

Perspectives on the Development of Digital Techniques and Tools with Implications for Accounting and Auditing Services

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ABSTRACT

The current research focuses on existing studies in the period 2021-2025, which investigate 5 elements such as: artificial intelligence, blockchain, bigdata, or cloud computing, applicable in the accounting field, in the context of the fourth industrial revolution. The study reveals the need for adaptation of accounting professionals and those who carry out audit activities, by developing and integrating the technological skills required by the industry revolution 4.0. The originality of the study lies in the fact that it creates a current image of the opportunities and threats associated with the implementation of digital systems in companies vis-à-vis the accounting and auditing profession.

Type of Paper: Review

Keywords: Employability, accounting, technology.

1. Introduction

In recent decades, digitalization has revolutionized almost all economic sectors, and the accounting field could not remain unchanged (Kroon et al., 2021; Knudsen, 2020). Digital transformations have led to changes within financial processes (Rikhardsson & Yigitbasioglu, 2018), in the way documents are managed (Fuller & Markelevich, 2020) and in financial and tax reporting (Lombardi & Secundo, 2020). Thus, the success of companies in the digital era depends on the ability to adapt and choose integrated solutions that meet both legal requirements and specific business needs (Demirkan et al., 2020; Yoon, 2020).

2. Literature Review

Digitalization in accounting and auditing is transforming financial processes through artificial intelligence, blockchain, big data, and cloud computing, thus redefining the role of accounting and auditing professionals (Cho et al., 2018; Secinaro et al., 2021; Demirkan et al., 2020). In

accounting, transparency is essential, and the implementation of digital technologies can improve a company's competitive advantage, help build trust among market participants (Yu et al., 2018), and reduce the risk of fraud (Dai et al., 2017), while automated transactions can be better tracked and user needs more easily detected (Fullana and Ruiz, 2021). The development of computer-assisted audit techniques and tools (CAATT) has enabled data extraction and analysis, thus improving the efficiency and effectiveness of processes (Braun and Davis, 2003; Chan, et al., 2018; Dagiliene & Kloviene, 2019). Some studies argue that artificial intelligence (AI) and blockchain technology have different potential on quality, with blockchain being able to affect the accounting process, and AI the audit process (Han et al., 2023; Toufaily, et al., 2021; Lombardi et al., 2022). In practice, however, it is observed that auditors use AI tools for advanced analysis of financial data, looking for patterns and trends to obtain information and identify risks, with AI contributing to the quality and effectiveness of the audit (DeZoort & Pollard, 2023; Bharadiya, 2023). From the analysis of the specialized literature, we observe the major impact of digital technologies on the accounting and auditing profession, each technology contributing in a specific way: (1) Artificial Intelligence (AI) uses advanced data analytics to identify risks and patterns, improving the quality and effectiveness of the audit; (2) Blockchain transforms the accounting process by increasing the transparency and security of transactions, reducing the risk of fraud; (3) Big Data allows the analysis of massive volumes of data, providing a more solid basis for business decisions and allowing auditors to analyze transactions, not just samples; (4) Cloud Computing facilitates access and sharing of data in real time, reducing infrastructure costs and allowing business adaptation and management.

The purpose of this research is to analyze the transformative impact of emerging technologies (Blockchain, Big Data, Artificial Intelligence and Cloud Computing) on the accounting and auditing profession, as well as to identify and assess the opportunities and threats they generate. Following the review of the specialized literature from 2021-2025, a quantitative and qualitative analysis was conducted, which shows us the major impact of digital technologies on the accounting and auditing profession.

3. Research Methodology

As digital transformation is a relatively new topic, the research analyzed academic and practical articles from various accounting fields to summarize the role of digital transformation techniques and tools in accounting and auditing. The purpose of this analysis is to decode the emerging thematic structure at the intersection of advanced technologies and the accounting and auditing profession. For this purpose, we used the Web of Science, in which we searched for publications that had at least one associated keyword from both sets: (i) "Artificial Intelligence" or "Blockchain" or "Bigdata" or "Cloud Computing" and (ii) "accounting" or "audit". The search period was chosen as 2021-2025, and the publications were in the research field: Business Economics. After analyzing the abstracts, we eliminated papers that only

peripherally discussed one of the key elements that underpinned our research. For example, we eliminated papers with references in only a few sentences or those in which the keywords were used without further discussion. The selection process resulted in a total of 246 articles, from which we chose those relevant to our research objective, also considering the number of citations for each article. From a quantitative point of view, we analyzed the papers, considering for each article the year of publication, the number of authors, the country of origin, the methodology and the number of citations, as well as the words used in the title and abstract. From a qualitative perspective, we identified four themes that we studied through the lens of opportunities and threats. The first two themes, “Technological Domain” and “Accounting and Financial Reporting Domain”, refer to the role of technological changes in accounting and auditing. The other two themes, “Audit and Assurance Domain” and “Governance and Regulation Domain”, were identified during the review of the articles, and were taken up in the study because they are adjacent and allow the completion of the theme with important information.

4. Results

The analysis of the distribution of the number of articles per journal (Fig. 1a) shows us the high interest dedicated to the topic, and the analysis of the distribution of the number of articles associated with the publisher shows us the membership of some of the major publishers (Fig. 1b).

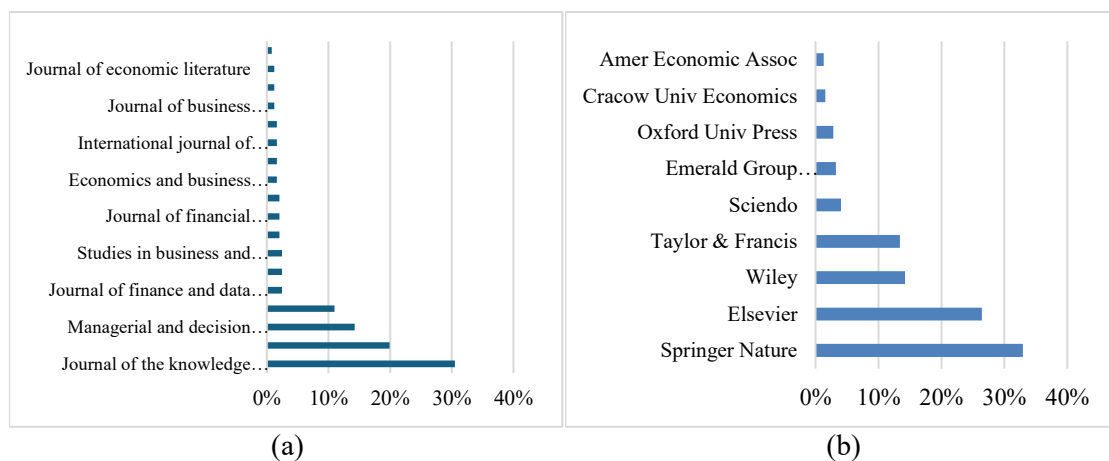


Figure 1. Distribution of the number of articles per journal and associated publishers

Analyzing Figure 1a, we can observe many articles in journals in the field of Business Economics, which shows the increased interest in this topic, and from Fig. 1b we also observe the existence of recognized international publishers.

Analysis by processing data in Vos Viewer shows us the grouping of elements according to specific similarities and the connections that appear between elements (see Figure 2). The analysis of the co-occurrence map revealed a complex structure, dominated by three central concepts, “Blockchain”, “Artificial Intelligence” and “Accounting”, which act as poles of attraction for various sub-themes. Four distinct thematic clusters are observed (see Figure 2), each representing a major research direction.

“business”. Terms such as “model”, “internal control” and “quality” suggest an analysis of new audit models and methods to improve internal controls and overall audit quality in the digital age. This cluster complements the blue cluster, extending the discussion of auditing beyond strictly blockchain-related aspects to include a broader perspective on the technological influence.

The publications examined in this analysis also cover the opportunities and threats associated with the implementation of digital systems in companies (see Table 1), this being presented by areas, on accounting and auditing.

Table. 1. The situation of opportunities and threats given by the impact of emerging technologies

Opportunities	Threats
I. Technological Field (Blockchain, Artificial Intelligence, Big Data)	
<ul style="list-style-type: none"> - Efficiency and automation (for repetitive processes: account reconciliation, data entry), and human resources can be allocated to analysis and consulting. - Increased accuracy and reliability (Blockchain distributed ledgers ensure data integrity, and AI can identify anomalies and errors). - Advanced analysis and prediction (Big Data and AI allow for analysis that can support strategic decisions, e.g. cost optimization, emerging risks). - New business models (e.g. smart contracts for auditing, decentralized financing platforms or virtual consulting, robo-auditors). - Improved cybersecurity (Blockchain can provide a higher level of transaction and data security) 	<ul style="list-style-type: none"> - Implementing and maintaining blockchain systems can be expensive, a deterrent for small and medium-sized businesses. - The lack of clear and standardized regulatory frameworks is a major barrier to Blockchain. - The design and architecture of blockchain systems requires specialized expertise, which is not always available. - Questions of ethics and accountability arise in decisions made by AI, and the quality of the results depends on the quality of the input data. - - Big data requires a robust IT infrastructure (often based on Cloud Computing) and specialized processing, security and privacy systems.
II. Accounting and Financial Reporting Field	
<ul style="list-style-type: none"> - Increased transparency and auditability (auditing can be continuous, producing transparency). - Real-time reporting (processing and validation capabilities). - Accuracy and reduction of manual errors (AI minimizes human errors and improves accuracy). - Simplified compliance (automation of compliance with predefined accounting or tax rules). - Added value for the accountant (strategic role: analysis, interpretation and consulting). 	<ul style="list-style-type: none"> - The need for professional retraining (adapting skills to new technologies). - Workforce reduction (for routine accounting tasks). - Changing accounting standards (new transaction models may require adaptation or creation of new standards). - Legal and tax challenges (new technologies may create ambiguities in tax and accounting legislation, requiring clarification and regulation). - Resistance to change (may slow or block progress).
III. Audit and Assurance Field	
<ul style="list-style-type: none"> - Continuous and real-time auditing (on-site monitoring and auditing increases efficiency and relevance). - Quality and depth of audit through AI (processing large volumes of data, identifying patterns, anomalies and risks). - Immutable audit trails (Blockchain provides complete and unalterable auditing, simplifying the collection of audit evidence). - Reduction of audit costs (automation and efficient data analysis reduce time and resources). - New assurance services (blockchain, smart contract security, or for AI algorithms). 	<ul style="list-style-type: none"> - The need for new audit skills through technologies (blockchain, AI and big data, for efficient auditing). - Unclear audit standards (the lack of standards based on blockchain or AI can create uncertainty and difficulties). - Governance and ethics challenges (not only data is evaluated, but also the logic of AI algorithms and the governance mechanisms of blockchain networks). - Threats to auditor independence (through AI developed by the audited entity, conflicts of interest may arise). - Impact on the business model of audit firms (reduction of staff at entry-level level, requiring a rethinking of the structure of audit firms).
IV. Governance and Regulation Domain	
<ul style="list-style-type: none"> - Effective regulatory frameworks (stimulate innovation, stability and protect the public interest). - Combating financial crime (blockchain transparency and AI analytical capabilities can improve the detection and prevention of money laundering, terrorist financing and fraud). - Rapid risk response (allow for the identification of new risks and regulatory response). 	<ul style="list-style-type: none"> - Regulatory uncertainty (technological evolution may exceed the capacity of regulators). - Inadequate legislation (challenges and specificities of new technologies, e.g., data ownership on blockchain, liability for AI). - The risk of over- or under-regulation (excess hinders innovation and lack allows abuses or systemic risks). - Diverse jurisdictions (complicate for global entities).

From the analysis of Table 1 we can say that emerging technologies are a transformative force for accounting and auditing, bringing with them a complex set of opportunities for efficiency

and improvement, but also threats related to professional adaptation, costs, security and the need for appropriate governance and regulatory frameworks.

5. Discussion

Like our study, there are studies that discuss the potential for applying digital technologies to specific audit and accounting tasks, highlighting the superior benefits obtained through automation (Cooper et al., 2020), as well as increased control and speed in data analysis (Kokina and Blanchette, 2019), thus contributing to the efficiency and effectiveness of activities. Currently, the specialized literature shows that digitalization has not been extended to all companies, therefore the maturity of implementation is not reached (Raval and Smith, 2020), with only scenarios in large companies (Cooper et al., 2020). Separating or identifying semi-automated and automated activities, as well as those that cannot be automated (Korhonen et al., 2021), assessing the costs and benefits of implementation in relation to risks in accounting and auditing (Zhang 2019), the training required for working with robots (level of trust, interaction and cooperation), are just some of the topics that remain open to new research.

6. Conclusion

The study allowed us to identify the importance and role of digital systems in the context of accounting and auditing. The keyword co-occurrence map provides a comprehensive picture of the research landscape, which is at the intersection of disruptive technologies and the accounting and/or auditing profession. It is evident that “Blockchain” and “Artificial Intelligence”, along with “Big Data”, are not just niche topics, but fundamental pillars that reshape “accounting” and “auditing”, generating new opportunities, but also significant threats. This analysis highlights the need for a holistic approach to research, which considers not only technical aspects, but also human, ethical and governance ones, to ensure an efficient and responsible transition to a digitalized era. The results obtained show us that the digitalization process continues, and the requirements related to the accounting and auditing profession include skills and knowledge to explore and actively participate in the changes generated by digitalization, able to use analytical techniques and tools combined with one's own professional judgment.

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Journal article

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