relevant authors, and existing research gaps, including the ethical dimension of professional practice in the context of artificial intelligence (AI) integration in auditing. In doing so, the study contributes to a deeper understanding of the impact of AI technologies on the practice of the auditing profession.

Although the existing literature provides valuable insights into the digitalization of auditing and the growing use of artificial intelligence, most studies remain predominantly technology-oriented, concentrating on automation efficiency, data analytics capabilities, or the operational implications of emerging tools associated with Audit 4.0. Even recent contributions addressing Audit 5.0 tend to approach it descriptively, emphasizing human - AI collaboration or ethical considerations in isolation, without integrating these aspects into a coherent institutional and regulatory framework. Consequently, the results indicate that the transition from Audit 4.0 to Audit 5.0 is often portrayed as a technological evolution rather than as a structural transformation of the audit function. This reveals a significant conceptual gap: the absence of a systemic and multidimensional analysis that simultaneously examines technological integration, professional role redefinition, ethical accountability, and normative adaptation. The present study addresses this gap by conceptualizing Audit 5.0 not merely as an advanced digital stage, but as a paradigmatic reconfiguration of the auditing profession within a complex governance ecosystem.

Contemporary society is undergoing profound transformations, currently characterized by the rapid rise of artificial intelligence - one of the most disruptive developments of recent decades. In this era of digital transformation, internal audit - understood as a management function, an activity, or a professional engagement (Botez & Melega, 2020) - is experiencing a substantial evolution. The shift from traditional audit approaches, based on manual verification and compliance-oriented procedures focused on reviewing documents and processes against predefined regulatory frameworks, to digitally enabled auditing involves the incorporation of artificial intelligence, advanced data analytics, robotic process automation (RPA), and cloud computing. These technologies significantly enhance the efficiency and reliability of audit processes (Moffitt et al., 2018; Rodrigues et al., 2023).

According to Vial (2019), digital transformation extends beyond the mere implementation of new technologies, profoundly reshaping business models, organizational structures, and operational processes. While AI is currently employed primarily for routine and administrative tasks, its influence is expected to expand considerably (Ahmed et al., 2025). Wassie and Lakatos (2024) argue that AI can substantially support the internal audit function by providing strategic oversight, minimizing manual procedures, and enabling higher value-added audit services. Based on a systematic literature review, Suyono et al. (2025) emphasize that the integration of AI into auditing represents an advanced stage of digitalization, transforming how data are collected, analyzed, and interpreted. AI-based tools are no longer limited to automating repetitive tasks; they increasingly support decision-making processes, anomaly detection, and risk anticipation.

The concept of “Audit 4.0” derives from the Industry 4.0 paradigm (Schwab, 2016) and is characterized by the integration of technologies such as the Internet of Things (IoT), big data, artificial intelligence, blockchain, and cyber-physical systems. These technologies enable automated, data-driven transaction and process analysis, often performed in near real time, replacing traditional periodic and sample-based audit procedures (Dai et al., 2019; Rosa et al., 2021; de Souza & da Silva Ribeiro, 2023). To distinguish it from previous generations - *Manual Audit 1.0*, *IT Audit 2.0*, and *Analytics-Enhanced Audit 3.0* - de Souza and da Silva Ribeiro (2023)

argue that Audit 4.0 facilitates the automation of existing audit procedures, expands coverage, reduces execution time, and enhances assurance quality.

Building upon the Industry 4.0 framework, the European Commission has introduced and promoted the concept of Industry 5.0, which positions research and innovation at the service of a sustainable, human-centric, and resilient European industry. This approach seeks to strengthen the role and contribution of industry to society beyond productivity and efficiency objectives (European Commission, n.d.).

In response to the limitations of the 4.0 era, auditing is increasingly evolving toward a new paradigm inspired by Industry 5.0 principles. Audit 5.0 is characterized by the deep integration of emerging digital technologies into audit processes, without replacing the professional judgment of the auditor (Tavares et al., 2025; Kurniawati & Primasatya, 2024; Atencio, 2025). The emphasis shifts from pure automation to the combination of advanced technologies with human values, resilience, and sustainability (Kurniawati & Primasatya, 2024; Sitorus & Tambun, 2023; Atencio, 2025; Ghobakhloo et al., 2023).

Scholars such as Vinuesa et al. (2020) and Raji et al. (2020) place particular emphasis on the ethical dimension of Audit 5.0, highlighting the importance of addressing risks such as algorithmic bias, model opacity, decision accountability, and the social impact of AI systems. Unlike Audit 4.0, which primarily focuses on optimization and automation, Audit 5.0 emphasizes the ethical and sustainable use of technology, incorporating AI model auditing, fairness assessments, and explainability mechanisms. Furthermore, the audit function assumes a more pronounced strategic role, in line with recent theoretical recommendations of the Institute of Internal Auditors (2020), which position internal audit as a key actor in managing digital risks and data-driven decision-making.

This new stage of auditing does not merely involve the adoption of more advanced technologies but entails a profound redefinition of the auditor's role, professional responsibilities, and the interaction between humans and intelligent systems. The relevance of this topic is amplified by the increasing pressure on the auditing profession to ensure not only compliance and efficiency but also trust, ethical integrity, and sustainability in organizational decision-making. Vitali and Giuliani (2024) underline that the transition from automated, data-driven Audit 4.0 to Audit 5.0—enriched with ethical and human-centered dimensions alongside AI integration—introduces new dilemmas for audit professionals.

Against the backdrop of accelerated technological transformations associated with the emerging concept of Audit 5.0, this study analyzes the main challenges generated for the internal auditing profession and its practitioners, focusing on professional roles and competencies, ethical judgment, human–technology interaction, and the need for an appropriate regulatory framework.

Unlike the majority of existing studies, which predominantly examine digital transformation in auditing through a technological or operational lens—focusing on automation, artificial intelligence applications, or data analytics efficiency—this paper adopts an integrated and systemic perspective on the transition from Audit 4.0 to Audit 5.0. Rather than conceptualizing Audit 5.0 as a mere extension of advanced digital tools, the study interprets it as a multidimensional process of professional, institutional, ethical, and regulatory reconfiguration. By explicitly interrelating technological evolution with issues of governance, accountability, professional judgment, and normative adaptation, the paper moves beyond descriptive accounts of emerging technologies and contributes to the conceptual consolidation of Audit 5.0 as a distinct paradigmatic stage in the evolution of the audit profession.

The original contribution of the study lies in the development of a multidimensional analytical framework that systematizes the challenges of Audit 5.0 into five interdependent categories: ethical and professional; technical and data management - related; competence-based; regulatory and standardization-related; and operational and economic. This structuring highlights the interdependence between technology, professional accountability, and governance, explicitly integrating the ethical dimension into the analysis of transformation. In addition, the results indicate that the transition to Audit 5.0 represents a structural and normative reconfiguration of the profession rather than a mere technological upgrad.

By anchoring the discussion within the broader context of strengthening public governance in Romania, the study provides both a theoretical contribution - through the integrated conceptualization of Audit 5.0 challenges, and a practical one, by outlining relevant directions for professional practice and future research.

The remainder of the paper is structured as follows: a concise review of the main concepts and developments related to Audit 4.0 and Audit 5.0; the methodology section and results analysis; and finally, the conclusions, which address research limitations, implications, formulated recommendations, and directions for future research.

Literature review

The literature highlights that the accelerated digitalization of organizational processes has generated significant pressure on the regulatory framework governing audit activities, which is currently characterized by a multi-level structure, international standardization, and harmonization with national and European legislation. This framework remains differentiated between financial (external) audit and internal audit. At the international level, the regulatory framework for auditing is based on the International Standards on Auditing (ISA) issued by the International Auditing and Assurance Standards Board (IAASB), complemented by the ethical rigor of the IESBA Code, both under the aegis of the International Federation of Accountants (IFAC). At the European level, this ecosystem is harmonized through EU directives and regulations (e.g. Directive 2014/56/EU), which ensure the coherence of financial reporting practices. In Romania, this framework is transposed through national legislation, represented mainly by Law no. 162/2017, the activity being monitored by the Authority for the Public Supervision of Statutory Audit Activity (ASPAAS) and professionally regulated by the Chamber of Financial Auditors of Romania (CAFR). This regulatory convergence ensures the transparency and credibility of financial information, constantly adapting global good practices to the realities of the local market. Herrera-Sánchez et al. (2023) emphasize the urgent need to adapt audit regulations to emerging technological advancements such as artificial intelligence, blockchain, and big data. Similarly, de Souza and da Silva Ribeiro (2023) examine the impact of digital transformation on public sector internal audit and underline the necessity of aligning the regulatory framework with new technological realities. Nwachukwu et al. (2021) identify a pronounced obsolescence of current regulations concerning the use of disruptive technologies, resulting in regulatory, ethical, and technical gaps that may undermine data traceability, algorithmic transparency, and professional accountability. Key findings indicate the absence of specific standards for digital technologies, the lack of ethical guidelines addressing algorithmic systems, and the rigidity of regulation in the face of rapid innovation.

Within the Industry 4.0 paradigm, public sector internal audit remains anchored in a traditional normative framework built upon compliance control and administrative accountability,

while digital governance policies promote technological modernization without a corresponding recalibration of the legal and institutional architecture. This dissonance reveals the absence of an integrated vision regarding the regulatory framework of Audit 5.0, which should not be conceptualized merely as a technological adjustment but as a component of a broader systemic institutional transformation. From this perspective, professional regulation, digital governance, and ethical responsibility cannot be treated as separate dimensions but must be understood as interdependent elements of the same evolutionary process. Binding legal norms specifically addressing AI-centered audits, blockchain, big data, and the human-centric environment of Industry 5.0 remain insufficiently developed, generating notable regulatory gaps. In this regard, Atencio (2025) identifies regulatory fragmentation and the lack of coherent normative frameworks as structural barriers to aligning audit practices with Industry 5.0 principles.

Accordingly, the transition from Audit 4.0 to Audit 5.0 cannot be reduced to procedural updates but must be understood as a structural recalibration of the relationship between technology, the auditing profession, and regulation.

Audit 4.0 is described as a generation in which Industry 4.0 technologies - such as smart sensors, the Internet of Things (IoT), cyber-physical systems, big data platforms, artificial intelligence, blockchain, and robotic process automation (RPA), enable continuous, real-time monitoring and auditing of transactions and processes (Dai et al., 2019; Rosa et al., 2021; de Souza & da Silva Ribeiro, 2023). It represents an evolutionary stage of classical auditing - whether financial, internal, compliance, or project-based, marking the transition toward a digitalized, automated, and data-driven model. This paradigm integrates emerging technologies such as artificial intelligence for pattern recognition, anomaly detection, and fraud prevention; big data and advanced analytics for real-time processing of large volumes of information; robotic process automation to eliminate repetitive and standardized tasks; blockchain technology to ensure transaction traceability and transparency; cloud computing to enhance data centralization and accessibility; and IoT applications, particularly relevant in technical or industrial audits for continuous monitoring of assets and processes. Through this technological integration, Audit 4.0 moves beyond traditional sampling-based and periodic verification models toward a continuous, predictive, and data-oriented approach. Moreover, it seeks to automate existing audit procedures, expand coverage, reduce execution time, and improve assurance quality compared to previous audit generations - namely Manual Audit 1.0, IT Audit 2.0, and Analytics-Enhanced Audit 3.0 (de Souza & da Silva Ribeiro, 2023).

Conceptually linked to Industry 5.0 and Society 5.0, Audit 5.0 is perceived as the most recent stage in the historical evolution of auditing, characterized by the deep integration of emerging digital technologies into audit processes without replacing professional judgment (Tavares et al., 2025; Kurniawati & Primasatya, 2024; Atencio, 2025). The literature is beginning to outline the notion of “Audit 5.0” as extending beyond automation, emphasizing human-technology collaboration, ethical data use, and the increasingly strategic role of the audit function within a digitally interconnected and uncertainty-driven economy. According to Tavares et al. (2025), Audit 5.0 entails the responsible and transparent integration of artificial intelligence technologies aimed at augmenting auditors’ capabilities rather than substituting them.

For a clearer understanding of the two paradigms - Audit 4.0 and Audit 5.0, *Table no. 1* synthesizes their key characteristics.

Table 1. Comparative Overview of Key Characteristics of Audit 4.0 and Audit 5.0

Differentiation criterion	Audit 4.0 Related to Industry 4.00	Audit 5.0 Related to Industry 5.00
Main objective	Increasing efficiency and automating the audit process	Creating sustainable value and human-centric auditing
Key technologies used	Big Data, Data Analytics, Cloud, RPA	Advanced Artificial Intelligence, Human–AI Collaboration, Digital Twins
Automation	High degree – many procedures automated	Intelligent automation alongside deliberate human intervention
Risk approach	Based on historical data and predictive models	Dynamic, anticipatory, oriented toward emerging risks (ESG, ethical, social)
Audit frequency	Almost continuous (continuous auditing)	Adaptive and contextual continuous auditing
Types of data analyzed	Structured and semi-structured	Structured, unstructured, and contextual (behavioral, social)
Ethical and ESG dimension	Limited approach	Central (ethics, sustainability, social impact)
Audit outcome	Detailed, findings-oriented reports	Strategic insights and forward-looking recommendations
Fundamental characteristics	Technology- and automation-focused, efficient and data-driven.	Emphasizes humans, ethics, sustainability, and long-term value, using technology as support rather than an end in itself

Source: authors, based on the literature.

The integration of emerging technologies into auditing is fundamentally transforming the way traditional processes are performed and managed. AI applications enable the rapid identification of anomalies and risks in large volumes of data, the automation of repetitive procedures, and the provision of predictive analytics that support auditor decisions. At the same time, AI is changing the role of the auditor, who is moving from the executor of standard procedures to the facilitator of decisions assisted by algorithms, requiring new skills in interpreting automatically generated results. By using machine learning technologies, the audit process becomes more dynamic, adaptive, and risk-centered, and the responsibility for the validity of conclusions is diversified, involving both algorithmic control and the auditor's professional judgment. Although recent literature explores various applications of AI in auditing, existing studies remain fragmented between technological, ethical, and normative perspectives, without providing an integrated framework that connects these dimensions. Most research focuses on either process efficiency or compliance, and the implications for the auditor's role and for the management of emerging risks are only partially analyzed. The present study fills this gap, proposing an integrative approach that combines the analysis of AI implementation in audit with the assessment of the impact on auditor skills, control procedures and the overall efficiency of the audit process. Through this synthesis, the research contributes both theoretically and practically to the understanding of how AI can be used strategically in audit, providing relevant recommendations for management authorities.

Methodology

The present study is grounded in a qualitative conceptual approach, based on a scoping review of the relevant scientific literature on Audit 4.0 and Audit 5.0, artificial intelligence, and technology-driven governance. The analysis focused on works published between 2018 and 2026, with the aim of identifying dominant trends, emerging models, and the main challenges associated with the transformation of the auditing profession.

This investigation is structured around the core dimensions of the transition from Audit 4.0 to Audit 5.0: technological, professional, ethical, and organizational. Within this framework, the study seeks to address the following research questions:

1. What are the main professional challenges generated by the transition from Audit 4.0 to Audit 5.0?
2. How is the role of the auditor reconfigured within the new digital context?

The adopted approach is exploratory in nature and aims to map the existing theoretical framework, while also highlighting the directions of conceptual development of Audit 5.0 in the academic literature, given its emerging character. The identification of relevant publications was conducted through a search of the Web of Science Core Collection database, recognized for the rigor of its indexing criteria. The search strategy was structured around three interrelated conceptual dimensions: the audit-specific dimension (“Audit 4.0” OR “Audit 5.0” OR “c” OR “data-driven audit” OR “AI-based audit” OR “auditor competency”); the digital transformation dimension (“digital transformation” OR “digitalization” OR “digitization” OR “Industry 4.0” OR “Industry 5.0” OR “Fourth Industrial Revolution” OR “Fifth Industrial Revolution”); and the implications and challenges dimension (challenge* OR evolution OR transition OR transformation OR implication OR risk* OR opportunit* OR barrier*). The combination of terms was performed using the Boolean operators AND and OR. In order to avoid the inclusion of irrelevant literature, the medical and educational fields were explicitly excluded through the NOT operator (medical OR education OR clinic). The search was restricted to the areas of Business, Management, Economics, Business Finance, and Public Administration.

Following the application of this strategy, 16 relevant works were identified (12 articles, 3 proceeding papers, and 1 review article). The limited number of publications highlights the still incipient stage of theoretical development in this field, particularly with regard to the conceptual delineation of Audit 5.0. The size of the corpus does not allow for a robust bibliometric analysis (such as co-citation analysis, co-word analysis, or bibliographic coupling), as such methods require a substantially larger number of contributions to ensure statistical validity and interpretative consistency.

To ensure broader coverage of the emerging literature, the source identification process was extended through the use of the Google search engine and the Google Scholar platform, using the same keywords. This additional step enabled the inclusion of recent articles, conference papers presented at international events, and conceptual studies that are not yet indexed in Web of Science but contribute significantly to the development of the theoretical framework of Audit 5.0. In total, 82 relevant papers were identified for the analyzed topic, of which 48 publications were selected to underpin the present study. The methodological approach of this study is based on a structured and systematic review of the specialized literature, aimed at ensuring transparency, replicability and relevance of the selected sample. The dataset consists of 48 academic articles identified through a multi-stage selection process. Initially, a comprehensive search was conducted in the main scientific databases, using predefined keywords related to artificial intelligence, audit, Audit

4.0 and Audit 5.0. The inclusion criteria targeted articles from peer-reviewed journals, published in recent years, with a clear focus on the intersection of AI technologies and audit practices. Subsequently, a screening process based on relevance, methodological rigor and conceptual contribution was applied, resulting in the final sample. Particular attention was paid to frequently cited and seminal works in the field, which were considered key references for understanding the evolution of AI in auditing.

The analytical procedure followed several sequential steps. First, the selected studies were systematically grouped according to thematic dimensions, such as technological applications, auditor competencies, ethical implications, and regulatory challenges. Second, a comparative analysis was conducted to identify patterns, similarities, and divergences in the literature. Third, the results were synthesized into conceptual categories, allowing the identification of research gaps and emerging trends. The relevance of the sample of 48 articles is supported by its coverage of both seminal contributions and recent developments, ensuring a balanced representation of the current state of knowledge in the field. This methodological design allows for a comprehensive understanding of how artificial intelligence is reshaping auditing and provides a solid foundation for the study's integrative framework.

Recent studies describe Audit 5.0 as moving beyond the predominantly technological focus of Audit 4.0 by integrating the human factor, professional judgment, and social responsibility into the analytical process, alongside the use of digital technologies such as artificial intelligence, big data, and robotic process automation.

In this context, the paper explores the hypothesis that Audit 5.0 entails a structural transformation of the role, competencies, and responsibilities of auditors, marking a paradigmatic reconfiguration of the profession rather than merely a technological extension of existing practices.

Results and discussions

The final corpus analyzed comprises 48 publications selected from an initial pool of 82 identified works. The relevance of the sample of 48 articles is supported by its coverage of both fundamental contributions and recent developments, ensuring a balanced representation of the current state of knowledge in the field. This methodological design allows for a comprehensive understanding of how emerging technologies are reshaping auditing and provides a solid foundation for the integrative framework of the study.

In terms of typology, the majority are articles published in indexed scientific journals, supplemented by conference proceedings and review studies.

An analysis of the temporal distribution reveals a marked intensification of academic interest during the period 2023-2025, as also evident from the annual distribution of publications (*Figure 1*). More than half of the included works were published within the last three years, underscoring the emergent and consolidating nature of the Audit 5.0 topic. Publications prior to 2020 predominantly focus on Audit 4.0, digitalization, and the integration of big data or robotic process automation (Moffitt et al., 2018; Salijeni et al., 2018; Tiberius & Hirth, 2019). In contrast, recent studies explicitly address Audit 5.0, explainable artificial intelligence, algorithmic governance, and the integration of ethical considerations into automated processes (Syam et al., 2025; Tavares et al., 2025; Wassie & Lakatos, 2024).

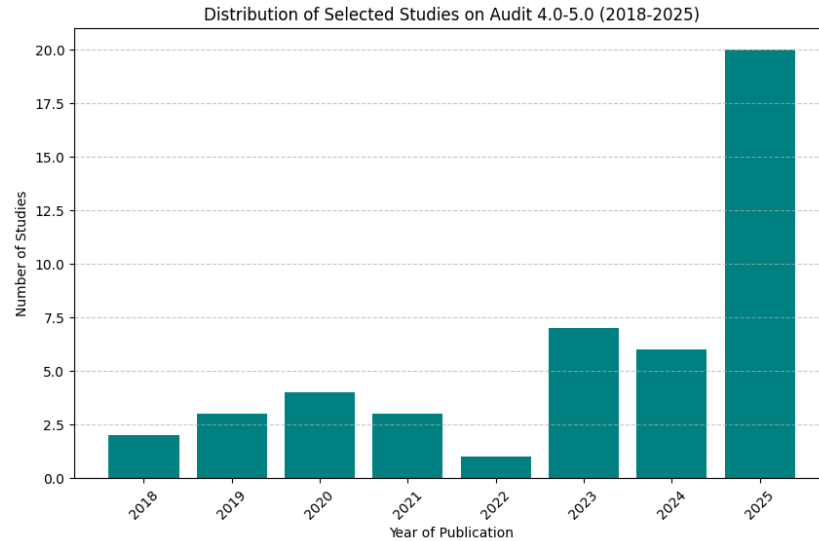


Figure 1. Distribution of selected studies by year (2018-2025)

From a geographical perspective, the literature reflects regional diversity, with contributions originating from Europe, Asia, Africa, and Latin America. A notable focus emerges in emerging economies (Indonesia, Malaysia, Kenya, Nigeria, Costa Rica), where the adoption of digital technologies in auditing is examined in conjunction with institutional and regulatory challenges.

Simultaneously, studies published in prestigious international journals (Accounting, Auditing & Accountability Journal; Accounting Horizons; Journal of Business Ethics; International Journal of Accounting Information Systems) provide a more normative and conceptual perspective on the ethical and paradigmatic implications of the transition to Audit 5.0.

Content analysis allowed for the identification of five major categories of challenges associated with the transition from Audit 4.0 to Audit 5.0, summarized in Table 2. This categorization highlights that the literature does not treat Audit 5.0 solely as a technological phenomenon, but rather as a multidimensional transformation.

Table 2. The main challenges of the transition to Audit 5.0 identified in the literature

No.	Thematic category	No. of studies	Dominant dimension	Sources
1.	Ethical and professional challenges	8	responsibility, objectivity, trust, professional mindset	Lehner et al. (2022); Munoko et al. (2020); Murikah et al. (2024); Syam et al. (2025); Kurniawati & Primasatya (2024); Fotoh & Lorentzon (2022); Mökander & Floridi (2021); Largo-Morocho & Váscquez-Acuña (2024)
2.	Technical and data management challenges	7	integrity, security, IT infrastructure, data quality	Herrera-Sánchez et al. (2025); Kamau & Yavuzaslan (2023); Nadzari & Yussof (2024); Salijeni et al. (2018); Tiberius & Hirth (2019); Dai et al. (2019); Sood & Kim (2023)
3.	Skills and abilities challenges	7	digital gaps, retraining, technological expertise, AI, data analysis	Salijeni et al. (2018); Herrera-Sánchez et al. (2025); Nadzari & Yussof (2024); Syam et al. (2025); Kurniawati &

				Primasatya (2024); Wassie & Lakatos (2024); Samiolo et al. (2023)
4.	Regulatory and standardization challenges	5	normative adaptation, accountability clarity, standards alignment	Kend & Nguyen (2020); Salijeni et al. (2018); Herrera-Sánchez et al. (2025); Fotoh & Lorentzon (2022); Raji et al. (2020)
5.	Operational and economic challenges	6	costs, efficiency, technological implementation, audit quality	Kamau & Yavuzaslan (2023); de Souza & da Silva Ribeiro (2023); Syam et al. (2025); Moffitt et al. (2018); Tavares et al. (2025); Rosa et al. (2021)

Source: authors, based on the literature.

Ethical and Professional Challenges

Lehner et al. (2022) identified five major ethical challenges in AI-based decision-making processes: objectivity, confidentiality, transparency, accountability, and trust.

Objectivity may be compromised due to biases embedded in automated decision-making processes. Confidentiality-related challenges arise from data protection issues. The lack of transparency stems from a certain degree of opacity of algorithms and from decisions that are not always explainable. Accountability becomes a matter of assumption in the context of AI-driven decision-making processes. Trust concerns emerge from limited understanding of algorithms and AI-based decision-making mechanisms.

Syam et al. (2025) emphasized the critical importance of avoiding technological dominance and the erosion of essential professional knowledge, identifying these risks as key ethical challenges. Salijeni et al. (2018) expressed concerns regarding auditor independence and the risk that a client-service-oriented mindset could compromise audit objectivity. In line with these concerns, Kurniawati and Primasatya (2024) highlighted the necessity of maintaining professional skepticism in the face of technological advancements.

Technical and Data Management Challenges

Data integrity and security have emerged as fundamental concerns across multiple studies. Herrera-Sánchez et al. (2025) emphasized the need for adequate technological infrastructure to ensure data integrity and confidentiality, while Salijeni et al. (2018) reported challenges related to information ambiguity, data overload and difficulties in navigating datasets to identify relevant information.

The generation of “false positive results” by big data analytics tools leads to unnecessary additional workload and costs. Given the complexity of blockchain technology, the lack of physical evidence for digital assets represents a significant technical obstacle (Kamau & Yavuzaslan, 2023). Security risks such as hacking, fraud, and challenges related to audit trails constitute additional operational concerns.

Nadzari and Yussof (2024) further highlighted cybersecurity risks and the increasing complexity of audit processes as key concerns.

Competency and Skills Challenges

A critical gap has been identified in auditors’ technological knowledge and capabilities. Syam et al. (2025) emphasized the fundamental challenge of providing adequate support for auditors to develop the necessary expertise. Conversely, Salijeni et al. (2018) noted a significant deficit in computer programming skills required to operate big data analytics tools, while Herrera-Sánchez

et al. (2025) pointed out that auditors must develop new competencies in data analytics, programming, and algorithmic understanding.

Particularly in the public sector, Nadzari and Yussof (2024) observed that auditors have varying levels of preparedness for adopting digital tools. As artificial intelligence has the potential to replace certain audit functions, auditors must master technological systems to ensure effective oversight. The continuous need to update knowledge and skills in response to technological change represents an ongoing competency-related challenge (Kurniawati & Primasatya, 2024).

Regulatory and Standards-Related Challenges

It has been observed that regulatory adaptation typically lags behind technological change. Herrera-Sánchez et al. (2025) emphasized the need to standardize tools and clarify issues related to auditor accountability for automated decisions.

Salijeni et al. (2018) identified a potential mismatch between existing standards and the rapidly evolving use of big data analytics in audits. Similarly, Nadzari and Yussof (2024) reported that regulatory environments adapt slowly to technological change, resulting in compliance gaps. A continuously evolving regulatory framework directly influences the relevance of the audit process. Consequently, the opinion of Kend & Nguyen (2020) is pertinent, who consider it necessary for regulatory authorities and professional standard-setting bodies must keep pace with developments in information technology, particularly with respect to automation.

Operational and Economic Challenges

The adoption of technology by organizations affects audit quality but is strongly influenced by perceptions regarding cost efficiency.

Auditors often question the value of big data analytics relative to the additional costs involved. Difficulties in tracking transactions and obtaining supporting documentation highlight the urgent need to implement robust risk management frameworks to maintain a balance between the benefits and risks of new technologies, representing a significant operational challenge (Syam et al., 2025; Nadzari & Yussof, 2024; Kamau & Yavuzaslan, 2023).

The cumulative analysis of the five categories confirms that Audit 5.0 is not just a higher stage of automation, but a structural reconfiguration of the profession. If Audit 4.0 was defined by the integration of digital technologies to increase efficiency, Audit 5.0 introduces a human-centered dimension, in which professional judgment, ethics, social responsibility, algorithmic governance become essential components. In this sense, the results support the hypothesis that the transition to Audit 5.0 marks a paradigm shift, implying the redefinition of the auditor's role as a guarantor of trust in a complex digital ecosystem.

The conclusions obtained from the analysis highlight a constant trend towards the increasing integration of new technologies into audit processes, especially in areas such as risk assessment, anomaly detection and data-driven decision-making. These findings are largely consistent with existing studies that highlight the efficiency gains and enhanced analytical capabilities offered by artificial intelligence technologies. However, the results also reveal important nuances that are less widely addressed in the literature, particularly with regard to the transformation of the auditor's role and the growing importance of hybrid skills that combine technical expertise with professional judgment. Furthermore, while previous research often treats technological, ethical and regulatory aspects separately, the findings of this study suggest that these dimensions are highly interdependent and should be analyzed within an integrated framework. At the same time, the study identifies a partial divergence from the existing literature in terms of the

depth of analysis related to the implications for risk management and governance. While previous research acknowledges the challenges associated with adopting AI, it often underestimates the complexity of ensuring accountability, transparency, and control in AI-assisted audit environments. Instead, this study emphasizes the need for a systemic perspective that embeds these elements at the core of audit transformation. Overall, the results confirm and extend existing knowledge, contributing to a more comprehensive understanding of the role of AI in auditing and highlighting areas where further research is needed.

Conclusions

The present study highlights that the transition from Audit 4.0 to Audit 5.0 entails a paradigmatic shift with profound implications for the auditing profession. Its primary contribution lies in systematizing the challenges generated by this transition and in reaffirming the auditor's role as a guarantor of trust, accountability, and ethical conduct within a complex and dynamic digital environment. Overall, the research provides relevant conceptual and practical benchmarks for the modernization of the audit function in the context of strengthening public governance in Romania, emphasizing that the evolution toward Audit 5.0 extends beyond a strictly technological dimension.

The study addressed the research questions by identifying the main categories of challenges associated with this transformation - *ethical, technical, operational, regulatory, and professional*, while simultaneously underscoring the expansion of the auditor's role. From a data analyst and user of advanced technologies, the auditor evolves into a strategic actor, a digital risk assessor, and a facilitator of organizational trust, assuming enhanced responsibilities in relation to the use of emerging technologies.

Despite its contributions, the research presents certain limitations that should be considered when interpreting the findings. First, Audit 5.0 represents a relatively recent concept, and the dedicated scientific literature is still in the process of consolidation. The limited number of indexed publications explicitly addressing this paradigm constrains the possibility of conducting an exhaustive analysis comparable to those available in more mature theoretical domains.

Second, the limited scope and heterogeneity of the available sources did not allow for a robust bibliometric analysis capable of highlighting citation networks, thematic clusters, or quantifiable evolutionary trends. Consequently, the study has a predominantly conceptual and synthetic character, grounded in a critical analysis of the existing literature, which may influence the degree of generalizability of the conclusions.

The findings indicate that conducting audit processes in collaboration with emerging technologies cannot be treated exclusively as a technological issue; rather, it must be approached within complex institutional and professional frameworks, with direct implications for governance, ethics, and human competencies. This underscores the need for an integrated approach that correlates technological developments with the regulatory framework, professional accountability, and the ethical dimension.

Furthermore, the research demonstrates that the transition toward Audit 5.0 involves a shift in emphasis from the traditional compliance-verification function to a strategic and proactive role focused on risk analysis and process evaluation within a digital environment characterized by interconnectivity and uncertainty. Auditors must possess the capacity to critically interpret outputs generated by automated systems and to assume responsibility not only for the accuracy of analyses but also for the organizational and ethical implications of employing intelligent technologies. In

this context, preserving professional independence and human judgment becomes essential in order to prevent the transformation of auditing into an exclusively algorithmic process.

From an applied perspective, the study generates relevant implications for the modernization of the audit function in Romania. The conclusions may support decision-makers in substantiating measures aimed at adapting the regulatory framework, restructuring processes, and redefining professional responsibilities within the context of the transition to Audit 5.0.

At the normative level, the necessity of updating legislation and methodological guidelines is emphasized in order to enable the integration of continuous auditing, artificial intelligence, and Big Data analytics, while simultaneously establishing clear principles regarding algorithmic transparency and decision-making accountability. The traditional model, predominantly oriented toward ex-post compliance verification, limits the effective capitalization on the potential of new technologies.

At the operational level, the implementation of Audit 5.0 requires achieving an adequate level of digital maturity within public institutions, ensuring interoperability among information systems, and clearly delineating the functions of monitoring, managerial control, and internal audit. In the absence of such a systemic approach, digitalization risks generating significant costs without proportional benefits and may exacerbate existing institutional ambiguities stemming from an uncertain digital environment.

Another significant finding concerns the gap between auditors' current competencies and the emerging requirements of the new paradigm. Reforming the professional training and development system becomes imperative through the integration of fields such as digital ethics, data analytics, artificial intelligence, and blockchain, alongside the strengthening of non-technical competencies - critical thinking, contextual interpretative capacity, and strategic communication, which are indispensable for the responsible use of technology without undermining the human dimension of the profession.

In light of the aforementioned implications, several priority directions can be outlined for the implementation of Audit 5.0: strengthening interdisciplinary cooperation among auditors, IT specialists, and organizational management; developing coherent digitalization strategies for the audit function; advancing and initially operationalizing continuous auditing practices and AI-assisted auditing through pilot projects; and establishing a clear ethical and digital governance framework applicable to audit activities.

Future research may extend the analysis by developing empirical studies on the application of Audit 5.0 across diverse organizational contexts. A systematic investigation of the difficulties, risks, and constraints associated with the technological integration process is required, as well as the identification of appropriate technical and organizational solutions for efficient and sustainable implementation within the public sector.

As the use of emerging technologies, particularly artificial intelligence, becomes increasingly embedded in practice, rigorous empirical assessments will become feasible regarding their impact on the labor market, on the dynamics of professional relationships within audit teams and between auditors and audited entities, as well as on the preservation of professional independence and objectivity. The results of such research could substantiate the development of coherent normative frameworks designed to regulate the use of disruptive technologies in the field of auditing and public fund management.

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