

# A Critical Analysis of Artificial Intelligence Technology in Accounting

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## **Abstract**

Artificial Intelligence (AI) has emerged as a disruptive force in the accounting profession, a field historically reliant on manual processes and human judgment. This study aims to critically analyze the AI technologies proposed in current accounting research and explore their implications on the accounting profession. Using a qualitative research approach and document analysis, the study systematically evaluated scholarly works on the integration of AI in accounting. The findings underscore that while process automation is a foundational pillar of digital transformation, amplifying analytical capabilities and bolstering decision-making processes are equally critical for businesses and financial institutions seeking a competitive edge. Consequently, strategic investment in a diverse portfolio of AI technologies, encompassing machine learning, neural networks, and expert systems, is essential. However, the lack of case-based reasoning and simulation modelling in accounting research limits the full potential of AI in the field. Integrating AI can transform accounting by automating routine tasks, enhancing data analysis, increasing accuracy, efficiency, and productivity, as well as improving decision-making. This integration creates opportunities for scholars, practitioners, and researchers in information technology and accounting to collaborate, navigating the complex terrain where these disciplines intersect and driving future exploration and innovation in the integration of AI in accounting.

**Keywords:** accounting, artificial intelligence technologies, collaboration, document analysis, transdisciplinaire.

## **1. Introduction**

In recent years, Artificial Intelligence (AI) has emerged as a transformative force across various industries, and the accounting profession is no exception. Historically, accounting has been a field heavily reliant on manual processes and human judgment. However, the rapid integration of AI technologies is propelling this profession into a new era, characterized by enhanced efficiency, accuracy, and analytical capabilities. The current landscape of accounting is witnessing a significant shift due to AI adoption (Kroon et al., 2021). AI-enabled technologies have broadened the scope of

accounting, embracing advanced data analytics, predictive modelling, and intelligent automation. These technological advancements are not merely augmenting existing processes but are fundamentally redefining traditional roles within the accounting sector. The integration of AI has led to improved decision-making processes, increased operational efficiency, and the ability to handle complex financial data at unprecedented scales and speeds (Sofia et al., 2023).

Despite the growing body of research on AI in accounting, there remains a significant gap in our comprehensive understanding of its multifaceted impact. Current research tends to focus on specific applications or isolated aspects of AI integration, failing to provide a holistic view of how these technologies are reshaping the entire profession. This fragmented approach to studying AI in accounting has resulted in a knowledge deficit, particularly in understanding the full scope and potential of AI applications across various accounting functions and processes. Moreover, the rapid pace of technological advancement often outstrips the speed at which academic research can analyze and document these changes. This creates a continual need for up-to-date, critical analysis that bridges the divide between existing knowledge and the dynamic, evolving world of AI in accounting (Mariani et al., 2023).

This research aims to address these gaps by conducting a thorough examination of AI technologies discussed in current accounting research. Our objective is to carefully evaluate existing literature, synthesize various findings, and gain a comprehensive understanding of how AI impacts the accounting profession. By doing so, we seek to provide a more holistic view of the current state of AI integration in accounting and its potential future trajectories.

Specifically, our research questions are:

1. What are the primary AI technologies currently being applied or researched in the field of accounting?
2. How are these AI technologies impacting traditional accounting processes and roles?
3. What are the potential future implications of AI adoption for the accounting profession?

Through this comprehensive analysis, we aim to contribute to the existing body of knowledge by providing a critical, synthesized overview of AI in accounting. This research will not only help scholars and practitioners understand the current landscape but also guide future research directions and inform strategic decision-making in the adoption and integration of AI technologies in accounting practices.

## **2. Literature Review**

Artificial Intelligence (AI) was first introduced in 1956 by John McCarthy, a computer scientist and emeritus professor at Stanford University. He defined AI as 'the science and engineering of making intelligent machines' (AISB- The society for the study of artificial intelligence and simulation of behaviour, 2014). The ensuing decades have witnessed an exponential growth in AI development, leading to what Luo et al. (2018) describe as '*the golden age of artificial intelligence*', which has been marked by significant

advancements in machine learning, natural language processing, robotics, and cognitive computing. Davenport and Ronanki (2018) reaffirmed that AI has now become an integral aspect of computer science focused on creating intelligent machines capable of using their cognitive abilities to perform a wide range of functions, from simple automation to complex problem solving. AI tools and technologies have dramatically transformed many industries by allowing machines to carry out intricate tasks that were previously solely managed by humans. The rise of AI has led to disruption across multiple sectors, notably in accounting. The application of AI is set to overturn conventional accounting methods and drive innovation within the industry. Integrating AI into accounting practices is expected to yield profound consequences, signalling a disruption that may redefine the field (Luo et al., 2018).

Deloitte Touche Tohmatsu (DTT) and Ernst & Young (EY), two of the Big Four accounting firms and pioneers in the industry, acknowledged the significant influence of AI on accounting as early as 2016 and 2017. They proactively responded to these advancements: DTT integrated AI into their accounting, taxation, and auditing services, while E&Y hired a renowned expert in machine learning and AI to lead their innovative global artificial intelligence team (State Council, 2017). This foresight and adaptability exemplify how industry leaders are embracing the AI revolution, underlining their commitment to innovation and their role in shaping the future of accounting.

In 2018, Luo noted that the adoption of AI in the accounting sector was nascent, a situation largely attributed to the elaborate nature of AI technology and the scarcity of experience and training in its application, which slowed its progression (Luo et al., 2018). However, by 2021, research by Kroon indicated a noticeable increase in the utilization of AI within the field of accounting (Kroon et al., 2021). A review of relevant academic literature shows that the disruptive AI technologies currently impacting the accounting realm include expert systems, neural networks, fuzzy logic, and robotic processes (Bako & Tanko, 2022; Chukwuani & Egiyi, 2020; Emetaram & Uchime, 2021; Shukla & Jaiswal, 2013). These tools are becoming increasingly prevalent as industry adoption grows and expertise in their application improves. In the following section, we will delve deeper into each of these AI technologies—expert systems, neural networks, fuzzy logic, and robotics—to explore how they are specifically transforming the landscape of accounting.

Expert systems are one of the most commonly utilized AI technologies. Their rise to prominence came in the 1980s, showcasing that computers could, in fact, be programmed to perform expert-level tasks across various fields. The objective of these systems was to handle decision-making tasks that were on par with, or superior to, human capabilities. This was notably beneficial in the field of accounting, where experts engage in financial analysis and decisions are made based on their assessments. The operational mechanics of an expert system shell involve a software program that functions as a knowledge-based system, designed to mimic the decisions an expert in the field would make. Owing to their capability to replicate expert

reasoning and the ease with which they can be deployed, these systems have become a mainstay in many industries (Chukwuani & Eginyi, 2020; Emetaram & Uchime, 2021). Furthermore, neural networks, often considered the digital counterparts to the human brain, are sophisticated frameworks in AI that simulate the brain's interconnected cells through a network of nodes, enabling learning from patterns in data (Taghizadeh et al., 2013). These data-driven constructs endow computer programs with the capacity for learning from examples, akin to human cognitive processes (Shukla & Jaiswal, 2013). The versatility and adaptability of neural networks facilitate their application across diverse fields. Within the accounting industry specifically, the integration of neural networks holds the promise of streamlining operations, enhancing precision, and delivering insights that bolster informed decision-making.

However, fuzzy logic, akin to a neural network, is another domain within AI that is engineered to simulate human-like reasoning and decision-making processes (Taghizadeh et al., 2013). Unlike the rigid true-or-false constraints of binary Boolean logic, fuzzy logic reflects the nuanced way humans think, acknowledging the existence of partial truths that exist along a spectrum from completely false to completely true (Shukla & Jaiswal, 2013; Taghizadeh et al., 2013). Incorporating this form of reasoning into AI systems enables more sophisticated decision-making, particularly in complex situations where information may be uncertain or imprecise conditions where traditional binary logic falls short. In the accounting sphere, fuzzy logic supports financial forecasts and assessments in contexts where variables such as business attractiveness and market competitiveness defy clear-cut classification and are inherently subjective (Beilin et al., 2019).

Robotics, a field at the intersection of science and engineering, leverages AI to endow machines with the capabilities to perceive their surroundings, make autonomous decisions, and execute tasks independently (Graetz & Michaels, 2015). These machines exhibit intelligence, autonomously navigating and interacting with their environment through an array of sensors (Bako & Tanko, 2022; Emetaram & Uchime, 2021). The value of robots to humanity lies in their precision, efficiency, and their capacity to operate without direct human oversight. Robotic Process Automation (RPA) is a testament to this, as it showcases the range of repetitive and high-volume tasks that can be performed by robots with remarkable accuracy and consistency. RPA leverages software 'bots' to carry out recurring tasks that are governed by predefined rules and protocols. These bots are capable of altering data, processing transactions, and communicating with various digital systems, thus streamlining operations. In the context of accounting, this automation enables human professionals to focus on more complex and strategic activities, elevating the role of human expertise by offloading routine work to machines (Association of Chartered Certified Accountants (ACCA), 2018).

Reflecting on the burgeoning influence of AI technologies on accounting, the insights provided by Kindzeka (2023), our attention to an imperative aspect: the role of policymakers in ushering in an era of standardized AI systems within the accounting paradigm. The call for such standardization is not merely a nod to uniformity but

serves as a safeguard to ensure that these advanced systems uphold the highest quality, remaining faithful to the foundational principles of accounting (Kindzeka, 2023). As AI continues to dominate and reshape the accounting landscape, policymakers must develop strong frameworks. These frameworks must be rigorous enough to manage the integration of AI technology in a way that not only improves efficiency and accuracy, but also maintains the integrity of accounting standards. In this sense, the future of accounting appears to be on the verge of revolutionary change, imbued with the promise of AI while remaining grounded in the ideas that have long served as the profession's foundation.

### **3. Methodology**

This study employed a qualitative research approach, specifically utilizing document analysis as the primary research design. Document analysis is a systematic process that involves collecting, extracting, reviewing, analyzing, and evaluating documents to provide context and answer specific research questions (Bowen, 2009). This design is particularly appropriate for this research as it allows for an in-depth exploration of existing literature on the integration of AI technologies in accounting, facilitating a comprehensive understanding of the subject matter. While recognized as a valuable research method in the social sciences Dalglish et al. (2017); document analysis remains underutilized in qualitative research (Merriam & Tisdell, 2016). This method offers several advantages, including access to rich and reliable data sources Morgan (2022), relative ease of data collection, cost-effectiveness, and fewer ethical concerns compared to other qualitative methods (Merriam & Tisdell, 2016). Documents often represent carefully compiled information by experts, providing a solid foundation for analysis (Creswell, 2003).

However, researchers must acknowledge the potential limitations of document analysis. Since documents are not prepared for research purposes but to report in a specific context, documents maybe presented with potential biases (Bowen, 2009; Merriam & Tisdell, 2016). The specific context of reports, may result in limited information in documents, which could result in possible manipulation of research problems and research questions based on available data (Blackstone, 2019). Documents are informed by specific discourse and is integrated (Prior, 2003). Consequently; documents can manipulate nature and context of knowledge creating gaps, subsequently documents need to be studied to be understood and gaps reflected on (Bryman & Burgess, 1994). Analysing and interpreting documents in order to extract meaning and to improve understanding and reflecting on the gaps will contribute to knowledge based on empirical findings (Corbin & Strauss, 2008). The documents were purposefully chosen and the researchers also consider Flick (2018) factors; authenticity, credibility, representativeness and meaning.

Analysing scholarly articles means that authentic documents are used. Dunne et al. (2016) explained that documents must be genuine, published scholarly articles adhere to this. Downloading the scholarly articles is the original document (Kridel, 2015), which enhance the creditability. Documents were collected based on the purpose of the study which is to critically analyse the artificial intelligence

technologies proposed in current accounting research. Finally, in analysing the documents the significance of the documents was determine. Determining the significance, the researchers assessed the meaning of the article as a whole, connecting literal meaning to the document context (Mogalakwe, 2009).

### **Sampling strategy**

Scholarly articles were purposefully selected from a range of academic journals published over a 31-year period, from 1992 to 2023. The sampling method employed was criterion sampling, where documents were chosen based on specific criteria: authenticity, credibility, representativeness, and meaning. This method was chosen to ensure that the selected articles accurately reflect the current state of knowledge and provide a robust foundation for the analysis of AI technologies in the accounting field.

### **Data Collection Method**

Data was collected through a thorough review of 85 scholarly articles that discuss the integration of AI technologies in accounting. The researchers utilized a structured approach to document analysis, which included identifying relevant articles, extracting pertinent information, and organizing the data for further analysis. This method allowed for a comprehensive gathering of insights regarding the various AI technologies proposed and utilized in accounting research.

### **Data Analysis**

The collected data underwent a content analysis to identify and classify the various AI technologies discussed in the selected articles. The analysis involved interpreting and synthesizing the information to determine themes and patterns related to AI adoption in the accounting profession. Qualitative analysis techniques were employed to ensure a nuanced understanding of the data, allowing for the identification of key trends and insights.

### **Validity and Reliability**

To ensure the validity and reliability of the study, several measures were implemented:

**Authenticity:** Only genuine, published scholarly articles were included in the analysis.

**Credibility:** The original documents were downloaded directly from reputable sources, ensuring that the information remained unaltered.

**Representativeness:** The selection of documents was based on their relevance to the research objective, ensuring a comprehensive representation of the topic.

**Meaning:** The significance and context of each document were carefully assessed to ensure that the findings accurately reflect the current landscape of AI in accounting.

### **Ethical Considerations**

Given that this study involved the analysis of publicly available scholarly articles, there were no major ethical concerns. The researchers adhered to ethical standards by ensuring that all information was used and presented accurately, without any misrepresentation or manipulation of the data. Proper citations and references were maintained to acknowledge the original authors and their contributions to the field.

#### 4. Results

Eighty-five (85) scholarly articles of the past 31-year period were content-analysed and the themes is illustrated in Figure 1 in order to observe the adoption of AI by accounting through research.

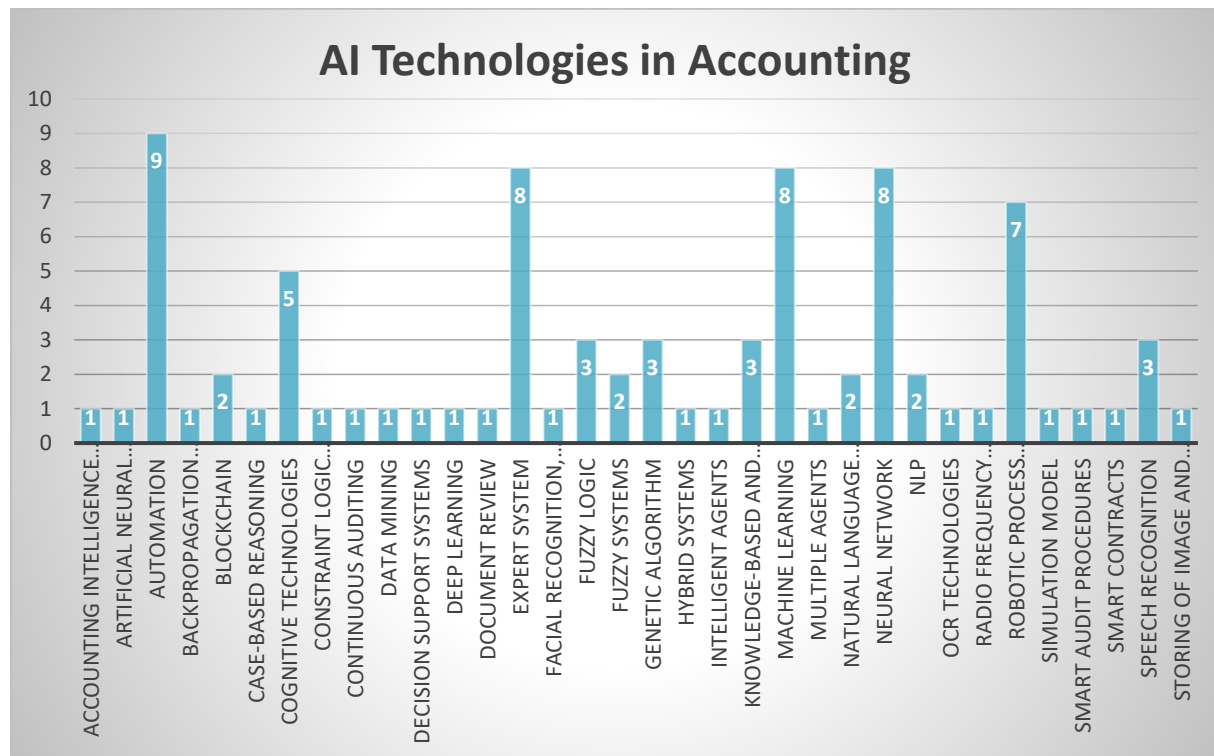


Figure 1 - AI Technologies in Accounting

Figure 1 provides a snapshot of the 57 scholarly articles which represent the current landscape of AI adoption within accounting. Listing the AI technologies being used in accounting together with the frequency of their observations. Of the 34 different themes observed in where AI technologies is used accounting research, 20 themes were observed only once, while 4 themes were observed on two times. The remaining ten themes based on the observations of the AI technologies from most frequently used to less frequently used are as follows: *Automation* - nine observations, *Machine Learning* - eight observations, *Neural Network* - eight observations, *Expert System* - eight observations, *Robotic Process Automation* - eight observations, *Cognitive Technologies* - five observations, *Fuzzy Logic* - three observations, *Knowledge-based and Expert Systems* - three observations, *Genetic Algorithm* - three observations, *Speech Recognition* - three observations.

The results of this study are organized according to the three primary research objectives outlined in the introduction.

##### 1. Examination of AI Technologies in Current Accounting Research

The analysis revealed a diverse array of AI technologies discussed in the existing literature on accounting. Notably, the review encompassed a total of 85 scholarly articles that highlighted various AI applications, including machine learning algorithms, natural language processing, and robotic process automation. These

technologies are increasingly being integrated into accounting practices, enhancing efficiency and accuracy in tasks such as data entry, financial forecasting, and fraud detection.

## **2. Evaluation of Existing Literature**

A careful evaluation of the literature indicated that while there is a growing body of research on AI in accounting, many studies focus on isolated aspects of AI integration. This fragmentation suggests a need for a more holistic understanding of how these technologies collectively influence the accounting profession. The findings also pointed to a lack of comprehensive frameworks that could guide practitioners in the effective implementation of AI solutions.

## **3. Synthesis of Findings and Understanding AI's Impact**

The synthesis of various findings from the reviewed articles underscored the transformative potential of AI in the accounting profession. AI technologies are not only streamlining traditional processes but also redefining the roles of accounting professionals. The results suggest that as AI continues to evolve, it will play a crucial role in shaping the future of accounting, necessitating ongoing research and adaptation within the field.

## **5. Discussion**

The study revealed that the most frequently used AI technologies in accounting research are Automation, Machine Learning, Neural Networks, Expert Systems, and Robotic Process Automation. Other observed AI technologies include Cognitive Technologies, Fuzzy Logic, Knowledge-based Systems, and Genetic Algorithms. This diverse range of AI applications highlights the multifaceted nature of digital transformation in the accounting field. These findings suggest that the accounting profession is undergoing a significant technological shift. Automation emerges as the foundational technology, which is unsurprising given its ability to improve efficiency, accuracy, and cost-effectiveness in accounting processes. The prominence of Machine Learning, Neural Networks, and Expert Systems indicates a move towards more sophisticated, data-driven decision-making in financial planning, risk management, and other complex accounting tasks. The variety of AI technologies being applied suggests that no single solution fits all accounting needs. Instead, a synergistic approach, integrating multiple complementary AI technologies, appears to be crucial for establishing a robust and comprehensive financial management ecosystem. The results of this study have several important implications for the accounting profession and organizations.

**Digital Transformation Complexity:** The findings underscore that digital transformation in finance and accounting is not a one-size-fits-all process. It requires a nuanced understanding of various AI technologies and their specific applications. This insight contributes to the existing body of knowledge by highlighting the need for a more holistic approach to AI integration in accounting.



**Strategic Technology Deployment:** Organizations should consider embracing a suite of complementary AI technologies rather than relying on a single solution. This approach allows for strategic deployment of different AI tools to address specific challenges and capitalize on emerging opportunities in financial management.

**Future-Proofing the Profession:** The prominence of advanced technologies like Machine Learning and Neural Networks suggests that the accounting profession is moving towards a more predictive and analytical role. This implies a need for upskilling and rethinking traditional accounting education to prepare professionals for this AI-augmented future.

**Ethical and Governance Considerations:** With the increasing use of AI in accounting, there's a growing need for research and guidelines on the ethical use of these technologies, particularly in areas like financial reporting and auditing. This study contributes by identifying the key technologies that should be the focus of such ethical considerations.

### **Limitations**

**Literature-Based Analysis:** The study primarily focuses on the analysis of scholarly articles, which may present potential biases and limited information due to the specific context in which the documents were created. Real-world applications of AI in accounting might differ from what is reported in academic literature.

**Scope of Analysis:** The document analysis approach may not capture the full scope of AI applications in accounting, as it relies on the available literature. Emerging or proprietary AI technologies used in practice might be underrepresented.

**Lack of Empirical Evidence:** The study does not provide in-depth case studies or empirical evidence to support the findings, which could strengthen the understanding of the practical implications of AI integration in accounting.

Despite these limitations, the research findings remain valid and valuable. They provide a comprehensive overview of the current state of AI in accounting research, which can serve as a foundation for future studies and practical applications. To address these limitations and further validate the findings, we recommend:

- Conducting surveys or interviews with accounting professionals to gather first-hand information on AI applications in practice.
- Performing case studies on organizations that have successfully implemented AI in their accounting processes to provide concrete examples and best practices.
- Collaborating with AI developers and accounting software companies to gain insights into emerging technologies that may not yet be widely reported in academic literature.
- Expanding the scope of the literature review to include industry reports and non-academic sources to capture a broader perspective on AI in accounting.

## 6. Conclusions

This research addresses the critical problem of understanding the impact of artificial intelligence (AI) technologies on the accounting profession. As the field of accounting undergoes significant transformation, it is essential to explore how these technologies can reshape traditional practices and enhance operational efficiency. The study reveals that process automation serves as a foundational pillar of digital transformation in accounting. However, it also emphasizes that amplifying analytical capabilities and bolstering decision-making processes are equally vital for businesses and financial institutions aiming to maintain a competitive edge. Strategic investment in a diverse portfolio of AI technologies, including machine learning, neural networks, and expert systems, is essential for organizations to thrive in this evolving landscape. The integration of AI can revolutionize accounting by automating routine tasks, enhancing data analysis, and improving accuracy, efficiency, and productivity. This transformation ultimately leads to better decision-making. The collaboration between scholars, practitioners, and researchers in information technology and accounting is crucial. This partnership will help navigate the complex intersection of these disciplines and drive future exploration and innovation in AI integration within accounting. As AI continues to dominate and reshape the accounting landscape, it is imperative for policymakers to develop robust frameworks that manage the integration of AI technology. Such frameworks should not only focus on improving efficiency and accuracy but also ensure the integrity of accounting standards. In summary, this research contributes to the growing body of knowledge on AI in accounting, highlighting its potential to transform the profession while also calling for responsible management of its integration.

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