

The Role of Artificial Intelligence in Enhancing the Effectiveness and Efficiency in Audit Firms

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Abstract

This research explores how Artificial Intelligence (AI) can revolutionize audit practices by investigating how AI can be implemented in audit firms and the resulting impact on those practices. The research design utilizes a qualitative case study approach, which provides in-depth insight into the adoption of AI within audit firms. By examining the perspectives of auditors, managers, and other stakeholders, this research highlights the factors that influence AI implementation. The research findings reveal that AI offers powerful tools for audit firms, namely automating repetitive tasks, analyzing massive data sets to detect risks, and improving communication and collaboration. These advancements could result in greater efficiency, potentially better audit quality, and more streamlined workflows. However, challenges remain. Auditors may exhibit biases toward human specialists, and data quality is critical to successful AI integration. Overall, this research contributes valuable knowledge to both academic literature and practical applications in auditing.

KEYWORDS: Artificial Intelligence, Audit Firms, AI, Effectiveness, Efficiency.

Abstrak

Penelitian ini mengeksplorasi bagaimana Kecerdasan Buatan (AI) dapat merevolusi praktik audit dengan menyelidiki bagaimana AI dapat diimplementasikan dalam perusahaan audit dan dampak yang dihasilkan terhadap praktik-praktik tersebut. Desain penelitian menggunakan pendekatan studi kasus kualitatif, yang memberikan wawasan mendalam tentang adopsi AI dalam perusahaan audit. Dengan memeriksa perspektif auditor, manajer, dan pemangku kepentingan lainnya, penelitian ini menyoroti faktor-faktor yang mempengaruhi implementasi AI. Temuan penelitian mengungkapkan bahwa AI menawarkan perangkat yang kuat untuk perusahaan audit, yaitu mengotomatisasi tugas-tugas yang berulang, menganalisis kumpulan data yang sangat besar untuk mendeteksi risiko, serta meningkatkan komunikasi dan kolaborasi. Kemajuan ini dapat menghasilkan efisiensi yang lebih besar, kualitas audit yang berpotensi lebih baik, dan alur kerja yang lebih efisien. Akan tetapi, tantangan tetap ada. Auditor dapat menunjukkan bias terhadap spesialis manusia, dan kualitas data sangat penting untuk keberhasilan integrasi AI. Secara keseluruhan, penelitian ini memberikan kontribusi pengetahuan yang berharga bagi literatur akademis dan aplikasi praktis dalam audit.

KATA KUNCI: *Artificial Intelligence, Kecerdasan Buatan, Efektivitas Audit, Efisiensi Audit*

INTRODUCTION

The Jiwasraya case which shook Indonesia in 2019, highlighted significant lapses in the role of auditors, particularly those from PricewaterhouseCoopers (PwC) Indonesia. Over nearly a decade (2008-2017), PwC audited Jiwasraya's financial statements and identified issues such as overvalued investments and unusual transactions, yet ultimately issued a qualified opinion (Nugroho & Abdullah, 2021). Despite these red flags, PwC failed to uncover the massive corruption scandal that later emerged, raising questions of negligence and potential conspiracy (Trihatmoko & Kuncoro, 2021). This failure points to a lack of thorough and meticulous auditing practices (Sari, 2020).

Despite these findings, PwC issued a qualified opinion on Jiwasraya's financial statements. A qualified opinion indicates that, except for certain issues, the financial statements present a true and fair view of the company's financial position (Trihatmoko & Kuncoro, 2021). This type of opinion still suggests there are specific concerns that need to be addressed, but it does not indicate a pervasive problem across the entire financial statement. However, PwC's audit did not uncover the full extent of the corruption and financial mismanagement at Jiwasraya. The massive scandal that eventually surfaced involved extensive fraud and led to significant financial losses.

The significant audit failures had profound consequences for the auditing profession and regulatory landscape in Indonesia. The credibility of auditors was severely damaged as public trust eroded. The investors and the public rely on auditors to provide an accurate and unbiased assessment of a company's financial health. PwC Indonesia, the auditor involved, faced sanctions from regulatory bodies like the Financial Services Authority (OJK) and the Ministry of Finance, which underscored the need for higher audit quality and stricter compliance with auditing standards (Sari, 2020). Consequently, the case prompted regulatory reforms aimed at enhancing the robustness of audit practices to prevent similar occurrences in the future. By Integrating Artificial Intelligence (AI) into the auditing process, it could have mitigated these issues by providing enhanced data analysis, continuous monitoring, and improved risk assessment, thereby supporting auditors in conducting more thorough and reliable audits.

If Artificial Intelligence (AI) implemented in the auditing processes at Jiwasraya, this scandal could likely have been averted. AI-driven audit tools offer enhanced capabilities in analyzing large datasets, detecting anomalies, and continuously monitoring financial transactions with unparalleled accuracy and efficiency (Karmańska, 2022). These systems can identify patterns and irregularities that human auditors might overlook, providing real-time insights and alerts for deeper investigation. Therefore, the integration of AI in audit practices not only enhances the reliability and thoroughness of audits but also mitigates the risks of oversight and fraud, ensuring greater financial integrity and trust.

The implementation of Artificial Intelligence (AI) in audit firms has significantly transformed the audit profession, enhancing both the efficiency and effectiveness of audit procedures. Research by Munoko et al. (2020) indicates that AI provides substantial benefits, such as time savings, faster data analysis, increased accuracy, and more in-depth insights into business processes, ultimately enhancing client service and competitive advantage (Munoko et al., 2020). Similarly, Ivakhnenkov (2023) highlights that AI in auditing improves data analysis, reduces human error, and enhances audit quality, although human expertise remains essential for proper implementation. Seethamraju & Hecimovic (2022) note that although the introduction of AI has the potential to improve audit quality and provide value-added services, the perceived lack of control in AI's "black box" environment is hindering audit practices need to be reconsidered. Integrating AI into auditing automates routine tasks, enhances anomaly detection, and enables auditors to provide more reliable and efficient services, but it also raises ethical implications and Careful consideration should also be given to the need for ongoing human monitoring.

Research on the role of artificial intelligence (AI) in improving the effectiveness and efficiency of audit firms has revealed a variety of benefits, including improved audit quality, reduced human error, and increased efficiency in data analysis. However, several research gaps remain unaddressed. Firstly, while numerous studies focus on the ethical implications and technological benefits of AI in auditing (Munoko et al., 2020), Research into the long-term impact on audit practices and quality is limited as AI is perceived to be uncontrollable in a "black box" environment (Seethamraju & Hecimovic, 2022). Additionally, the specific challenges of AI

implementation in small and medium-sized audit firms are under-explored, with most research centered on large organizations (Rikhardsson et al., 2022). Another gap includes the need for in-depth analysis of how the introduction of AI will impact audit fees and the replacement of human auditors. This is because conflicting results have been obtained regarding the time it takes for these effects to become apparent (Fedyk et al., 2021). Lastly, while AI's potential to transform audit procedures is well-documented, there is a need for more comprehensive frameworks to address data quality, regulatory compliance, and interdisciplinary collaboration in AI integration within audit firms (Ivakhnenkov, 2023). Addressing these gaps can provide a holistic understanding of the role of AI in auditing and guide its effective implementation.

Based on research gap above, the research question is RQ1: How can AI be implemented in audit firms?; RQ2: What are the impacts of AI implementation on audit firms?. This research makes a significant contribution to both academic literature and practical applications in the auditing field. Firstly, it provides a comprehensive analysis of how AI technologies can be systematically implemented within audit firms, addressing both technical and organizational challenges. This research bridges existing knowledge gaps by exploring the practical steps and considerations necessary for successful AI integration. Secondly, it evaluates the tangible impacts of AI adoption on audit firm operations, including improvements in audit quality, efficiency, and accuracy. By examining the ethical, regulatory, and human factors involved, this study offers a balanced perspective on the benefits and potential risks of AI in auditing. Overall, the research not only enhances the theoretical understanding of AI's role in auditing but also provides actionable insights for audit practitioners, policymakers, and technology developers seeking to leverage AI for enhanced audit effectiveness and efficiency.

LITERATURE REVIEW

Technology Acceptance Model (TAM) Theory

The Technology Acceptance Model (TAM) is a widely used theoretical framework in the fields of information systems and technology adoption research. TAM aims to describe and predict

user acceptance and usage of new technologies based on user perceptions of usefulness and ease of use (Pande & Taeihagh, 2024). TAM believes that users' intention to use technology is influenced by two main factors:

1) *Perceived Usefulness (PU)*

This refers to the extent to which users believe that using a particular technology will improve their job performance or productivity. In the context of an audit firm, auditors may consider AI technology useful if they believe it can improve audit quality, efficiency, accuracy, or decision-making processes (Bruin, et al., 2021).

2) *Perceived Ease of Use (PEOU)*

This relates to the extent to which users perceive that using the technology is free. It incorporates factors such as simplicity of operation, ease of learning, and compatibility with existing workflows. In audit firms, auditors may be more inclined to adopt AI technology if they find it easy to use and integrate into existing audit procedures (Bruin, et al., 2021).

TAM believes that both perceived usefulness and perceived ease of use directly affect users' attitudes toward technology adoption, which in turn affects their behavioral intentions to use the technology. Furthermore, users' actual usage behavior is influenced by their intentions to use the technology. In this research, TAM can provide valuable insights into auditors' acceptance and adoption of AI technologies. Investigating auditors' perceptions of the usefulness and ease of use of AI tools in their audit work, researchers can assess their willingness to adopt these technologies and integrate them into their work practices.

Resource-Based View (RBV) Theory.

The Resource-Based view (RBV) theory is a strategic management framework that emphasizes the importance of internal resources and capabilities in achieving sustainable competitive advantage (Utami & Alamanos, 2022). Developed primarily by scholars such as Jay Barney and Birger Wernerfelt in the 1980s and 1990s, RBV suggests that Companies can gain

competitive advantage by leveraging unique, valuable, rare, and irreplaceable skills resources and capabilities (Beamish & Chakravarty, 2021). RBV identifies two types of resources:

- a) Tangible Resources, these are the physical and financial assets of a firm, including equipment, facilities, capital, and cash reserves.
- b) Intangible Resources, these are less tangible assets such as brand reputation, intellectual capital, organizational behavior, and knowledge assets.

RBV argues that sustainable competitive advantage arises from the possession of resources that meet certain criteria:

- 1) Value: Resources should enable a company to take advantage of opportunities or mitigate obstacle in its external environment.
- 2) Rareness: Resources should be unique or rare compared to those of competitors.
- 3) Inimitability: Competitors should find it difficult to imitate or replicate the firm's resources.
- 4) Non-Substitutability: There should be no equivalent substitutes for the companies resources.

In the point of view of audit firms and this research, RBV theory can provide insights into how AI technologies can become a strategic resource for companies seeking a competitive advantage in the audit industry. Artificial intelligence technologies such as machine learning algorithms, natural language processing and data analysis tools can be viewed as valuable and potentially rare resources for audit firms. These technologies can make audits more effective and efficient by change the company routine tasks into automatization, increasing the ability of data analysis, and providing deeper insights into financial information.

The unique capabilities of AI, such as its Ability to process large amounts of data at high speed and identify patterns and anomalies, can give audit firms a competitive edge in delivering audit services with greater accuracy, reliability, and timeliness (Lubis, 2022). Moreover, the inimitable nature of AI technologies presents a barrier to imitation by competitors. Developing AI capabilities requires significant investments in technology infrastructure, data analytics expertise,

and organizational change management. Firms that successfully integrate AI into their audit processes can establish a distinctive competency that is difficult for rivals to replicate.

By applying RBV theory to the research on AI implementation in audit firms, researchers can examine how the strategic deployment of AI resources contributes to firms' competitive advantage. They can explore the relationship between the unique features of AI technologies and audit firms' ability to create value, differentiate their services, and sustain long-term performance in the dynamic and competitive audit market.

METHODOLOGY

Research Approach

In this research, we use the qualitative case study approach to explore the multifaceted nature of AI implementation and its impact on audit practices (Sjoberg et al., 2020). By conducting in-depth case studies within audit firms, researchers can investigate the contextual factors that influence the adoption and utilization of AI technologies, such as organizational culture, leadership support, and technological infrastructure. Additionally, the qualitative case study approach allows researchers to capture the diverse perspectives of auditors, managers, and other stakeholders involved in AI implementation, shedding light on their motivations, concerns, and experiences (El Khatib & Ahmed, 2020). Through rigorous data collection and analysis, qualitative case studies contribute to a nuanced understanding of the opportunities and challenges associated with integrating AI into audit practices, informing future research, practice, and policy in the field.

Data Source

This research, employing a qualitative case study approach, investigates the multifaceted nature of Artificial Intelligence (AI) implementation and its impact on audit practices within audit firms. Here, we explore suitable data collection techniques to gather rich and detailed information:

1) Semi-structured Interviews

This will be the cornerstone of data collection. A semi-structured interview guide, comprised of open-ended questions, will be developed to delve into the lived experiences and

perspectives of various stakeholders involved in AI implementation at the chosen case study firms. These stakeholders may include auditors, managers, and other personnel directly or indirectly impacted by AI adoption. The interview guide will be adaptable, allowing for tailoring questions to each participant's specific role and expertise within the firm.

2) Document Analysis

Collecting and meticulously analyzing relevant documents pertaining to AI implementation in the case study firms is crucial. These documents could encompass internal reports detailing AI adoption strategies, training materials for auditors on using AI tools, press releases announcing AI initiatives, and social media posts highlighting the firm's approach to AI. By critically examining these documents, researchers can gain valuable context and supplementary insights into the firms' philosophies and practices regarding AI integration.

3) Participant Observation

With the informed consent of the case study firms, researchers may opt to conduct participant observation. This entails observing auditors and other personnel as they utilize AI tools in their daily work practices. Witnessing firsthand the interactions between personnel and the technology, along with observing their work environment, can offer invaluable insights into the practicalities and implications of AI integration within the audit process.

Research Technique.

This This research will delve into the transformative role of Artificial Intelligence (AI) in audit firms by employing a qualitative case study approach with triangulation. The case study method allows for an in-depth exploration of AI implementation within chosen firms, focusing on the experiences and perspectives of auditors, managers, and other stakeholders (Sjoberg et al., 2020). To strengthen the credibility and richness of the findings, triangulation will be used. This involves gathering data through multiple methods, such as semi-structured interviews, document analysis of internal reports and training materials, and potentially participant observation (Thomas, 2021). Additionally, surveys with a broader sample of auditors can be incorporated to provide a wider industry perspective. By triangulating data from internal and external sources, as well as perceptual and objective data, the research aims to achieve a comprehensive

understanding of how AI impacts audit effectiveness and efficiency within the case study firms. This multifaceted approach will contribute valuable insights into the evolving landscape of auditing in the face of AI advancements

RESULT AND DISCUSSION

AI implementation in audit firms

Audit firms can leverage AI in various ways to improve efficiency and effectiveness. These functionalities go beyond replacing auditors; AI acts as an assistant, automating specific tasks and enhancing human capabilities. The AI implementation in Audit Firm illustrated on figure below

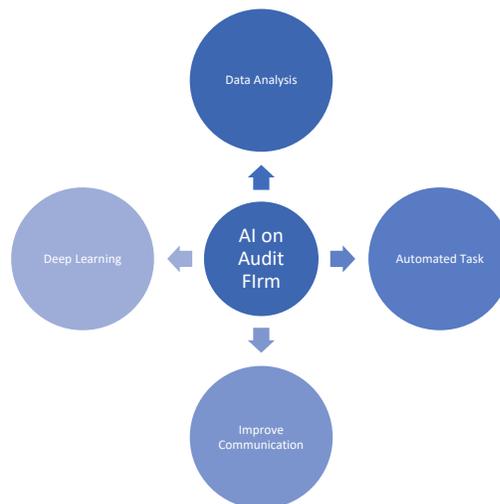


Figure 1 AI Implementation on Audit Firm

Source: Rikhardsson et al. (2022)

- **Data Analysis:** AI, particularly machine learning, can analyze vast amounts of data from various sources like text, audio, and video. This can be used to identify patterns, anomalies, and potential risks that might be missed by manual review.
- **Automated Tasks:** Repetitive tasks like data extraction, document review, and transaction testing can be automated using Robotic Process Automation (RPA) or other AI tools. This frees up auditors' time to focus on higher-level analysis and judgment.

- **Improved Communication:** Natural Language Processing (NLP) can automate communication with clients, such as sending inquiries and analyzing responses. This streamlines communication and allows auditors to focus on complex interactions.
- **Deep Learning:** This advanced AI technique can be used to generate insights and support auditor judgment during various phases of the audit process. It can analyze diverse data types to provide a more comprehensive picture of potential risks.

While research suggests significant benefits, challenges exist. Auditors may exhibit an "algorithm aversion," placing undue trust in human specialists over AI-generated evidence. Addressing this bias is crucial for successful AI implementation. Overall, AI offers a range of tools to enhance the audit process, allowing auditors to work more efficiently and effectively while focusing on areas requiring human expertise and judgment.

In context of A Landscape of Technologies and Applications, Artificial intelligence (AI) has become a ubiquitous term, encompassing a vast array of technologies capable of intelligent behavior. Understanding the specific tools and their functionalities is crucial for exploring AI's potential impact on various fields, including auditing. This section delves into a map of AI technologies and applications, providing a framework for comprehending the diverse capabilities of AI.

The map, based on the work of Corea (2018), categorizes AI technologies into distinct domains based on their underlying principles. These domains include logic-based technologies, knowledge-based technologies, probabilistic methods, and machine learning tools. Each domain offers unique functionalities, such as knowledge representation, reasoning under uncertainty, and the ability to learn from data.

Furthermore, the map illustrates how these technologies translate into practical applications. AI can be used for setting and achieving goals, representing and understanding the world around us, and transforming raw data into meaningful information. Specific technologies like inductive logic programming, robotic process automation (RPA), decision networks, artificial neural networks, computer vision, and natural language processing (NLP) all fall under these overarching applications.

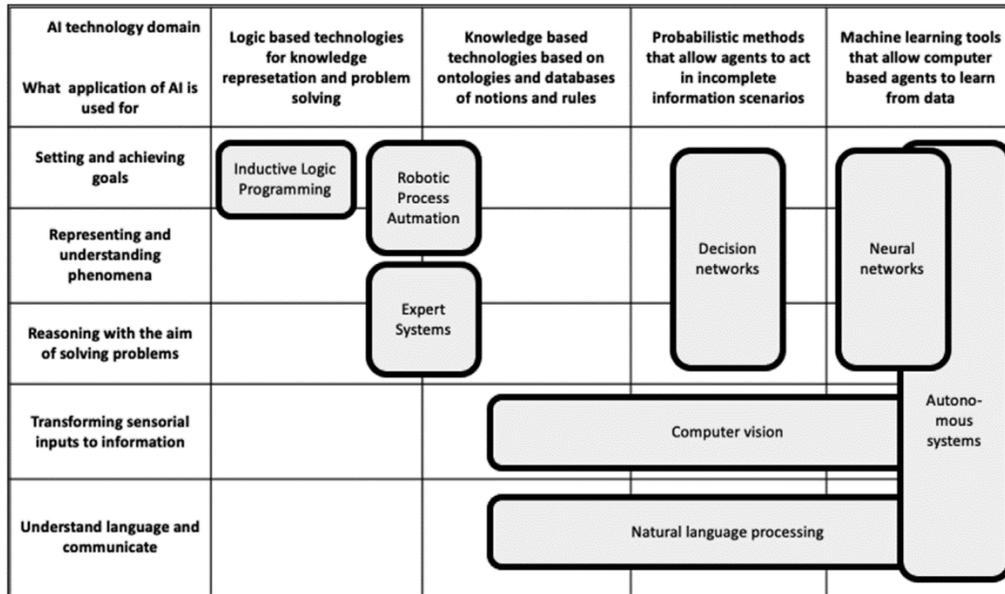


Figure 2 A map of AI technologies and applications based on AI technology domains and what the application of AI

Source: Rikhardsson et al. (2022)

The Figure show the outlines various AI technologies and applications. Here’s a breakdown of the information it contains:

AI Technology Domains:

- Logic Based Technologies: This section refers to tools used for knowledge representation and problem-solving. It likely encompasses technologies like expert systems and logical reasoning methods.
- Knowledge Based Technologies: This section covers technologies that rely on knowledge bases and ontologies, which are structured databases formalizing specific knowledge domains.
- Probabilistic Methods: This section refers to technologies that allow for reasoning and decision-making in situations with incomplete information. This likely includes Bayesian networks and other statistical methods.
- Machine Learning Tools: This section covers technologies that allow computers to learn from data without explicit programming. This is a broad category encompassing various techniques like neural networks, decision trees, and support vector machines.

Applications of AI:

- Setting and Achieving Goals: This section likely refers to planning and scheduling algorithms that can be used to define and achieve goals within an AI system.
- Representing and Understanding Phenomena: This section likely refers to machine learning and computer vision techniques that allow AI systems to perceive and interpret the world around them. This could involve image or speech recognition.
- Transforming Sensorial Inputs to Information: This section refers to technologies that convert raw sensory data (like images or audio) into a format that can be understood and processed by AI systems.

Specific Technologies:

- Inductive Logic Programming: This is a type of machine learning where the system learns by inductively generating rules from data.
- Robotic Process Automation (RPA): This technology automates repetitive tasks using software robots that can mimic human actions while interacting with computer applications.
- Decision Networks: This refers to probabilistic graphical models that encode relationships between variables and can be used for reasoning and decision-making under uncertainty.
- Artificial Neural Networks: These are interconnected groups of artificial neurons inspired by the biological structure of the brain. They are capable of learning complex patterns from data.
- Computer Vision: This field refers to image and video analysis techniques that enable computers to interpret and understand visual content.
- Natural Language Processing (NLP): This field refers to technologies that allow computers to understand and process human language.

Overall, the diagram provides a high-level overview of various AI technologies and their applications across different domains. It highlights the breadth of AI and how these technologies can be used for various tasks such as planning, perception, data processing, and language understanding.

The impacts of AI implementation in audit firms.

Artificial intelligence (AI) is rapidly transforming numerous industries, and the auditing profession is no exception. By leveraging AI's capabilities, audit firms can enhance efficiency, effectiveness, and potentially the quality of their audits. This section explores the multifaceted impacts of AI implementation in audit firms, drawing upon relevant research findings.

1) Enhanced Efficiency and Productivity:

One of the most significant impacts of AI is the potential to streamline the audit process. Repetitive and time-consuming tasks, such as data extraction, document review, and transaction testing, can be automated using AI tools like Robotic Process Automation (RPA) (Huang & Vasarhelyi, 2019). This frees up valuable auditor time for higher-level analysis, judgment, and focusing on areas requiring human expertise. Research by McKinsey Global Institute (2017) suggests that over 60% of occupations involve tasks where more than 30% can be automated, indicating significant potential for efficiency gains in auditing.

2) Deeper Data Analysis and Risk Detection:

AI, particularly machine learning techniques, excels at analyzing vast amounts of data from various sources, including text, audio, and video (Sun, 2019). This allows auditors to identify patterns, anomalies, and potential risks that might be missed by traditional manual review. For example, AI can analyze financial statements, contracts, and communication records to pinpoint inconsistencies or red flags that may indicate fraud or errors.

3) Improved Communication and Collaboration:

Natural Language Processing (NLP) plays a crucial role in facilitating communication within the audit process. NLP can automate tasks like sending inquiries to clients and analyzing their responses (Raschke et al., 2018). This streamlines communication and allows auditors to focus on complex interactions requiring human judgment. Additionally, AI-powered collaboration tools can enhance teamwork within audit teams and potentially with clients, fostering a more efficient workflow.

4) Evolving Role of Auditors:

While AI automates tasks, it's important to understand that it is not intended to replace auditors. AI acts as an assistant, augmenting human capabilities and allowing auditors to focus on higher-order skills like critical thinking, professional skepticism, and decision-making (Faggella, 2020). This shift necessitates a focus on developing new skillsets within the audit profession, with auditors needing to adapt and learn to work effectively alongside AI tools.

5) Challenges and Considerations:

Despite the potential benefits, challenges exist in AI implementation within audit firms. One concern is "algorithm aversion," where auditors may place undue trust in human specialists over AI-generated evidence (Commerford et al., 2021). Addressing this bias through training and fostering trust in AI's capabilities is crucial. Additionally, ensuring data quality and security is paramount, as AI models are only as good as the data they are trained on. Furthermore, ethical considerations regarding transparency and potential job displacement within the audit profession need to be addressed.

CONCLUSIONS

This research has explored the potential of Artificial Intelligence (AI) to revolutionize the auditing profession. The Jiwasyaya case exposed critical shortcomings in traditional audit practices, highlighting the need for enhanced efficiency, data analysis, and risk detection. AI offers a compelling solution, promising to streamline workflows, uncover hidden patterns, and ultimately enhance audit quality.

The findings show that Audit firms can leverage AI in various ways to boost efficiency and effectiveness. AI acts as an assistant, automating repetitive tasks like data extraction and document review while freeing up auditors for higher-level analysis. Advanced AI techniques like machine learning can analyze vast datasets to identify patterns and potential risks that might be missed by traditional methods. Natural Language Processing (NLP) can streamline communication and improve collaboration within audit teams.

The additional findings show that AI implementation offers a multitude of benefits. Firstly, it streamlines workflows and automates repetitive tasks, enhancing efficiency and productivity. Secondly, AI excels at analyzing vast amounts of data, enabling auditors to detect anomalies and potential risks that might be missed by manual review. This can lead to deeper data analysis and potentially improved audit quality. Thirdly, AI can facilitate communication and collaboration within audit teams, fostering a more efficient workflow. However, challenges exist. Auditors may exhibit a bias towards human specialists over AI-generated evidence. Addressing this and ensuring data quality are crucial for successful AI integration. Ethical considerations regarding transparency and potential job displacement within the audit profession also require careful attention.

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