What is the role of artificial intelligence in shaping accounting information systems? A literature review

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Abstract:

Artificial intelligence (AI) applied to accounting and auditing represents a matter that is getting the attention of researchers. This paper provides an understanding of the evolution of AI and its role in shaping accounting information systems (AISs). It aims to summarize the current state of the literature that deals with the impact of AI on AIS, highlighting related aspects, such as the benefits and challenges of AI in AIS research. This review suggests that current studies dealing with this matter are scarce and invites future research to examine how bias and transparency are handled in the context of AI auditing systems and whether human auditors will fully rely on AI outcomes.

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1. Introduction:

The accounting literature makes a significant contribution to information systems management. It highlights how accounting insights can help information systems professionals manage the intangible aspects of information technology (IT) projects. These contributions include assessing risks, controlling and coordinating projects, addressing biases in decision support systems, and examining the authority and incentive structure of the firm (O'Connor and Martinsons, 2006; Soudani, 2012). Given the rapid evolution of technology and digital advancements, the study of accounting information systems (AISs) remains highly pertinent. In the conventional sense, AIS is recognized as a computerized framework responsible for collecting, inputting, processing, storing, supervising, and presenting accounting data. It serves various purposes, like decision-making and planning, and is used by internal users for reporting to investors, creditors, and tax authorities (Dagiliene and Šutiene, 2019; Turner et al., 2020). The primary function of AIS involves handling both financial and non-financial transactions to generate high-quality information that is vital for steering business operations. It oversees, organizes, monitors, synchronizes, and appraises performance. Moreover, this system curtails organizational expenses, bolsters operational efficiency, and furnishes reliable real-time data when needed. It also fosters global knowledge and innovative reporting methods while streamlining the connection between risk areas and business activities (Huy and Phuc, 2020; Ibrahim et al., 2020; Kwarteng and Aveh, 2018; Ladan Shagari et al., 2017).

Typically, AISs are implemented before other business applications to ensure compliance with essential regulations such as bookkeeping and financial statement disclosures (Petratos and Faccia, 2019). The current AISs in use, even when cloud-based, are structured as centralized systems across all companies to uphold security principles like confidentiality, controllability through ensuring direct access and a clear chain of command, and cost-effectiveness (Hadidi and Hadidi 2020; Parthasarathy and Sharma 2016; Faccia et al., 2019; Zhezhnych and Tarasov, 2018).

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Scholarly discussions also delve into the benefits of applying AIS. For instance, Soudani (2012) emphasizes that the optimal utilization of an AIS in a company is correlated with enhanced flexibility and adaptation to market changes, ultimately improving the effectiveness of transactions and competitiveness. In Furthermore, AIS has the potential to reduce decision-making uncertainties and facilitate improved planning and control of business operations (Sari et al., 2019).

Moreover, the evolving technological landscape has significantly impacted AISs, especially with the advent of artificial intelligence (AI) (Kureljusic and Karger, 2023). The introduction of AI has revolutionized how accounting data is processed, analyzed, and utilized. AI-powered tools have enabled the automation of repetitive tasks, improved data accuracy, and facilitated predictive analytics. This transformation has turned accounting systems into dynamic, intelligent platforms capable of delivering real-time insights for informed decision-making in today's rapidly changing business environment (Cooper et al., 2019).

AI encompasses various techniques within this global trend, incorporating big data strategies and advanced machine learning to comprehend data patterns and forecast future scenarios (Cockcroft, S., & Russell, 2018; Ionescu, 2019; Kureljusic and Karger, 2023). Sophisticated AI-based accounting software diverges significantly from traditional AISs, constantly adapting its design and coding through learning to approach human cognitive capabilities in certain tasks (Munoko et al., 2020). Moreover, AI-driven processing speed surpasses human capacity in handling repetitive yet cognitively demanding accounting and auditing functions (Cooper et al., 2019). For instance, AI-enabled smart robots now swiftly identify critical contract terms in intricate lease, loan, and debt contracts for IFRS 9 classification, completing tasks significantly faster (Cooper et al., 2019). The autonomous functionality of AI, as demonstrated by the IFRS classification, raises questions about accountability, traceability of these classifications, and the ethical implications regarding their impact on society and the workforce (Lehner et al., 2022; Munoko et al., 2020).

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Despite increased interest, the computer science or management disciplines dominate the study of AI. Previous research initiatives have largely investigated technical points of view and, more particularly, some specific AI algorithms and their accuracy for selected data sets, often excluding outliers to produce results that are more accurate. We believe that to advance research in AIS, we need to recognize past accomplishments and identify areas that require further investigation. Therefore, the purpose of this review is to provide an understanding of the evolution of AI and its role in shaping AISs. It aims to offer an overview of the current state of the literature that deals with the impact of AI on AIS, highlighting related aspects such as the benefits and challenges of AI in AIS research. Additionally, it provides avenues for future research.

Our research makes two significant contributions to the existing AIS literature. Firstly, we shed light on the extent to which AI has impacted AIS research. Secondly, as argued by Jans et al. (2023), AIS studies in accounting journals tend to be fragmented. Therefore, this review aims to provide an overview of the current state of the literature that deals with the impact of AI on AIS.

As such, the paper is organized as follows: Section 2 outlines the evolution and integration of AI in AIS. Section 3 presents the literature review. Section 4 discusses the benefits and challenges of AI in AIS. Finally, Section 5 offers concluding remarks and avenues for future research.

2. Evolution and integration of AI in AIS:

Throughout history, the evolution of accountants' work has paralleled the advancements in information technology, with scholars emphasizing the interwoven nature of technology and accounting information (Granlund and Mouritsen, 2003). The literature outlines the pivotal technological phases that have greatly impacted companies. The initial phase was marked by the advent of computerized information systems. These systems were introduced in the 1960s and 1970s. These systems revolutionized how accountants managed data, enabling more comprehensive records and precise analyses. The subsequent phase, in the 1990s and early 2000s, saw the rise of the World Wide Web and integrated information systems such as enterprise resource

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planning (Rom and Rohde, 2007). Currently, we are experiencing the third phase of technological evolution, characterized by digitalization and AI, which is unfolding and reshaping organizational operations and accounting practices (Collins et al., 2021; Jans et al., 2022; Knudsen, 2020).

In 1955, John McCarthy defined AI as "the science and engineering of making intelligent machines." (McCarthy, 2007, p. 2). Initially, AI focused on high-level cognition rather than animal-like abilities such as recognizing concepts or perceiving objects. It aimed to achieve multi-step reasoning, understanding natural language, creating novel plans, and even contemplating its own thought processes. The integration of AI tools and techniques within AIS frameworks represents a pivotal evolution in accounting systems (Harrast, 2020; Yoshikuni et al., 2023). This fusion involves embedding AI capabilities into traditional AIS, enabling the automation and enhancement of various accounting processes.

AI tools encompass machine learning algorithms, natural language processing (NLP), and predictive analytics, among others, which are integrated into AIS to efficiently process, interpret, and analyze large volumes of financial data (Ranta et al., 2023). For instance, machine learning algorithms facilitate pattern recognition and anomaly detection within financial datasets, aiding in fraud detection and risk assessment (Ionescu 2019; Kureljusic and Karger 2023). NLP algorithms empower AIS to comprehend and extract insights from unstructured financial texts, such as regulatory filings or financial reports. Moreover, predictive analytics models embedded in AIS provide predictive capabilities for financial forecasting and decision-making (Yoshikuni et al., 2023). This integration not only accelerates the speed and accuracy of financial data processing but also augments the quality and depth of insights generated. As a result, it improves the overall efficiency and effectiveness of accounting processes. However, while this integration holds immense potential, it also necessitates careful consideration of ethical implications, data privacy concerns, and the need for ongoing human oversight to ensure accurate and ethical use of AI-driven AIS (Lehner et al., 2022; Zhang et al., 2023).

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AI tools and techniques are integrated into AIS frameworks through various applications that revolutionize accounting processes. One notable application is the utilization of machine learning algorithms for financial data analysis and anomaly detection. These algorithms enable AIS to discern patterns within vast datasets, automatically detecting irregularities or potential instances of fraud (Ranta et al., 2023; Yoshikuni et al., 2023). NLP techniques represent another significant integration, allowing AIS to interpret unstructured financial texts such as regulatory filings or financial reports (Fisher et al., 2016). This capability enables the system to extract relevant insights, assisting in compliance assessments or trend analysis. Predictive analytics, another facet of AI, empowers AIS to forecast financial trends or outcomes based on historical data, aiding in decision-making and strategic planning (Huerta and Jensen, 2022). Additionally, robotic process automation (RPA) functionalities automate repetitive accounting tasks like data entry, reconciliation, and report generation, freeing up valuable time for accounting professionals to focus on analysis and strategy (Harrast, 2020; Ionescu, 2020). These integrations not only enhance the efficiency and accuracy of accounting processes but also offer advanced functionalities, thereby augmenting the overall value and capabilities of AIS in modern accounting practices.

3. Empirical studies on the impact of AI on AIS

AI applied to accounting and auditing represents a matter that is getting the attention of researchers. Studies that focus on this issue are limited. Some of them investigate the emergence of AI in accounting and auditing (Kokina and Davenport, 2017; Makridakis, 2017) or the effect of AI on the accounting and auditing profession (Chukwuani and Egiyi, 2020; Chukwudi et al., 2018; Cooper et al., 2019; Lee and Tajudeen, 2020). They also focus on the limits of AI for accounting tasks (Leitner-Hanetseder et al., 2021) and the potential impact of AI on forecasting in financial and accounting fields (Kureljusic, Karger, 2023).

The sorts of AI applications were divided into four groups by Kokina and Davenport (2017), who further divided the degree of intelligence attained by the technology into an additional four groups. The applications include analyzing numbers,

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word and image processing, digital job execution, and physical task execution. The categories for intelligence levels are: self-aware intelligence, context awareness and learning, repetitive task automation, and human support. While many accounting and auditing duties can be completed using the other three levels of intelligence, none of the AI applications have yet attained the self-aware intelligence level.

Makridakis (2017) examines the potential for machines to become truly intelligent as well as current and upcoming developments in artificial intelligence. The report outlines key theories and hypotheses about how artificial intelligence could transform human life. One of the most significant changes that AI may bring about in the human environment is the transformation of the field and industry of accounting and auditing.

Cooper et al. (2019) examine the adoption of RPA, known as bots, in the public accounting industry. Big 4 auditing firms use this software to reduce repetitive and monotonous business procedures by automating data input, processing, and output across computer applications. To get insights into how RPA software is currently being used, the authors conducted semi-structured interviews with 14 accounting professionals from the Big Four auditing companies. According to interviewees, bots are used throughout the firm but have acquired the most popularity in tax services, followed by advising services and assurance services. According to interviewees, bot adoption has boosted quality and resulted in astounding advances in efficiency. Interviewees report that bot usage reduces outsourcing while enhancing employee job satisfaction and upward career advancement. In addition, respondents provide their thoughts on the abilities required to thrive in an accounting profession that combines RPA and human judgment.

Chukwuani and Egiyi (2020) investigate the effect of AI on the accounting sector. They demonstrate the level of progress being made in the accounting business in terms of automating the accounting process. They discuss the accountant's role in modern automation and how accountants in the twenty-first century can adjust to broad automation in the sector.

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Chukwudi et al. (2018) present the influence of AI on accounting functions in a survey-based descriptive study. According to the findings of their research, the use of artificial intelligence improves the performance of accounting functions in accounting businesses in southeast Nigeria.

In a survey of Malaysian organizations utilizing various AI-based accounting software, Lee and Tajudeen (2020) demonstrate that the adoption of AI is not execlusive to large firms. Additionally, their findings reveal that these firms are employing AI-powered accounting software to store invoice images and fully automate the process of capturing information.

In their study, Kureljusic and Karger (2023) explain that one widely employed use of AI approaches is forecasting. This includes forecasting cash flow variables such as customer payment dates (Bahrami et al., 2020), and profit and loss variables, such as revenues (Kureljusic and Reisch, 2022).

4. Benefits and challenges of adopting AI in AIS

AI technology has revolutionized the field of financial reporting. In fact, with automated data entry and processing using AI algorithms, firms are able to handle large volumes of data and improve efficiency and time savings (Cooper et al., 2019). Moreover, AI-powered predictive analytics offer valuable insights for decision-making and financial reporting as well, which leads to making more informed choices (Bahrami et al., 2020; Yoshikuni et al., 2023).

AI has a key role in enhancing accuracy and reliability in financial reporting by decreasing errors in AIS (Huy and Phuc, 2020; Ibrahim et al., 2020). In addition, AI-enabled fraud detection and risk management systems help identify and prevent fraudulent actions in accounting data, leading to strengthening security measures (Petratos and Faccia, 2019; Ranta et al., 2023; Yoshikuni et al., 2023). Also, real-time insights offered by AI allow companies to make better decisions and stay ahead in the competitive market (Cooper et al., 2019).

While most studies shed light on the numerous benefits of using AI in AIS, some other studies show the importance of the different challenges that companies may

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encounter and take into consideration. In fact, Lehner et al. (2022) suggest that ethical considerations are critical in the development and implementation of AI-powered AIS. Biases in AI systems can perpetuate discrimination and inequality; thus, they must be addressed and mitigated. Also, transparency is important, as AI systems must be able to explain their decision-making processes in order to be held accountable. Additionally, to properly use AI in AIS, talent gaps and training requirements must be addressed, as employees may require upskilling or reskilling to operate alongside AI technologies (Leitner-Hanetseder et al., 2021). To secure sensitive information, security concerns such as data privacy and cybersecurity threats must be carefully addressed (Petratos and Faccia, 2019). Finally, integration issues and resistance to AI adoption can stymie the successful application of AI in AIS, necessitating businesses to address these concerns and foster an acceptance culture (Leitner-Hanetseder et al., 2021).

5. Conclusion and avenues for future research

The purpose of this paper is to provide an understanding of the evolution of AI and its role in shaping AISs. It aims to offer an overview of the current state of the literature that deals with the impact of AI on AIS, highlighting related aspects such as the benefits and challenges of AI in AIS research.

Studies that focus on this matter are scarce. In fact, there are limited studies investigating the emergence of artificial intelligence in accounting and auditing (Kokina and Davenport, 2017; Makridakis, 2017) and the effect of AI on the accounting and auditing profession (Chukwuani and Egiyi, 2020; Chukwudi et al., 2018; Cooper et al., 2019; Lee and Tajudeen, 2020). Some other studies focus on the limits of AI for accounting tasks (Leitner-Hanetseder et al., 2021) and the potential impact of AI on forecasting in the financial and accounting fields (Kureljusic, Karger, 2023).

This review suggests that, based on previous studies, AI technology has significantly improved financial reporting by automating data entry and processing,. It offers valuable insights for decision-making and financial reporting, while also enhancing accuracy and reliability by reducing errors in AIS, preventing fraud, and

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providing real-time insights. However, ethical considerations, transparency, talent gaps, training requirements, security concerns, and resistance to AI adoption are essential for successful implementation. In fact, biases in AI systems can perpetuate discrimination and inequality. Therefore, transparency is important for accountability. Additionally, addressing data privacy and cybersecurity threats is crucial for securing sensitive information. Businesses must foster an acceptance culture and address these challenges to ensure successful AI adoption.

Future studies should focus on bias in AI and whether applications utilizing AI are capable of making wise judgments and decisions. There is a lack of objectivity, and it is important to highlight that when intelligent robots are used, their creations or interactions with people often reflect the prejudices of those humans.

Future studies might also focus on how transparency, or the lack therefore, affects AI-based accounting and auditing choices. The linkages between model inputs, transformations, and outputs were very simple for human observers to understand in earlier iterations of AI and analytics (e.g., rule-based expert systems, linear regression analysis). Even for technical professionals, machine learning and deep learning neural networks, for instance, are frequently "black boxes" that are impossible or very difficult to comprehend and analyze. It might be challenging for audited companies, accounting firms, and regulatory authorities to delegate choices and judgments to such technologies unless they are made more visible. Future studies should look at how these issues of bias and transparency are handled in the context of accounting and auditing, from the perspective of both users and designers of intelligent systems. Will the advantages of AI auditing systems offset the unforeseen repercussions of possible biases and interpretability issues?

This review invites future studies to focus on several questions, such as: To what extent will human auditors rely on the outcomes of tasks accomplished by AI? In the upcoming years, a strong collaboration between accounting experts and practitioners will be necessary to clarify this shift and offer assistance to firms and regulators.

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