**Doctoral School of Business Management**

**Thesis Booklet**

**Fekadu Agmas Wassie**

Doctoral Dissertation

# Audit Transition in the Age of Digital Revolution: Technology, Performance, Sustainability, and Transparency — Insights from Emerging Markets

**Thesis Supervisor:**

**Lakatos László Péter, Ph.D.**

(Associate Professor)

Budapest, 2026

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## 1. Research background and justification of the topic

As a lecturer in accounting and finance with teaching and research experience at Debark University and Corvinus University of Budapest, I am deeply interested in exploring *"Audit Transition in the Age of Digital Revolution: Technology, Performance, Sustainability, and Transparency — Insights from Emerging Markets"* because it aligns closely with both my academic and research focus. My experience has strengthened my commitment to understanding how digital innovations transform audit practices, influence the quality of financial reporting, and enhance transparency in emerging markets. When I began this research, I envisioned it as an opportunity to bridge theory and practice, generate insights for curriculum development, guide practitioners, and contribute to a broader understanding of sustainable and technology-driven transitions in auditing. The thesis, developed as a compilation of interconnected publications, collectively examines how digital technologies reshape audit processes, auditor judgment, performance outcomes, sustainability assurance, and disclosure practices, positioning auditing as an evolving system influenced by innovation, sustainability expectations, and transparency demands. In addition to these quantitative and technological dimensions, the audit transition also involves important qualitative aspects, such as auditors' perceptions of emerging technologies, professional judgment processes, trust in AI-supported systems, and behavioral responses to complex audit environments, which are increasingly recognized as critical components of modern auditing research.

The concept of "audit transition" emphasizes that the changes observed are not merely incremental improvements but fundamental shifts in how audits are designed, executed, and evaluated. Digital transformation acts as the primary driver of this transition, while audit transition represents its broader professional and methodological outcome. Traditional audit approaches (largely reliant on sampling, periodic testing, and retrospective verification) are increasingly being replaced by technology-enabled methods that allow auditors to examine complete datasets, perform continuous monitoring, and assess risks in real time. In the digital age, auditing is no longer primarily about selecting representative samples; it increasingly involves full-population testing, system-wide anomaly detection, and deeper analytical insight into organizational behavior. This evolution reflects the growing complexity of business environments and the exponential increase in transaction volume and data sophistication

(Allbabidi, 2021; Awuah et al., 2022). Advancing audit processes through technological innovation and enhanced disclosures has therefore become critical for maintaining confidence, ensuring regulatory compliance, and strengthening the efficiency and transparency of financial reporting. Recent studies further emphasize that this transition is not only technological but also organizational and behavioral, requiring auditors to adapt their cognitive processes and professional judgment in increasingly data-driven environments (Abdo-Salloum & Chehade, 2026; Sundarasen et al., 2026).

The inclusion of technology, performance, sustainability, and transparency as core pillars reflects the audit transition's multidimensional impact. Technology serves as the central catalyst, reshaping audit methodologies and tools through data analytics, automation, and artificial intelligence. Performance captures the growing recognition that technology-supported audits influence not only financial reliability but also broader organizational outcomes, such as operational efficiency, decision quality, and internal control effectiveness. Sustainability highlights the expanding scope of auditing beyond financial accuracy toward long-term value creation, ethical conduct, and effective corporate governance. Fraud and unethical practices undermine sustainability by eroding trust, damaging reputations, and weakening financial stability (Demirović et al., 2021). Consequently, governance mechanisms (such as internal auditing, risk management systems, skilled human capital, and the effective use of audit technologies) play a critical role in preventing fraud and supporting sustainable business practices. Transparency reflects the increasing importance of audit disclosures as communication tools that convey risk, uncertainty, and the usefulness of information to stakeholders. Emerging research also highlights that these dimensions are increasingly interconnected through digital technologies, particularly AI-enabled systems that simultaneously influence audit performance, governance quality, and transparency outcomes (Leocádio et al., 2024; Gu et al., 2024).

Recent technological advancements associated with the digital revolution have led to the development of specialized software and tools designed to enhance audit effectiveness and efficiency. Among these, computer-assisted audit techniques (CAATs) represent foundational technologies that enable auditors to gather, process, and evaluate large volumes of data more systematically (Mahzan & Lymer, 2014). The Information Systems Audit and Control Association (ISACA) defines CAATs as tools and procedures used by auditors to perform data-

driven audit tasks. In data-intensive environments, CAATs enhance accuracy, mitigate risk, and improve coverage by allowing auditors to analyze entire datasets rather than samples. Techniques such as data mining, pattern recognition, and statistical analysis facilitate the identification of anomalies and irregular trends that may signal heightened risk (Pedrosa et al., 2020). Tools such as Audit Command Language (ACL), Interactive Data Extraction and Analysis (IDEA), Excel macros, and automated workpaper software (e.g., CaseWare and AuditFile) have become increasingly common, streamlining audit workflows and enhancing integration with accounting systems (Al-Okaily et al., 2022).

Building on these foundational tools, artificial intelligence (AI) and automation represent the next stage of technological advancement in auditing. Automation substantially enhances audit efficiency by enabling the rapid execution of repetitive tasks such as data collection, sorting, and preliminary analysis (Smidt et al., 2021). AI-driven tools extend beyond traditional CAATs by incorporating learning capabilities, predictive analytics, and advanced pattern recognition. These systems can analyze vast numbers of transactions in real time, identifying complex anomalies and risk patterns that may remain undetected in manual or rule-based audits. As a result, auditors are increasingly able to focus on higher-level activities such as professional judgment, risk assessment, and strategic analysis. Research on AI-enabled auditing is therefore critical, as these technologies have the potential to enhance audit quality, reduce time and cost, and minimize human error and bias, thereby improving objectivity and reliability (Zhang & Song, 2022). At the same time, their adoption raises important challenges related to data security, system integration, and auditor competence. More recent studies highlight the emergence of AI co-piloted auditing and generative AI applications, which support auditors in complex decision-making, automated reporting, and advanced risk assessment while also raising concerns about explainability, overreliance, and auditor trust (Gu et al., 2024; Popa et al., 2024; Zhang & Zhou, 2025).

Beyond improvements in audit processes, the adoption of audit technologies increasingly influences organizational performance and sustainability outcomes. Prior research suggests that technology-enabled auditing contributes to improved operational efficiency, stronger internal controls, enhanced client confidence, and more informed decision-making (Errore et al., 2013; Wang et al., 2022). In addition, as sustainability and ESG (environmental, social, and

governance) reporting gain prominence, auditors are expected to provide assurance not only on financial information but also on non-financial disclosures related to ESG practices. Technology-supported audits play an increasingly important role in enhancing the credibility of such disclosures, thereby supporting long-term value creation and effective risk management (Samagaio & Diogo, 2022). Recent empirical evidence further confirms that AI-driven analytics can improve audit efficiency and support auditor judgment, while also introducing risks related to overreliance on automated outputs and the need for new competencies (Kokina et al., 2025; Li & Goel, 2025a).

Simultaneously, the digital transformation of auditing has heightened expectations regarding transparency and the quality of disclosure. Stakeholders increasingly demand clear, timely, and informative audit reports that provide insight into a company's financial position, key risks, and areas of judgment (Camacho-Minano et al., 2023). A significant development in this regard is the introduction of Key Audit Matters (KAMs), which require auditors to communicate the most significant issues encountered during the audit. KAMs enhance transparency by explaining how auditors addressed complex or high-risk areas, thereby improving users' understanding of audit processes and outcomes (Bepari et al., 2022). As reporting environments become more complex, research on enhancing the relevance, clarity, and timeliness of audit disclosures is essential for strengthening accountability and trust. In AI-enabled audit environments, transparency is further linked to issues of explainability and auditability of algorithms, which are critical for maintaining stakeholder trust and regulatory compliance (Li & Goel, 2025b).

The importance of these developments is illustrated by high-profile corporate failures such as the Wirecard scandal in 2020. Wirecard AG, a German payments company, collapsed after an investigation revealed that €1.9 billion purportedly held in trust accounts did not exist. The company's auditor, Ernst & Young (EY), failed to detect the fraud over several years, highlighting the limitations of traditional audit approaches reliant on sampling and legacy systems. Advanced audit technologies, including real-time data analytics and AI-driven tools, could potentially have identified inconsistencies and red flags earlier by enabling continuous monitoring and full-population analysis (Seethamraju & Hecimovic, 2022). Moreover, more detailed and standardized disclosures across subsidiaries may have increased transparency and

deterred misrepresentation. This case highlights the pressing need for refined audit methodologies and regulatory reforms in an increasingly digital and complex business landscape.

Motivated by these developments and personal research interests, this thesis examines how technological advancements are transforming auditing practices, performance outcomes, sustainability assurance, and transparency in emerging economies, with a particular emphasis on Ethiopia. While the empirical studies are grounded in "emerging market" contexts, their implications extend beyond these settings. Emerging economies are characterized by constrained resources, evolving regulatory frameworks, and uneven technological adoption, making them valuable contexts for observing how audit innovations unfold under practical limitations (Puthukulam et al., 2021). Ethiopia, in particular, shares key institutional, regulatory, and market characteristics with other emerging economies in Sub-Saharan Africa and parts of Asia, including developing auditing standards, limited technology adoption, resource constraints, and evolving disclosure frameworks, which allow for cautious generalization of the findings. The challenges identified in the literature, such as auditor competence, organizational readiness, trust in technology, and the effective use of full-population testing, are increasingly relevant across both developing and developed economies. Additionally, conducting empirical research in Ethiopia was facilitated by the researcher's access to data and professional networks (through scholarly associations) within the Ethiopian audit industry, which provided more practical opportunities than might have been available in other countries. Evidence from emerging markets further suggests that institutional constraints, resource limitations, and varying levels of technological readiness significantly influence the adoption and effectiveness of AI in auditing (Pérez-Calderón et al., 2025).

Accordingly, this research addresses three core questions:

***RQ1*** – *Technology Adoption: How do emerging technologies reshape auditing practices?*

***RQ2*** – *Technology Impact: How does audit technology enhance organizational performance and sustainability?*

***RQ3*** – *Transparency: How do audit disclosures enhance transparency and risk assessment?*

The study employs a combination of systematic literature reviews and empirical investigations to address these questions. By integrating evidence from multiple studies, the thesis offers comprehensive insights into the ongoing audit transition in the digital age. Although

rooted in an emerging market context, the findings contribute to a broader global discourse on how the auditing profession can adapt to digital complexity, heightened accountability, and expanding stakeholder expectations in an evolving regulatory and economic environment. At the same time, the study acknowledges that understanding the full implications of audit transformation also requires attention to qualitative dimensions, including auditor behavior, judgment processes, and interactions with emerging technologies, which remain important avenues for future research.

## 1.1. Research frame

My dissertation is grounded in a collection of published articles that examine the role of technology and disclosures in reshaping auditing practices and their broader contributions. Accordingly, the concept of "audit transition in the age of the digital revolution" captures a fundamental shift in the nature, scope, and expectations of contemporary auditing. Figure 1 illustrates the relationship between the research questions, publications, and the studies' findings. The foundation of the dissertation lies in systematic literature reviews (Study I), which examine the application of technology in auditing. Study I established the conceptual foundation by examining the transformative potential of artificial intelligence to shape the future of the internal audit function, offering theoretical insights into the ongoing digital transition in auditing. It outlines the technological and organizational shifts driving the transition in the digital era. More recent research further reinforces this transition by emphasizing the growing role of AI-enabled auditing frameworks and human–AI collaboration in shaping modern audit environments (Leocádio et al., 2024; Gu et al., 2024).

In addition to the studies included in this dissertation, I have authored a literature review on “Computer-assisted auditing techniques adoption for audit of information systems”, which has been accepted for publication in the International Journal of Business Information Systems (Wassie & Lakatos, 2025). Since 2023, AI auditing research has advanced rapidly, with emerging studies highlighting the integration of generative AI, large language models, and AI-driven analytics into audit practices. As presented in a separate subsection (see Section 1.3), the review offers additional theoretical and empirical insights into the significance of technology and disclosures in audit practice, complementing the dissertation’s focus on technology, sustainability, and transparency in auditing. These reviews, along with a comprehensive

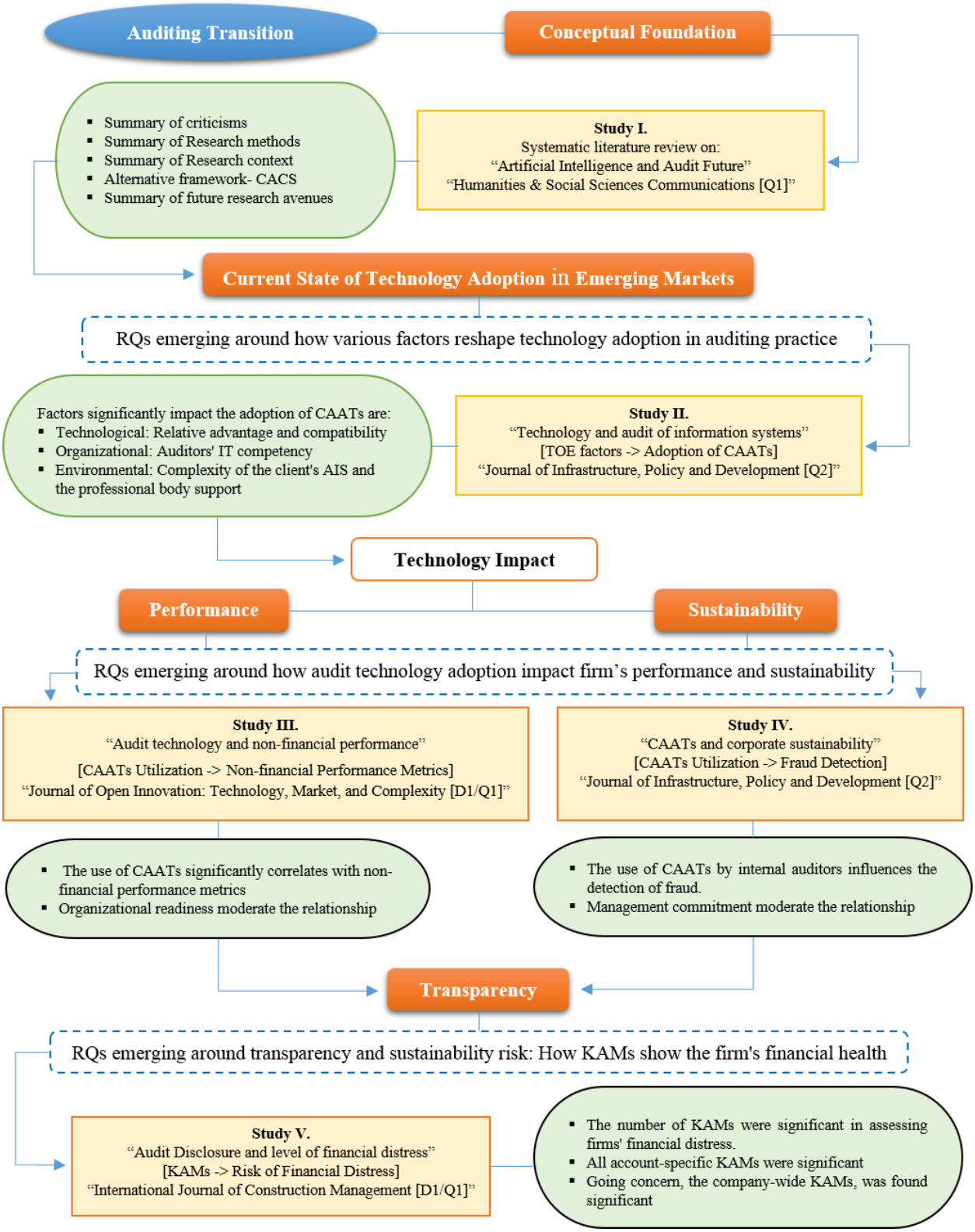
categorization exercise, provide a valuable summary of the mechanisms and applications of technology and disclosures for interested readers, and help identify emerging research questions in the field that warrant further exploration. The literature reviews revealed the diverse modes and domains in which technology and disclosures can be effectively applied, highlighting opportunities for future research. Recent studies particularly emphasize the transformative impact of generative AI and advanced analytics on audit processes, professional competencies, and decision-making, highlighting the need for continuous adaptation in audit practices (Popa et al., 2024; Zhang & Zhou, 2025; Abdo-Salloum & Chehade, 2026).

When I began work on my dissertation, several influential studies had already examined the adoption of technology to improve auditing processes. Key contributions to the field include studies by Mahzan and Lymer (2014), Al-Okaily et al. (2022), and Samagaio and Diogo (2022), which examined the impact of individual and institutional factors on the adoption of technology in audit practices. Similarly, Camacho-Minano et al. (2023) investigated the relevance of audit disclosures, particularly their relationship with financial distress. While employing varied theoretical approaches and examining diverse contexts, these studies aimed to derive overarching conclusions. My focus in this study, however, was on understanding the specific effects of technology and disclosures within the current context and how they influence auditing processes and sustainability in the digital age. To achieve this, Study II utilized the Technological, Organizational, and Environmental (TOE) framework to examine six factors affecting technology adoption in external audits. It investigated the adoption of audit technologies among Ethiopian audit firms, identifying the key factors influencing the integration of information system tools within emerging market contexts (answers RQ1). More recent empirical evidence suggests that AI adoption in auditing is also influenced by factors such as auditor readiness, governance structures, and the need for explainable systems, particularly in technology-driven audit environments (Li & Goel, 2025a; Li & Goel, 2025b). Building on this, Study III analyzed how the use of audit technologies (CAATs) contributes to improved non-financial performance in audit firms (answers RQ2), underscoring technology's role as a strategic enabler of audit quality and organizational outcomes (see Figure 1). In line with recent findings, technology-enabled auditing not only improves efficiency but also supports auditor judgment and reduces cognitive burden, while introducing new challenges related to overreliance on automated outputs (Kokina et al., 2025).

Additionally, Study IV extended the analysis to the sustainability domain, examining how computer-assisted audit tools and techniques can support corporate sustainability practices and reinforce the broader social responsibility of auditing within the context of developing economies (also answers RQ2), providing a unique lens for analysis. Sustainability, in general, refers to the ability of organizations or societies to meet current needs without compromising the resources and opportunities available to future generations (Ganesan et al., 2017). It involves balancing economic performance, social responsibility, and environmental protection, ensuring that current actions do not create long-term harm. In this thesis, sustainability is examined through the lens of the last two studies. In Study IV, it is proxied by the effectiveness of internal auditors in detecting fraud within business acquisition processes. This approach is supported by previous research, which shows that fraudulent activities can significantly weaken a company's ability to create value for shareholders and other stakeholders, posing a threat to long-term stability and responsible business practices (Amoako et al., 2023). In Study V, sustainability is represented through financial accountability, as evidenced by Key Audit Matter (KAM) disclosures. By promoting transparency, mitigating economic and operational risks, and supporting responsible financial practices, KAM disclosures help companies maintain sustainable growth (Kohler, 2020). Together, these approaches provide practical ways to assess sustainability, demonstrating how ethical governance and financial oversight contribute to long-term business success (answers RQ2). Recent literature also highlights that AI-enabled auditing contributes to sustainability by enhancing governance, risk monitoring, and fraud detection capabilities, particularly in complex and data-intensive environments (Sundarasen et al., 2026).

Finally, Study V explored the transparency dimension (see Figure 1) by investigating whether key audit matters (KAM) disclosures effectively reveal firms' financial distress risk, highlighting the communicative value of enhanced audit reporting and its implications for a company's sustainability risks (answers RQ3). Collectively, these studies provide a comprehensive understanding of how technology, sustainability, and transparency intersect during the audit transition in emerging economies and in the current digital revolution era. In contemporary audit environments, transparency is increasingly linked to the explainability and auditability of AI systems, reinforcing the importance of clear communication and trust in technology-supported audit processes (Li & Goel, 2025b).

Figure 1. Relationship of research questions, publications, and results




*Source: Researcher's own compilation*

An emerging theme in the literature was the continued reliance on traditional auditing techniques, which often fail to detect material misstatements promptly (Rosli et al, 2013). Studies such as those by Seethamraju and Hecimovic (2022) have highlighted the low adoption rates of advanced technologies, including artificial intelligence (AI), in auditing processes. Recognizing this gap, I aimed to contribute to theoretical advancements in the adoption of AI within internal auditing. This effort culminated in Study I, in which a novel theoretical framework (Commitment, Access, Capability, and Skills Development (CACS)) was proposed to address AI adoption in internal audits. Study I and supplementary reviews also identified potential research areas and gaps, offering insights into how technology and disclosures upgraded audit practices, enhancing performance and sustainability (see Figure 1). These developments also underscore the importance of qualitative dimensions, such as auditor attitudes toward AI, trust in automated systems, and the interaction between human expertise and intelligent technologies, which are increasingly recognized as critical factors influencing successful technology adoption.

The literature review revealed a range of factors impacting technology adoption in auditing. In Study II, the researcher employed the TOE framework to investigate how the six different factors affect the adoption of Computer-Assisted Audit Techniques (CAATs). These factors included technological factors (relative advantage and compatibility), organizational factors (auditor IT competency and the size of the audit firm), and environmental factors (the complexity of client accounting information systems and support from professional bodies). Besides, Study III analyzed the impact of such technologies on audit firms' performance (non-financial), revealing how digital transformation (CAAT usage) enhances three non-financial outcome metrics (client relationships, employee engagement, and operational efficiency). Recent studies further indicate that these factors are complemented by emerging considerations, such as institutional readiness, regulatory support, and resource constraints, particularly in emerging-market contexts (Pérez-Calderón et al., 2025).

Furthermore, the literature highlights the potential of technology to enhance audit quality and corporate sustainability. Internal auditing, as part of enterprise risk management, plays a crucial role in controlling fraud risk (Demirović et al., 2021). According to Puthukulam et al. (2021) and Ahmi and Kent (2013), integrating human expertise with computer-based systems

can strengthen internal control mechanisms. Study IV extended the discussion to sustainability by examining the relationship between corporate sustainability (measured by the scope of fraud detection) and the adoption of CAATs in internal audits across government-owned and private entities, underscoring the broader societal value of audit technology. In line with recent research, the integration of AI into audit processes is increasingly viewed as a means to enhance both audit quality and long-term organizational sustainability through improved monitoring and risk assessment capabilities (Abdo-Salloum & Chehade, 2026).

Building on prior research on corporate sustainability and non-financial performance in external auditing, Study V shifted focus to enhanced audit disclosures. Rather than relying solely on initial literature reviews, this study examined the relationship between audit disclosures, such as Key Audit Matters (KAMs), and corporate sustainability, with a specific focus on their impact on firms' financial health. It highlights the role of enhanced audit disclosures (KAMs) in promoting transparency and signaling financial distress risk, underscoring how technology-driven audit practices contribute to greater accountability and trust in developing economies. The findings emphasized the importance of emerging technology and enhanced disclosures in supporting primary auditing functions, identifying this as an area for further exploration. Recent developments further suggest that technology-driven audit disclosures, supported by AI and data analytics, enhance transparency and stakeholder confidence by improving the clarity, relevance, and timeliness of audit reporting.

## 2. Methods and scientific results of the thesis

### 2.1. Study I. “Artificial intelligence and the future of the internal audit function”

***Methods***

This study serves as a comprehensive overview that provides a foundational framework and inspiration for my subsequent research. A comprehensive approach was taken by reviewing scholarly literature on AI in the IAF and organizing the findings into thematic clusters. This systematic literature review drew on 15 articles identified through a keyword search in the Web of Science database. The systematic review involved a three-step search for relevant articles published between 2019 and 2023, using the keywords "artificial intelligence" and "internal audit." Initially, the study retrieved 62 publications, but two filtering criteria were applied to

narrow down the results (given that the WoS database covers a wide range of disciplines). The criteria were document type (limited to articles and conference proceedings) and research area (business economics). As a result, 25 and 22 articles were excluded based on these criteria, leading to a final selection of 15 relevant papers for the review.

Study I was initiated in 2022 and designed as a foundational systematic literature review for the subsequent studies in this thesis. Although the article was published in 2024, the literature included (narrow sample) reflects studies available during the review and finalization period (between 2019 and 2023). Including recently published studies is methodologically appropriate for a systematic review, particularly in a rapidly evolving field such as audit digitalization, where excluding recent contributions could result in an incomplete or outdated synthesis. To ensure continued relevance, we incorporated recent studies aligned with the review themes as they became available in the subsequent empirical studies. These newer studies largely reinforce and extend established theoretical and empirical insights rather than altering the review's conceptual foundation, thereby strengthening the overall coherence and rigor of the thesis.

We structured the study review into three clusters of analysis to thoroughly examine the scholarly work on AI in IAF. The first cluster focused on assessing the relevance and novelty of the selected publications, using citation analysis and the frequency of publications over time. The second cluster evaluated the research methodologies employed in the selected papers, as understanding the application of theory is crucial for practical analysis. In line with Allbabidi (2021), the study analyzed the theoretical contributions of each paper, categorizing them into three distinct sets. This analysis also explored how the research methods aligned with these theoretical contributions. This evaluation served as an indirect measure of the theoretical depth and methodological fit within the area of AI used in IAF. The third analysis cluster examined the research context, considering the temporal and geographical dimensions of the selected studies. This aspect provided insights into how future researchers can expand their research on AI and autonomous function by linking it to theory, increasing geographical coverage, or conducting comparative studies. This thematic analysis helped pinpoint research gaps and paved the way for future exploration of audit transition in the rapidly evolving technological environment.

***Results***

In the first cluster, the findings revealed that not all publications had the same impact on the field, which supported the arguments of Puthukulam et al. (2021). The study confirmed that research on the use of AI in the IAF is still in its early stages of development (Zhou, 2021). In the second cluster, the review found that surveys were the most common research method, indicating a quantitative approach to studying the topic. Nevertheless, the limited conceptual publications on AI use in the Internal Audit Function (IAF) highlight the need for further theoretical development and a consensus on definitions. Additionally, the review reveals that many researchers have explored the topic by proposing new models (Korol et al., 2022), which have inspired others to contribute fresh perspectives to the field's theoretical frameworks. Nevertheless, a lack of comprehensive frameworks for applying AI in the IAF remains.

In the third cluster, the review confirmed the findings of Allbabidi (2021), who noted that most research on AI adoption in auditing is conducted in developed countries, suggesting a need for further investigation in developing regions, such as Africa. Furthermore, the review revealed that no studies have been conducted using a comparative analysis of two countries. Finally, the study recommended the adoption of the recently introduced Commitment, Access, Capability, and Skills Development (CACS) framework (MetricStream, 2020) to facilitate the integration of AI in organizations' IAFs. This framework offers practical guidance for organizations while laying the groundwork for future research and theoretical advancements in internal auditing.

***Updated research developments in AI and audit technology (2022–2026)***

While Study I provides a systematic review of AI applications in auditing based on literature published between 2019 and 2023, the field has evolved significantly in recent years. Building on earlier contributions, recent studies have increasingly focused on developing conceptual frameworks, strengthening governance mechanisms, and addressing practical challenges associated with AI-enabled auditing. In addition, the literature has increasingly incorporated qualitative and behavioral perspectives, including auditor trust in AI systems, the interpretability of algorithmic outputs, and ethical concerns surrounding automated judgment (Kokina et al., 2025; Li & Goel, 2025b). Early advancements in this direction include the work of Minkkinen et al. (2022), who conceptualized continuous auditing approaches for AI systems

and emphasized the importance of structured monitoring tools. More recent research has expanded this perspective, with Leocádio et al. (2024) proposing comprehensive conceptual frameworks for AI integration in auditing, and Gu et al. (2024) introducing the concept of AI-co-piloted auditing, which highlights collaborative interactions between auditors and intelligent systems to enhance audit efficiency and decision-making.

The rapid emergence of generative AI and large language models has further transformed the scope of audit technology. A study of Popa et al. (2024) developed a framework for integrating generative AI into the development of professional competencies, illustrating how such tools can support complex audit activities, including automated reporting and advanced risk assessment. Similarly, Zhang and Zhou (2025) emphasized the implications of generative AI for audit practice and research, particularly in reshaping audit processes and professional roles. Complementing these developments, Sundarasen et al. (2026) provided a comprehensive mapping of AI-enabled auditing research, highlighting increasing attention to audit quality, ethical considerations, and the evolving skill requirements of auditors in technology-driven environments. Broader systematic insights are offered by Abdo-Salloum and Chehade (2026), who document the transformative impact of AI on accounting and auditing practices, reinforcing the growing importance of digital technologies across the profession.

Recent empirical and practice-oriented studies further demonstrate both the opportunities and challenges associated with AI adoption in auditing. The study of Kokina et al. (2025) shows that AI-driven analytics can enhance audit efficiency and support auditor judgment by reducing cognitive burden, while also cautioning against risks such as overreliance on automated outputs. In a similar vein, Li and Goel (2025a) examine the integration of AI into IT auditing, emphasizing the need for new competencies, governance frameworks, and effective audit procedures for AI-driven systems. Their subsequent work (Li & Goel, 2025b) further highlights issues of auditability and auditor readiness, stressing the importance of transparency and explainability in AI-based audit environments. Evidence from emerging markets, as reported by Pérez-Calderón et al. (2025), underscores the contextual nature of AI adoption, suggesting that institutional and resource constraints play a significant role in shaping implementation outcomes.

Additionally, Shivram (2024) demonstrates how machine learning techniques can be applied throughout the internal audit lifecycle, enhancing fraud detection, audit planning, and

continuous monitoring. Collectively, these studies indicate that the adoption of AI in auditing extends beyond technological implementation and involves broader transformations in professional practices, organizational structures, and regulatory environments. They also point to critical challenges in ethics, interpretability, and compliance that stakeholders must address to ensure the responsible and effective use of AI technologies.

Incorporating these recent developments into this dissertation provides a more comprehensive and up-to-date understanding of the evolving AI and auditing landscape. This expanded perspective complements the findings of Study I. It establishes a strong foundation for subsequent studies that examine how emerging audit technologies influence performance and sustainability, as well as their role in enhancing transparency and professional practices.

### 2.2. Methodological approach for the subsequent empirical studies

All of the subsequent four empirical studies employed a quantitative research method, as I aimed to explore relationships between various variables and make independent judgments based on data described by precise procedures (Kothari, 2004). Except for Study V, the first three empirical studies used survey research to gather auditors' opinions and attitudes. The surveys were carefully designed, and we meticulously planned the sampling process to minimize potential errors related to respondents or their answers (Al-Okaily et al., 2022). A key requirement for professional research is internal validity, ensuring that the research measures what it intends to measure. We carefully selected each survey question item and adapted it from existing literature to achieve internal validity. We also pretested the questionnaires with a sample of respondents, followed by brief interviews, to refine them and ensure clarity and consistency in the responses. We obtained informed consent from all participants to use their responses in the study. The statistical methods used to analyze the results were tailored to each study's objectives, ensuring rigorous analysis. The surveys helped assess the impact of factors within the Technology-Organization-Environment (TOE) framework on the adoption of Computer-Assisted Audit Techniques (CAATs) for auditing information systems (Study II), the impact of CAAT utilization on non-financial performance metrics (client relationships, employee engagement, and operational efficiency) (Study III), and the effects of CAAT usage on corporate sustainability, as measured by the scope of fraud detection (Study IV). The question items for each factor were drawn from the existing literature, enhancing the study's validity and reliability (Kothari, 2004).

While surveys were the primary method for assessing auditors' opinions and attitudes, Study V employed secondary data analysis to examine relationships among variables. We selected this approach because it best suited the nature of the variables, the longitudinal data, and the study's objectives. We performed relevant tests, including robustness and endogeneity checks, to ensure the data met the necessary criteria for analysis (Hair et al., 2017). Overall, the representative sample used in Studies II, III, and IV, coupled with the longitudinal nature of Study V, strengthened the validity of the findings, making the results more generalizable and relevant to understanding auditing practices.

### 2.3. Study II. "Technology adoption in audit of information systems: Ethiopian audit firms' perspective"

***Methods***

This study aims to investigate the key factors influencing the adoption of CAATs in Ethiopian audit firms, utilizing the TOE framework. The study gathered primary data by surveying qualified external auditors in Ethiopian audit firms, specifically Certified Public Accountants (CPAs) and the Association of Chartered Certified Accountants (ACCA). The survey was divided into two strata: auditors based in Addis Ababa (the capital) and those based outside the capital. Using G*Power (version 3.1), we determined that the minimum required sample size for the PLS-SEM analysis was 89. The study successfully gathered 113 valid responses from the two strata. The data was collected using a self-administered questionnaire.

The extent of CAAT usage in the audit firms served as the dependent variable, following the methods of Siew et al. (2020). The adoption of various CAAT tools, including "Generalized Audit Software, Database SQL Search and Retrieval, Audit Automation Software, Test Data, Embedded Audit Modules, and Parallel Simulation Software", was evaluated on a scale ranging from (1) "Never use at all" to (7) "Extensively used." The overall score for the dependent variable was calculated by averaging the response scores across all the tools.

The study used closed-ended questions with a 7-point Likert scale (1 = "strongly disagree", 2 = "disagree", 3 = "slightly disagree", 4 = "neutral", 5 = "slightly agree", 6 = "agree", 7 = "strongly agree") to measure the independent variables. We chose a 7-point scale to improve

the accuracy of responses by offering a wider range of options, thereby enhancing the likelihood of capturing participants' genuine opinions (Venkatesh & Bala, 2012; Siew et al., 2020).

The study examined the impact of various factors on CAAT adoption by formulating seven hypotheses. These hypotheses suggested that technological factors (such as relative advantage and compatibility), organizational factors (including auditors' IT competency and audit firm size), and environmental factors (including clients' AIS complexity and support from professional bodies) would positively influence the adoption of CAATs in Ethiopian audit firms. Additionally, the study examined the moderating effect of audit firm size on the relationship between clients' AIS complexity and the adoption of CAATs.

***Results***

The findings revealed that two technological factors (relative advantage and compatibility) were significant determinants of CAAT adoption in Ethiopian audit firms. Moreover, auditors' IT competency, an organizational factor, significantly impacted the adoption of CAATs. Environmental factors, such as the complexity of clients' AIS and support from professional bodies, also played an important role in influencing CAAT adoption. These results aligned with previous studies (Siew et al., 2020; Daoud et al., 2021; Rosli et al., 2013; Al-Okaily et al., 2022).

The results concerning the impact of auditors' IT competency and clients' AIS complexity on CAAT adoption did not align with our initial expectation of a positive effect. The research found that auditors' IT competency has a significant, albeit negative, impact. This negative relationship can be attributed to several factors, including a limited understanding of CAATs, resistance to change, insufficient training, risk-averse behavior, and resource limitations. Addressing these challenges requires a concerted effort to enhance auditors' IT knowledge, provide extensive CAAT training, and allocate resources to support the installation and use of CAATs. Similarly, although clients' AIS complexity affects CAAT adoption, the relationship is also negative. This adverse effect may stem from resource constraints, regulatory concerns, integration challenges, and heightened risk perceptions associated with auditing complex AIS environments. Organized efforts are needed to overcome these obstacles, like allocating

appropriate resources, developing robust regulatory frameworks, and enhancing technological capabilities that facilitate the integration of CAATs into the audit process.

Regarding the moderation effect, the study examined the interaction between audit firm size and clients' AIS complexity on the adoption of CAATs. According to Hair et al. (2017), an effect is considered significant if the t-value falls between 0.9993 and 4.466. The analysis revealed that the moderating effect of audit firm size on the relationship between clients' AIS complexity and CAAT adoption was insignificant. The result indicates that audit firm size does not significantly affect the negative relationship between clients' AIS complexity and the adoption of CAATs.

As a robustness check, the results were evaluated in light of the properties of PLS-SEM, which is variance-based and explicitly aims to maximize the explained variance of endogenous constructs rather than reproduce a covariance matrix. Accordingly, the high $R^2$ values for CAATs adoption (0.91–0.92) fall within the "very substantial" range and are methodologically acceptable, particularly in a theory-driven technology adoption model with proximal predictors and a single-item, perceptual dependent variable measured on the same Likert scale, which is known to reduce measurement noise and increase explanatory power. The inclusion of the moderation term led to only a modest incremental increase in $R^2$, suggesting added explanatory value rather than overfitting. We addressed Potential concerns related to common method variance through procedural remedies (anonymity, randomized items, and data collection in two rounds) and statistical tests. Harman's single-factor test showed that one factor accounted for 46.62% of the variance, which is below the 50% threshold. Measurement quality was further confirmed, as all constructs met convergent validity criteria (factor loadings, CR, and Cronbach's alpha > 0.70; AVE > 0.50), and discriminant validity was supported by both the Fornell–Larcker criterion and HTMT ratios below 0.85. Taken together, these results suggest that the high explanatory power stems from a strong theoretical foundation rather than endogeneity, common method bias, or model misspecification.

## 2.4. Study III. “Audit technology as a catalyst for improving non-financial performance in Ethiopian audit firms”

### *Methods*

The purpose of this study was to investigate how CAATs influence firms' non-financial performance metrics (client relationships, employee engagement, and operational efficiency). After reviewing Contingency Theory (CT), the Resource-Based View (RBV), the Technology Acceptance Model (TAM), and the Technology-Organization-Environment (TOE) framework, this study initially proposed that CAAT use significantly impacts all non-performance metrics. Besides, the moderating role of organizational readiness was expected to strengthen the positive effects of CAATs on non-financial outcomes (operational efficiency metric).

The study employed a quantitative, cross-sectional survey design to examine the relationship between the use of computer-assisted audit tools (CAATs) and non-financial performance among Ethiopian audit firms. This design enabled the simultaneous collection of data, providing a snapshot of the current level of CAAT adoption and its association with operational outcomes such as client relationships, employee engagement, and efficiency. The cross-sectional approach was particularly suitable for the Ethiopian context, where longitudinal studies are often constrained by limited resources, inconsistent record-keeping, and organizational instability (Kothari, 2004). The design aligns with the study’s objective of identifying correlations rather than causal effects, thus offering a cost-effective and time-efficient means of capturing how CAAT use contributes to firm-level outcomes at a single point in time.

The study's population included all 172 certified audit firms registered with the Accounting and Auditing Board of Ethiopia (AABE). Using Yamane's (1967) sample size formula with a 5% margin of error and a 95% confidence level, we determined that the study required a minimum sample size of 120 firms. A structured questionnaire was distributed electronically to 150 audit firms, yielding 122 valid responses (an 81% response rate). The questionnaire measured CAAT usage, client retention, employee turnover, operational efficiency, and organizational readiness, alongside demographic and control variables. To minimize potential biases such as social desirability and response bias (Kothari, 2004), the study employed validated instruments, ensured anonymity, and standardized question formats. These

methodological precautions strengthened data reliability and enhanced the generalizability of the findings to the broader Ethiopian audit context.

Non-financial performance served as the dependent variable, operationalized through client retention rate (CRR, the percentage of clients retained over a specific period), employee turnover rate (ERR, the proportion of employees who left the firm within a specific time frame), and operational efficiency (OPE, the percentage of audits completed on time) following prior studies (Errore et al., 2013; Wang et al., 2022). The independent variable, CAAT usage (CTU), was measured using a five-point Likert scale. At the same time, organizational readiness (OGR), proxied by technology budget availability, was treated as a moderating variable (Le et al., 2023). Firm age and size were included as controls. The survey instrument underwent expert review and pilot testing, achieving Cronbach's alpha values ranging from 0.82 to 0.91, which confirmed its high internal consistency. Data analysis involved the use of descriptive statistics and multiple regression models to assess the strength and direction of relationships among variables. We selected regression analysis for its ability to handle multivariable relationships and test moderating effects, providing a robust understanding of how CAAT adoption influences non-financial performance outcomes in the Ethiopian auditing environment.

***Results***

The study's findings revealed an average CAAT usage score of 3.4 (68%), indicating a moderate level of technological integration in auditing. Indicators such as client retention (72%), employee turnover (21%), and operational efficiency (84%) revealed generally strong organizational outcomes, while 55% of firms reported allocating specific budgets for audit technology adoption.

The regression result of the study demonstrated that CAAT adoption significantly predicted non-financial outcomes across all models. The results show that CAAT use (CTU) explained 95.1% of the variance ($R^2$ value) in client retention, 92.8% in employee turnover, and 95.1% in operational efficiency. Specifically, CAAT use (CTU) significantly predicts client retention (CRR) ($\beta = 1.311$), employee turnover (ERR) ($\beta = –0.966$), and operational efficiency (OPE) ($\beta = 0.780$), with all relationships significant at the 1% level ($p \leq 0.01$), consistent with conventional statistical thresholds (Kothari, 2004). The study’s findings reinforce the argument that CAATs play a vital role in improving non-financial performance dimensions, supporting

earlier research that linked audit technology to better client relationships, lower employee turnover, and enhanced operational efficiency (Rosli et al., 2013). In addition, Organizational readiness (OGR) significantly moderated the relationship between CAAT use and operational efficiency ($\beta = 0.005$, $p \leq 0.05$), indicating that firms better equipped in terms of infrastructure and capability were more successful in converting technological adoption into efficiency gains. The moderating effect of organizational readiness aligns with global evidence highlighting the importance of infrastructure, training, and managerial support for successful digital transformation (Rosli et al., 2013; Wang et al., 2022). Moreover, consistent with prior studies from developing contexts (Atta et al., 2024), the findings acknowledge persistent institutional barriers such as limited resources and resistance to change, while confirming that individual perceptions of usefulness and ease of use (core components of the Technology Acceptance Model (Bigliardi et al., 2020)) remain decisive in shaping adoption outcomes. Collectively, these findings validate the proposed hypotheses (H1–H4), indicating that technological capability, combined with readiness and strategic commitment, is crucial in driving sustainable performance improvements in emerging audit markets.

As a robustness check, standard model diagnostics were first assessed, with normality supported by the Shapiro–Wilk test ($p = 0.072$), acceptable internal consistency indicated by Cronbach's alpha values above 0.70, negligible multicollinearity evidenced by low VIF values (1.311), and homoscedasticity confirmed by the Breusch–Pagan test ($p = 0.241$). In response to feedback received during post-publication seminar presentations, particularly regarding the high explanatory power of the models ($R^2$ = 95.1%, 92.8%, and 95.1%), we conducted additional analyses to address potential endogeneity related to CAAT usage (CTU). Specifically, a control function approach was applied using six individual CAAT application scores as instruments; in the first stage, CTU was regressed on these scores, and firm-level controls (size, age, and organizational readiness), and the resulting residuals were included in second-stage regressions predicting client retention, employee engagement, and operational efficiency. The residual terms were statistically insignificant across all models, suggesting that endogeneity did not materially bias the estimates. At the same time, CTU remained a strong and stable positive predictor of all non-financial performance outcomes. Although reverse causality cannot be entirely ruled out in this cross-sectional study (because all variables are observed at a single point in time and we cannot definitively establish the direction of causality), these supplementary analyses strengthen

confidence that the reported relationships reflect substantive effects of CTU rather than endogeneity-driven bias.

## 2.5. Study IV. "Leveraging computer-assisted audit tools for corporate sustainability: Evidence from Ethiopia"

### *Methods*

This study aims to enhance understanding of the impact of CAATs on fraud detection, contributing to corporate sustainability. The study hypothesizes that adopting CAATs has a positive impact on corporate sustainability, as measured by the extent to which internal auditors detect fraudulent schemes in Ethiopian companies. Additionally, the study examines the moderating effect of company characteristics, such as ownership, size, and management commitment.

The research used a survey method, gathering data through questionnaires developed based on existing literature. According to Hair et al. (2017), the survey method is suitable for collecting data on company-related attributes and professional experiences. The target population consisted of internal auditors in government and private companies in Ethiopia. The sample size was determined using G*Power (version 3.1), resulting in a minimum sample size of 74. Due to the lack of a comprehensive database of internal auditors in Ethiopia, participants were contacted via email through the Internal Auditing Institute of Ethiopia and on LinkedIn. Consequently, non-probability sampling was employed, specifically the convenience sampling method. The sample was relatively narrow due to limited access to the full population, reliance on available contacts, and practical constraints in reaching respondents. Additionally, data availability influenced the sampling approach, as only auditors whom we could contact and who were willing to respond were included. The survey gathered 83 valid responses, exceeding the minimum required sample size of 74.

Corporate sustainability, the dependent variable in this study, was represented by the scope of fraud detection activities carried out by internal auditors during the acquisition. Baader and Kremar (2018) identified seven common fraud patterns in the acquisition cycle: double payments, bid rigging, pass-through schemes, private purchases, kickback fraud, non-accomplice vendors, and shell companies. These fraud types were used to assess the scope of tasks

undertaken by internal auditors in detecting fraud within the acquisition cycle. The study employed a five-point Likert scale to measure the significance of these items in audit activities, with 1 representing "Strongly disagree" and 5 representing "Strongly agree." The survey also included two exploratory questions to assess the general use of CAATs in internal auditing, with internal auditors rating the frequency of CAAT usage in their tasks on a five-point scale, where one represents "Never," 3 represents "Sometimes," and 5 represents "Always."

CAAT usage was considered the independent variable, measured according to previous studies (Pedrosa et al., 2020; Le et al., 2023), comprising 10 items related to the application of CAATs in audit tasks. Company characteristics were also assessed for their moderating effects, with company ownership (COSP) coded as 1 for private companies and 0 for government-owned companies, company size (CSIZ) coded as 1 for large companies and 0 for small companies, following the World Bank Group's criteria for small and medium-sized enterprises. Management commitment (MTCT) was coded as 1 for committed and 0 for non-committed companies.

***Results***

The analysis results showed that CAAT adoption enhances internal auditors' ability to detect fraud, consistent with previous research (Demirović et al., 2021; Zhang & Song, 2022). Companies are increasingly adopting business automation and data digitalization, making the effectiveness of internal auditing dependent on the effective use of information technology. These findings are consistent with Amoako et al. (2023), who assert that using CAATs is essential for companies to maintain a fraud-free environment. Thus, the practical application of CAATs is vital for reducing fraud incidents and enhancing corporate sustainability.

The study also examined the moderating effect of company characteristics on the relationship between CAAT utilization and fraud detection. The results indicated that neither company ownership nor size had a significant impact on this relationship. The findings showed that internal auditors in government-owned companies have access to tools similar to those used by their private sector counterparts, suggesting that both organizations leverage comparable technological resources for fraud detection. The results align with previous studies, such as those by Samigo and Diago (2022) and Amoako et al. (2023). However, the study also reveals that management commitment plays a significant moderating role in the relationship. This finding

aligns with Mahzan and Lymer (2014) and Demirović et al. (2021), who emphasized the crucial role of management commitment in a company's technology adoption. Top management's commitment goes beyond merely providing resources to overcome resistance to using CAATs (Daoud et al., 2021; Smidt et al., 2021). It also includes actively endorsing new information systems and strengthening the legitimacy of CAAT adoption. As a result, management's support for integrating CAATs within the internal audit function is crucial in detecting a wider array of fraudulent activities, thereby contributing to the company's sustainability.

As a robustness check, preliminary analyses confirmed the reliability and validity of the measurement model and assessed potential differences across company characteristics. We evaluated the validity and reliability of the collected data to ensure the accuracy of the results and confirm that the study was free from common method variance (Fuller et al., 2016). The validity of the attributes was also checked through tests for average variance extracted (AVE), discriminant validity, and heterotrait-monotrait (HTMT) ratios (Hair et al., 2017; Ganesan et al., 2017). Both CATU and FRDT exhibited strong internal consistency, with Cronbach's alpha and composite reliability above 0.7, standardized item loadings above 0.7, and AVE values exceeding 0.50, which supports convergent validity. We confirmed discriminant validity via Fornell–Larcker criteria and HTMT ratios below 0.85. CATU remained a strong positive predictor of FRDT, explaining 49.1% of its variance in the base model ($R^2 = 0.491$) and 51.0% when company characteristic moderators were included ($R^2 = 0.510$). Following post-publication feedback from seminar presentations, we conducted additional analyses to address the potential endogeneity of CATU using a control function approach with ten individual CAAT applications as instruments. In the first stage, overall CATU was regressed on these instrument scores and control variables (firm size, ownership, and management commitment), and the researcher saved residuals. In the second stage, we included the residuals in the main PLS-SEM models predicting FRDT, together with CATU and controls. The residuals were not statistically significant, indicating no substantial endogeneity bias. Harman's single-factor test further suggested that common method variance was unlikely, as the largest factor explained only 38.7% of the variance. Overall, these results reinforce that CATU exerts a substantive positive effect on fraud detection performance rather than reflecting spurious associations, reverse causality, or measurement bias.

## 2.6. Study V. "Key audit matters disclosure: Do they reveal construction firms' risk of financial distress? Evidence from Ethiopia"

***Methods***

This study aims to empirically investigate the connection between auditors' reports on the type and number of KAMs and the financial distress levels of client firms (sustainability risks). The KAMs are analyzed in two ways: by risk level and financial impact category. The study posed three research questions to address its aim: (1) “Is there a relationship between the number of KAMs reported by auditors and the financial distress level of the client firm?” (2) “Is there a relationship between the risk level of KAMs reported by auditors and the financial distress level of the client firm?” (3) “Is there a relationship between auditors' reporting on KAM categorized by their primary impact and the client firm's financial distress level?”

A quantitative, explanatory research design was used, considering the nature of the variables and the study's objective to examine relationships. The initial sample comprised all construction companies (3,119) registered with the Ethiopian Ministry of Urban Development and Construction (EMUDC) from 2017 to 2021. A purposive sampling technique was employed to select the sample, focusing on recent periods to ensure the findings were current and relevant. The sample was then narrowed to include only grade-one construction firms, as these companies are category-A taxpayers required to submit comprehensive audit reports. Most of these firms' financial audit reports were accessible through the Ethiopian Revenue and Customs Authority (ERCA). We gathered additional KAM disclosures and auditors' data from the company's annual reports. The sampling process excluded 2,698 firms that did not meet the criteria of being grade-one construction companies and category "A" taxpayers. The process left 421 grade-one construction firms. The study excluded an additional 334 companies because they did not provide complete data during the specified period. As a result, the final sample consisted of 87 grade-one construction firms, with 435 firm-year observations.

The study developed three pooled OLS regression models to address the research questions. The dependent variable, financial distress (FIDT), was measured using a revised version of Altman's (1983) Z-score model, a widely accepted method for predicting bankruptcy (Camacho-Minano et al., 2023). The independent variables were defined by the number of Key

Audit Matters (KAMs) in each firm, measured using established methods (Bepari et al., 2022). These included the total number of KAMs (NKAM), the number of account-specific KAMs (AKAM), the number of company-wide KAMs (CKAM), the number of KAMs related to liquidity (FLQY), solvency (FSLY), and profitability (FPRY). The study also incorporated control variables, such as audit fee (ADFE), audit opinion (ADOP), and auditor change (ADCH), to account for auditor characteristics, as well as construction firm size (CFSZ) and the existence of financial restatements (REST) for client characteristics. Following Bepari et al. (2022), the study included fixed effects for year and industry categories to account for time-series trends and industry-specific factors. The following OLS regression models were then developed to analyze the data and answer the research questions.

***Model 1:*** Examines the relationship between the number of KAMs reported by auditors and the client firm's financial distress level (RQ1)

$$FIDT_{it} = \beta_0 + \beta_1 NKAM_{it} + \sum CONTROLS + \varepsilon_{it}$$

***Model 2:*** Examine the relation between the type of KAMs and financial distress level (RQ2)

$$FIDT_{it} = \beta_0 + \beta_1 AKAM_{it} + \beta_2 CKAM_{it} + \sum CONTROLS + \varepsilon_{it}$$

***Model 3:*** Examined the effect of KAM by classifying the financial impact on the financial distress level (RQ3)

$$FIDT_{it} = \beta_0 + \beta_1 FLQY_{it} + \beta_2 FSLY_{it} + \beta_3 FPRY_{it} + \beta_4 GOCN_{it} + \beta_5 OCWR_{it} + \sum CONTROLS + \varepsilon_{it}$$

***Results***

The findings indicate that KAMs reported by auditors are valuable tools for predicting and assessing the financial distress risk of a firm (sustainability risks). Specifically, the study demonstrates that as the number of KAMs disclosed increases, the risk of financial distress for construction companies also rises. The economic significance of this finding shows that the firm's risk of financial distress increases by 19.5% for every additional KAM disclosed. Based on this, the study suggests that construction companies experiencing financial distress disclose around four KAMs (rounded from 2.94 × 1.195 = approximately 4), with the average number of KAMs per sample firm being 2.95.

Furthermore, the nature of KAMs plays a significant role in assessing a firm's level of financial distress. The findings reveal that account-specific KAMs are more influential in

assessing financial distress than company-wide KAMs. The study suggests that, on average, three out of four KAMs disclosed by financially distressed construction companies are account-specific (1.92 × 1.347 = approximately 3). At the same time, the remaining one is company-wide (1.02 × 1.161 = approximately 1), with the average number of account-specific and company-wide KAMs being 1.92 and 1.02, respectively. Additionally, account-specific KAMs, categorized by their primary impact on liquidity, solvency, and profitability, were particularly useful in assessing a firm's financial health and potential for distress. The results show that liquidity (–0.329), solvency (–0.330), profitability (–0.316), and going concern (–0.205) KAMs all have a significantly negative relationship with the firm's financial distress level (FIDT). Conversely, other company-wide KAMs (–0.05) exhibited insignificant negative relationships with FIDT. The result could be that identifying company-wide KAMs, aside from going concern, is more challenging for auditors, making their predictive power weaker than other types of KAMs.

The findings of GOCN align with previous research (Camacho-Minano et al., 2023), demonstrating a notable relationship. However, the link between FIDT and OCWR differs from that found in a previous study (Moroney et al., 2021), which reported no significant correlation. Additionally, the FLQY results are consistent with prior literature on financial distress (Bepari et al., 2022), indicating that liquidity measures are more effective in predicting bankruptcy than other financial indicators. However, this contrasts with the findings of Camacho-Minano et al. (2023), who concluded that firm liquidity does not significantly impact financial distress. Moreover, the FSLY results align with previous research (Kohler et al., 2020) on corporate bankruptcy, confirming that leverage measures are reliable predictors of company defaults. Lastly, the findings for FPRY are consistent with earlier studies (Sierra-García et al., 2019) on financial distress prediction using ratio-based models, which confirmed that profitability measures are the best predictors of bankruptcy. The results remained robust after conducting alternative financial distress measures and endogeneity tests.

As a robustness check, the study employed three alternative financial distress measures (Z″-Score (FIDTzsv), Charitou's score (FIDTch), and Charitou's score indicator (FIDTchv)) to validate the relation between KAMs and FIDT. Logistic regression using FIDTzsv shows a significant negative association with the number of KAMs (coefficient = –0.167), with a pseudo

$R^2$ of 45.1% and an AUC of 0.724, indicating KAMs reliably reflect financial distress. Using FIDTch, higher financial distress is significantly associated with reports disclosing more KAMs. Similar results were found for KAM classifications, while FIDTchv also yielded comparable negative coefficients for both the number and classification of KAMs. Endogeneity was addressed using a two-step system GMM estimator, which corrected for unobserved variables, measurement errors, and simultaneity. The Diff-Hansen test showed no significant over-identification (p = 0.226). Propensity score matching confirmed a negative relationship between NKAM and financial distress (coefficient = –0.193), controlling for auditor characteristics (audit fee, audit opinion) and client characteristics (firm size). Finally, a change specification model using the change in NKAM between periods (NKAM_g) showed a significantly adverse effect (–0.015), demonstrating that KAM disclosures capture changes in financial distress beyond underlying firm fundamentals. Collectively, these results confirm the robustness of KAMs as indicators of financial distress.

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## 4. List of own (and co-authored) publications related to the topic

### *4.1.1. Publications included in the dissertation*

The studies are presented and ordered in original or planned form, as intended for publication.

Wassie, F. A., & Lakatos, L. P. (2024). Artificial intelligence and the future of the internal audit function. *Humanities and Social Sciences Communications, 11*(386), 1–13. https://doi.org/10.1057/s41599-024-02905-w

Wassie, F. A., & Lakatos, L. P. (2024). Technology adoption in audit of information systems: Ethiopian audit firms' perspective. *Journal of Infrastructure, Policy and Development, 8*(13), 1–23. https://doi.org/10.24294/jipd8819

Wassie, F. A., & Lakatos, L. P. (2025). Audit technology as a catalyst for improving non-financial performance in Ethiopian audit firms. *Journal of Open Innovation: Technology, Market, and Complexity, 11*, 100556. https://doi.org/10.1016/j.joitmc.2025.100556

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Wassie, F. A., & Lakatos, L. P. (2023). Key audit matters disclosure: Do they reveal construction firms' risk of financial distress? Evidence from Ethiopia. *International Journal of Construction Management, 24*(15), 1689–1697. https://doi.org/10.1080/15623599.2023.2286882

### *4.1.2. Other publications, conference presentations, and work-in-progress papers related to the topic*

Wassie, F. A., & Lakatos, L. P. (2025). Computer-assisted auditing techniques adoption for audit of information systems. *International Journal of Business Information Systems.* Advance online publication. https://doi.org/10.1504/IJBIS.2024.10065904

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Wassie, F. A., & Lakatos, L. P. (2025). *Driving quality in environmental, social, and governance disclosures: The role of information technology and auditors in Ethiopia*. In Proceedings of the Annual Financial Markets and Liquidity Conference 2025**.** Corvinus University of Budapest, Budapest, Hungary.

Wassie, F. A., Lakatos, L. P., & Szabó, M. L. (2025). *Revolutionizing audit efficiency: The transformative role of IT-driven auditing tools in Ethiopia*. In Proceedings of the 33rd National Conference of Hungarian Auditors 2025**.** Chamber of Hungarian Auditors, Visegrád, Hungary.

Wassie, F. A., & Lakatos, L. P. (2023). *Determinants of computer-assisted audit techniques adoption: Information system auditing by Ethiopian audit firms*. In Uncertainty in Business and Economy – RICE PhD Seminar 2023. National University of Public Service, Budapest, Hungary.

Wassie, F. A. (2023). *Call for independence: Assessing external auditors in Ethiopia from the perspective of firms and clients*, in Proceedings of the 7th International CEO (Communication, Economics, Organization) Social Sciences Congress. Samarkand Branch of Tashkent University of Economics, Samarkand, Uzbekistan.

Wassie, F. A. (2023). *Unlocking the true performance: A study on motivation impact in Ethiopian microfinance institutions.* Paper presented at the International Conference on Financial Management and Economics 2023, Ton Duc Thang University, Ho Chi Minh City, Vietnam

Lakatos, L. P., & Wassie, F. A. (2025). *From rotation to restatement: The impact of auditor changes on financial reporting dynamics in Central Europe.* Journal manuscript under review.

Wassie, F. A., Lakatos, L. P., & Partha, M. (2025). *Expertise and transparency in audit judgments: Experimental evidence from intangible asset valuation in Hungary*. Journal manuscript in preparation (pilot study).