BLOCKCHAIN TECHNOLOGY AND THE ACCOUNTING PROFESSION. A STRUCTURED LITERATURE REVIEW.

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Abstract: This study investigates the impact of blockchain technology (BCT) on the accounting profession, focusing on both the opportunities and challenges associated with its integration. The objectives are to assess the current state of academic research on blockchain in accounting, to analyse key themes and research focuses in the literature, and to evaluate the technology's potential impact on the profession. Methodologically, this research follows a structured literature review (SLR) approach, analysing 60 academic papers using both qualitative and quantitative methods. Key results indicate that blockchain can automate reconciliations, improve audit trails, and streamline accounting tasks. However, scalability issues, privacy concerns, regulatory uncertainty, and implementation costs remain significant challenges. While blockchain holds promise for transforming accounting practices, the research reveals a need for more empirical studies, particularly real-world applications. The findings contribute to ongoing discussions in both academia and industry, emphasizing the importance of further research and collaboration between accounting professionals and IT specialists to effectively harness blockchain's potential.

Introduction

Blockchain technology, initially developed to facilitate cryptocurrency transactions, has rapidly expanded into various sectors, including accounting and auditing. Its decentralized and immutable ledger offers the potential to enhance transparency, accuracy, and trust in financial reporting and audit processes (Schmitz and Leoni, 2019). In recent years, scholars have increasingly explored how blockchain can address challenges in the accounting profession, including the accuracy of financial data (Sheldon, 2019) and the evolution of audit practices (White et al., 2020). However, despite the growing interest in this field, there remains a significant gap in empirical research, particularly regarding practical applications and case studies (Smith, 2018b; McCallig et al., 2019). Several studies have focused on technical aspects of blockchain, such as the comparison between public and private systems, centralized versus decentralized networks, and peer-to-peer versus cloud-based models (O'Leary, 2019). These explorations contribute to understanding the technological infrastructure necessary for blockchain's integration into accounting systems. Other research has examined the intersection of information technology and accounting, envisioning how blockchain-enabled software could automate financial data interpretation, thereby supporting professionals in their day-to-day tasks (Tan and Low, 2019).

Despite the theoretical potential of blockchain, practical case studies remain scarce, which is understandable given that the technology is still in its infancy within the business process landscape

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(White et al., 2020). Nevertheless, the few existing empirical studies, such as the one by Sean Stein Smith (2018a), provide valuable insights into the potential benefits and challenges of blockchain implementation in accounting. As the technology continues to develop and adapt, it is expected that more empirical studies will emerge, filling this critical research gap. The existing literature identifies three principal areas of focus: (1) research encompassing both accounting and auditing use cases (Kozlowski, 2018; Bonson and Bednarova, 2019); (2) evaluations of the benefits and drawbacks of blockchain technology within these sectors (Fuller and Markelevich, 2020); and (3) enquiries into the overarching influence of blockchain on the accounting profession and its related fields (Schmitz and Leoni, 2019). These studies underscore the transformative potential of blockchain but also point to several challenges, such as scalability, privacy concerns, and regulatory uncertainties (Sarkar, 2018; Desplebin et al., 2021).

The primary objective of this research is to contribute to the growing body of knowledge on blockchain's integration into accounting and auditing practices. By synthesizing existing literature and conducting a structured analysis of blockchain's strengths and weaknesses, this study aims to provide a comprehensive understanding of the opportunities and challenges posed by this technology for the accounting profession. Given the infancy of blockchain adoption in this field, the relevance of this research lies in its potential to inform both academia and industry on how blockchain can enhance financial transparency, data integrity, and audit reliability. Furthermore, this study seeks to fill the gap in practical case studies by drawing on the few available empirical examples and offering critical insights into the technology's real-world applications. Over time, blockchain's potential to disrupt traditional accounting and auditing processes will only grow, making it essential to explore how this technology can be effectively integrated into existing systems (Kokina et al., 2017; Pimentel and Boulianne, 2020). Therefore, this research is not only timely but also necessary for guiding the future direction of blockchain adoption in accounting.

Research design and methodology

To address the subjectivity often associated with traditional literature reviews, researchers have increasingly turned to the "Structured Literature Review" (SLR) method, developed by Massaro et al. in 2016. This 10-step approach aims to improve the literature review process by establishing a strong research foundation, providing critical reflections, and identifying future research opportunities (Massaro et al., 2016). In this context, the present research on blockchain technology in the accounting profession follows the recommendations by Massaro (2016) and the model proposed by Dumay et al. (2016) as presented in Figure no. 1.

The SLR methodology began with shaping a review protocol (SLR step 1) to document the process. Since blockchain technology develops constantly, the review sought to comprehend how this field of study has developed and how it affects the accounting industry. Consequently, the research questions (SLR step 2) were developed based on the literature review continuum of Massaro et al. (2016), with adaptations to suit the field of accounting (Dumay et al., 2016). Therefore, this article aims to address the following research questions: ***RQ1. What is the present status of academic research into blockchain technology in the accounting field?*** This question seeks to assess the breadth and depth of the existing literature in this field. ***RQ2. What are the key focuses of blockchain technology in the accounting profession literature?*** This question aims to conduct a structured analysis of the literature, applying an analytical framework based on relevant criteria. ***RQ3. What is the impact of blockchain technology on the accounting profession?*** The objective of this question is to identify the main opportunities and challenges that blockchain technology presents to the accounting profession, as reflected in academic research and discussions.
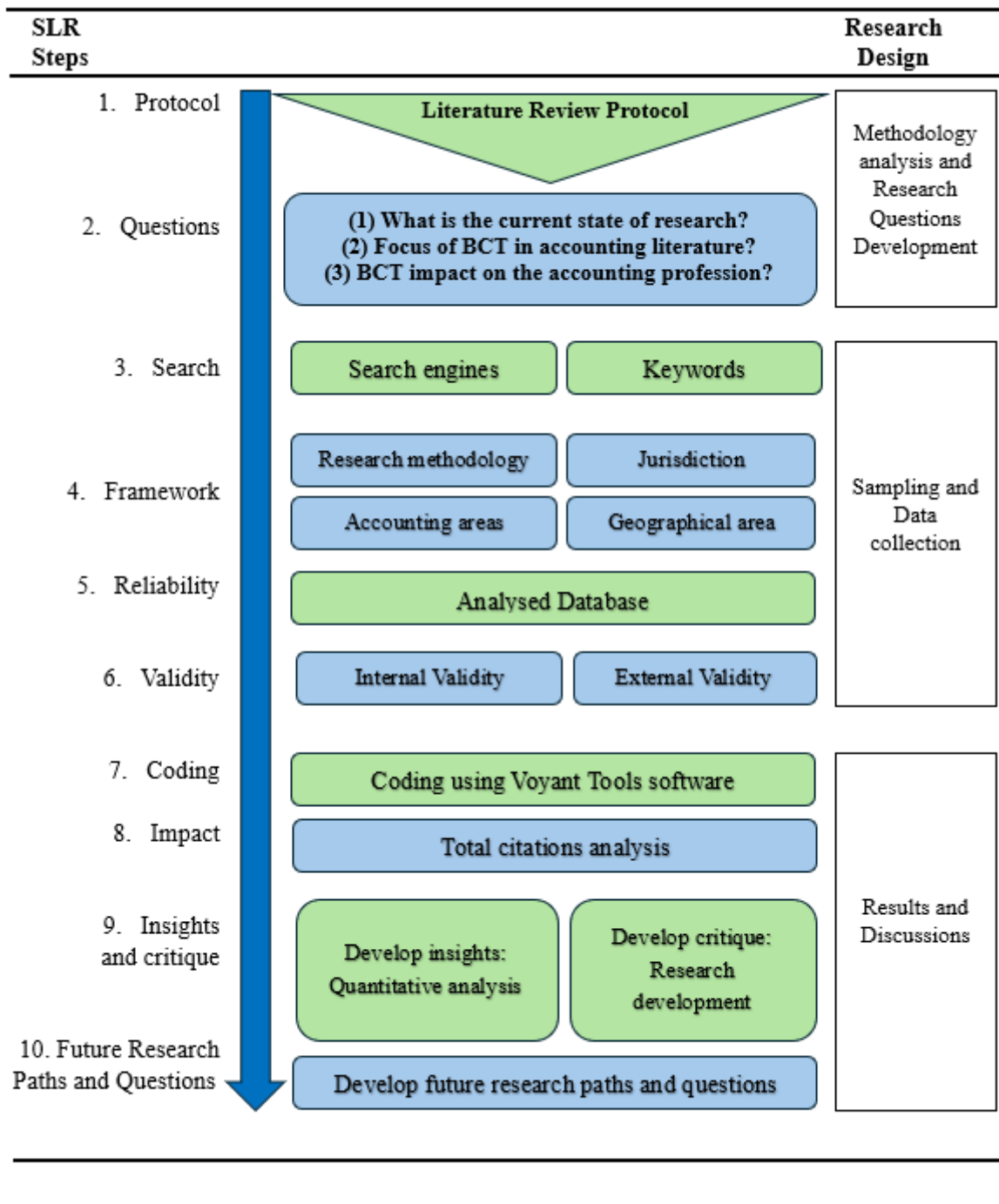
Figure no. 1. Research Design based on SLR steps
Source: Author's creation inspired by Massaro et al., 2016.

The data collection process (SLR step 3) involved exploring academic papers from multiple sources. The Clarivate Analytics Web of Science (WoS) platform was used initially, as it contains highly cited journals. Given the novelty of the topic, additional databases—ProQuest and Google Scholar—were included to capture a broader range of relevant papers. After introducing the searching formula: "("Blockchain") AND ("accounting" OR "accountancy" OR "audit*")", the process implied checking if the chosen words or phrase appeared in the titles, abstracts, or keywords of the articles. Duplicates, papers with no citations, and conference proceedings were excluded.

Subsequently, the papers were analysed to determine their relevance to the research questions, following guidance from Dumay et al. (2016). Papers with only cursory mentions of blockchain or insufficient exploration of the topic were eliminated. Ultimately, 60 papers published between 2015 and 2023 formed the final sample. The analytical framework (SLR step 4) for coding the articles was based on prior literature (e.g., Guthrie et al., 2012; Dumay et al., 2016, Buenechea-Elberdin, 2017; Cuozzo et al., 2017;) including 13 attributes adapted for our analysis of the accounting profession in the blockchain era as it can be seen in Table no. 2.

Regarding data reliability (SLR step 5), no statistical approaches were applied due to the nature of SLR as a content analysis method (Massaro et al., 2016). The process was iterative rather than rigid (Dumay et al., 2016), and this study adopted a systematic approach to ensure the reliability of the data reviewed, considering the evolving nature of blockchain research. Data validity (SLR step 6) was addressed at both internal and external levels. Internal validity was derived from the causal relationships identified across the analysed papers, while external validity was supported by the comprehensiveness of the selected sources (Massaro et al., 2016). The decision to include papers beyond highly ranked journals reinforces the external validity of the research.

For coding and quantitative analysis (SLR step 7), Voyant Tools was employed. Voyant, a web-based text analysis tool, was used to analyse article titles, providing visualizations of key terms to help identify dominant themes and trends relevant to blockchain research in the accounting profession. Article impact (SLR step 8) was assessed through citation analysis, highlighting the distinction between well-cited and lesser-known papers, as shown in Table no. 1. Insights and critiques (SLR step 9) addressed two key research questions: the current state of academic research on blockchain technology within the accounting profession, and the key themes concerning the opportunities, and challenges associated with blockchain adoption in accounting. Future research directions (SLR step 10) are presented in the concluding section.

Quantitative Analysis and Results

This section provides a quantitative analysis of the literature, addressing the first research question. The early years of Blockchain research in accounting, 2015 and 2016, saw little activity, reflecting the field's nascent stage. In 2017, there was a notable rise in publications, signalling growing recognition of Blockchain's potential. This interest continued to grow in 2018, but 2019 marked the peak of excitement, with a significant spike in publications as researchers intensely explored Blockchain's potential to transform accounting systems. However, 2020 saw a sharp decline, likely due to the global COVID-19 pandemic, which shifted research priorities. In 2021 and 2022, a smaller but steady level of interest persisted, indicating a period of reassessment. Publications increased somewhat by 2023, indicating a revived but more cautious interest in the long-term effects of blockchain technology on accounting. As visible in Figure no. 2, from a slow start, through a period of intense exploration, to a more stabilized phase, the trend reflects the trajectory of a maturing research field. implying that while the fervour may have diminished, the relevance and potential of Blockchain in accounting continue to be of significant interest.
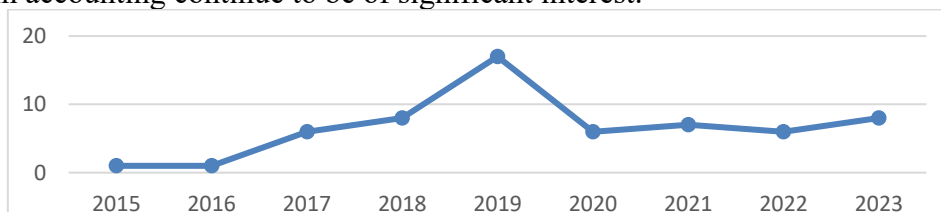

Figure no. 2. Evolution of the articles published over the years

Throughout the years, 37 journals present in our study had at least one article published on the blockchain in accountancy topic. Nevertheless, only six of them have stood out as the most prolific, publishing at least three articles over the analysed period, 2015 – 2023. The findings reveal

different patterns of publication among the top journals. The Journal of Corporate Accounting and Finance (JCAF) and the Journal of Emerging Technologies in Accounting (JETA) are tied as the most prolific, each publishing a total of 5 articles. These contributions are spread across multiple years (2016-2020), reflecting a steady output over time. On the other hand, The Australian Accounting Review (AAR) which follows closely, published 4 articles—all in 2019, marking it as a significant year of scholarly output on the topic for this journal. Accounting Perspectives (AP), The Current Issues in Auditing (CIA) and the International Journal of Accounting Information Systems (IJAIS) contributed with 3 articles each, with their publications concentrated in specific years (2018-2021), showing periodic but consistent engagement with the topic. Overall, the evolution of publications among these prolific journals suggests a mix of sustained interest and peak periods of scholarly focus, reflecting the dynamic nature of blockchain research within the accounting profession.

Considering the interdisciplinary nature of our theme, an ideal scenario would involve each article being authored by researchers with both economic and technological expertise. This often necessitates collaboration between at least two researchers. For the papers included in our sample, the results demonstrate a clear trend of increasing collaboration, with a preference for co-authorship and larger research teams. The year 2019 witnessed a significant rise in academic output, standing out for both solo and collaborative research efforts. Seven single-author articles and ten studies with more than two authors were published, highlighting a peak in joint ventures. In recent years, there has been a consistent trend of multi-author publications. This trend reflects the evolving nature of research in this area and emphasizes the recognition that addressing complex topics, such as blockchain in accounting, benefits significantly from diverse perspectives and the collective expertise of multiple authors.

From the comparative analysis performed and presented in Table no. 1, we can notice that there are five papers with the highest number of citations: Dai and Vasarhelyi (2017), Fanning and Centers (2016), O'Leary (2017), Kokina et al. (2017), and Schmitz and Leoni (2019). These papers represent significant contributions to the field, indicating their high quality and impact on the research landscape concerning Blockchain in accounting. Considering the publication year and total citations, the 2017 paper by Dai and Vasarhelyi stands out with 307 citations, reflecting strong and sustained interest from researchers in Blockchain accounting research. Furthermore, the concentration of highly cited papers between 2016 and 2019, totalling 958 citations, emphasizes that the most impactful research in this area was produced during this period, marking it as a key timeframe for significant developments in Blockchain's role within accounting.

Table no. 1. Top articles by citations ranking places

No.	Authors	Publication Year	Total Citations
1	Dai and Vasarhelyi	2017	**307**
2	Fanning and Centers	2016	**235**
3	O'Leary	2017	**141**
4	Kokina et al.	2017	**139**
5	Schmitz and Leoni	2019	**136**
Total citations *as of 15 July 2024.*		**2016 - 2019**	**958**

The keywords included in the titles of articles provide valuable insights into the primary focus areas explored by the authors. The 100-word cloud created for this analysis with the help of Voyant Tools software and illustrated in Figure no. 3, highlights that "blockchain" and "accounting" are the most prominent terms, indicating that the majority of research has centred on exploring the relationship between blockchain technology and its impact on the accounting profession. The presence of related keywords such as "technology," "auditing," and "audit" suggests that a significant

portion of the research is focused on examining blockchain's role in auditing processes, its potential to improve auditing practices, and its implications for both accounting systems and professionals. The keywords reveal a research focus at the intersection of blockchain, accounting, and technology, reflecting an interest in the transformative potential of blockchain and its capacity to revolutionize auditing and accounting practices.

Figure no. 3. Keywords of articles titles

Structured Analysis and Results

The structured analysis of blockchain literature focuses on the criteria included in the research framework, aiming to uncover the dominant research patterns within the sample. This analysis follows the original classification scheme by Guthrie et al. (2012), adapted to the specific context of blockchain in accounting. The following sections discusses each criterion included in Table no. 2, providing a critical evaluation of the results and answers for the second research question.

Table no. 2. Analytical Framework

Research Design Framework & Results					
Code	*A. Research methods*	*No.*	*Code*	*C. Jurisdiction*	*No.*
R1	Literature review	21	J1	International	55
R2	Case study/ Interviews/ Survey	8	J2	National	5
R3	Commentary/ Analytical	18		*Total*	*60*
R4	Exploratory	4			
R5	Conceptual	9			
	Total	*60*			
Code	*B. Accounting and Audit Area*	*No.*	*Code*	*D. Geographical area*	*No.*
A1	Management & Financial Acc.	23	G1	Europe	5
A2	Financial & Internal Audit	10	G2	USA	6
A3	Accounting & Audit	27	G3	Other / Not specified	49
	Total	*60*		*Total*	*60*

Blockchain research in accounting is characterized by a diverse range of ***research methods***, from empirical studies to theoretical explorations. Within the sample, literature reviews dominate, representing 35% of the studies. This heavy reliance on literature reviews suggests that blockchain's integration into accounting is still in its exploratory stages, with most studies synthesizing existing knowledge to identify potential applications and theoretical frameworks (Dai and Vasarhelyi, 2017; Bonson and Bednarova, 2019). Commentary and analytical papers account for 30% of the studies and serve as a platform for debating blockchain's impact on accounting practices. These studies often emphasize the need for future research to empirically validate blockchain's theoretical benefits (Fuller and Markelevich, 2020). Conceptual studies make up 15% and primarily focus on proposing

blockchain's potential to disrupt accounting practices without offering concrete empirical evidence (Kozlowski, 2018; Anis, 2023). Exploratory studies represent 6.7%, indicating that while there is interest in blockchain's practical applications, empirical investigations remain limited (Abu Afifa et al., 2023). Case studies, interviews, and surveys remain underrepresented, making up 13.3% of the studies (O'Leary, 2017; Smith, 2018b). This suggests a gap in empirical research, which needs to be addressed to better understand how blockchain functions in real-world accounting settings. Studies like Liu et al. (2022) and Brender et al. (2019) are notable exceptions, offering insights into the potential of blockchain for internal control and auditing functions.

Blockchain's potential to revolutionize both ***accounting and auditing practices*** is well-documented in the literature. The majority of the studies (45%) focus on the intersection of accounting and audit, reflecting the technology's ability to influence both sectors simultaneously (Bansal et al., 2018; Desplebin et al., 2021). Blockchain's transparency and real-time ledger capabilities allow both accountants and auditors to access accurate, immutable financial records, thereby enhancing the reliability of financial reporting (Coyne and McMickle, 2017; Lombardi et al., 2022). A significant portion of the research (38.3%) concentrates on management and financial accounting, exploring how blockchain can improve internal processes, decision-making, and financial reporting (Calderon and Stratopoulos, 2020; Ferri et al., 2021). Financial and internal audit research is less prevalent, comprising 16.7% of the studies. However, the studies that do focus on audit highlight blockchain's potential to streamline audit processes by offering tamper-proof, transparent records (Dyball and Seethamraju, 2021; Sunde and Wright, 2023).

The jurisdictional analysis of the sample reveals a heavy focus on international perspectives, with 91.6% of the studies taking a global approach to blockchain's impact on accounting. This reflects blockchain's cross-border relevance and its potential to influence multinational corporations and global accounting standards (Schmitz and Leoni, 2019). The international focus is understandable, as blockchain's decentralized nature allows for uniform application across jurisdictions, offering the potential for standardized accounting and auditing processes on a global scale (Watson and Mishler, 2017; Rozario and Thomas, 2019). On the other hand, national-level studies are limited, making up 8.3% of the research. This suggests that while blockchain is recognized globally, more research is needed to examine how national regulatory frameworks and local accounting practices interact with the technology (Matskiv et al., 2023).

The geographical distribution of the literature shows that most studies (81.6%) do not specify a particular region, focusing instead on blockchain's global implications (Yu et al., 2018; Pimentel and Boulianne, 2020). Only 8.3% focus on Europe and 10% on the USA. These findings suggest that while blockchain is viewed as a globally transformative technology, more region-specific research is needed to understand the challenges and opportunities of blockchain implementation within different accounting systems (Karajovic et al., 2019). European studies, such as those by Desplebin et al. (2021) and Ferri et al. (2021), often focus on regulatory challenges and technological adoption in specific European countries. In contrast, US-based research frequently explores blockchain's potential to enhance transparency and compliance within financial accounting and auditing practices (Sheldon, 2018; Bystrom, 2019; Calderon and Stratopoulos, 2020; Cai, 2021).

The structured analysis of blockchain literature reveals a landscape dominated by theoretical explorations, particularly literature reviews and conceptual studies, which reflects blockchain's early stage of adoption in accounting. The dominance of international studies highlights blockchain's global relevance, but the scarcity of empirical research underscores the need for more hands-on investigations. Moreover, the emphasis on accounting and auditing underscores the revolutionary potential of blockchain in both domains, while research on internal and financial auditing is still little covered. As blockchain continues to develop, future research should focus on filling these empirical and regional gaps, particularly as the technology becomes more integrated into real-world accounting systems (Alles and Gray, 2023; Sunde and Wright, 2023).

Qualitative Analysis and Results

Blockchain technology, originally developed for cryptocurrency transactions, has since evolved into a versatile tool with wide-ranging application across industries, including accounting. This section provides a detailed analysis of the opportunities and challenges that BCT presents to the accounting profession, based on insights gathered from the literature review. By evaluating its strengths alongside its limitations, this analysis sheds light on blockchain's overall impact on accounting practices, answering the third research question.

Opportunities of Blockchain Technology in Accounting

The capacity of BCT to improve trust and transparency is one of its most well-known benefits. Blockchain guarantees that once data is verified and published, it becomes unchangeable, resulting in an auditable and impenetrable trail by decentralizing transaction records (Bonson and Bednarova, 2019; Schmitz and Leoni, 2019). This immutability is critical in reducing fraud, as all participants in a blockchain network have access to the same unalterable data, ensuring a high level of transparency (Coyne and McMickle, 2017; Wang and Kogan, 2018). For auditors and financial professionals, this transparency is a game-changer. Blockchain eliminates the need for manual verification of transactions and allows real-time auditability (Fanning and Centers, 2016; Rooney et al., 2017; Bystrom, 2019). Auditors can access a comprehensive, immutable record of all transactions, which reduces the likelihood of errors or fraudulent entries and enhances the reliability of financial statements (McCallig et al., 2019; Abu Afifa et al., 2023). This real-time access also facilitates faster decision-making for stakeholders, who rely on accurate and timely information (Smith, 2018a).

The consensus mechanisms that underlie blockchain technology, such as Proof of Work (PoW) and Proof of Stake (PoS), ensure that all transactions are verified by network participants before they are added to the ledger (Kozlowski, 2018). This decentralized validation process reduces the possibility of collusion or data manipulation, further enhancing trust between stakeholders (Dai and Vasarhelyi, 2017). Moreover, blockchain's transparency is especially beneficial in industries where supply chain traceability is critical, allowing organizations to track goods and services with a high degree of accuracy (Kokina et al., 2017; Liu et al., 2022;). Blockchain's ability to enhance trust and transparency also aids regulatory compliance. The immutable nature of blockchain ensures that all transactions remain intact and verifiable, contributing to the integrity of financial reporting processes (Kwilinski, 2019; O'Leary, 2019)

Another significant advantage of blockchain in accounting is the use of smart contracts, which are self-executing agreements with the terms of the contract directly embedded in code (Karajovic et al., 2019). These contracts automate many routine accounting tasks, such as transaction verification, reconciliation, and regulatory compliance, significantly reducing the potential for human error (Kitsantas and Chytis, 2022) improving operational efficiency and allowing accountants to focus on more strategic tasks such as financial planning and analysis (Rozario and Thomas, 2019).

Blockchain's programmability allows for its adaptation across different sectors and for various purposes, providing flexibility in how organizations deploy it (O'Leary, 2017). For example, blockchain technology can be used to automate the recording of payroll, taxes, and financial transactions, which streamlines business operations and reduces the need for manual interventions (Pflueger et al., 2022). Businesses aiming to optimise their accounting processes find blockchain to be an appealing solution because of the automation it offers, which also reduces transaction processing costs (Inghirami, 2019).

Furthermore, blockchain's integration with other emerging technologies, such as the Internet of Things (IoT), enhances its capability to monitor transactions in real-time (Liu et al., 2019). In industries such as logistics and manufacturing, this real-time monitoring can significantly improve the efficiency and accuracy of accounting processes by providing up-to-date information on inventory, supply chains, and asset tracking (Fanning and Centers, 2016; Watson and Mishler, 2017). Blockchain's ability to integrate seamlessly with emerging technologies and other enterprise systems

demonstrates its flexibility and scalability potential, helping accounting professionals streamline tasks and focus on value-added services (Pimentel and Boulianne, 2020; Sinha, 2020).

Blockchain's ability to provide certainty over asset ownership is another significant advantage for the accounting profession. The technology allows for real-time verification of asset transfers and ownership, ensuring that financial records are accurate and up to date (Smith, 2018a; Rîndașu, 2019). This feature is particularly valuable in industries where multiple parties are involved in complex financial transactions, as blockchain can eliminate the need for intermediaries by providing a single, trusted source of truth for all participants (Kitsantas and Chytis, 2022). In the auditing field, blockchain technology streamlines the verification of asset ownership and transaction history, enhancing both the efficiency and accuracy of audits (Kwilinski, 2019). Auditors can quickly verify the validity of asset ownership, reducing the time and resources required to perform comprehensive audits (Lombardi et al., 2022). Blockchain's ability to enhance trust over asset management is a valuable tool for accounting professionals, enabling them to provide more accurate financial reports and assessments (Cai, 2021).

Blockchain's cryptographic features, particularly the use of hashing and consensus protocols, make it a powerful tool for fraud prevention (Coyne and McMickle, 2017). The immutable nature of blockchain guarantees that once a transaction is documented, it cannot be modified without compromising the entire chain, rendering it exceedingly difficult for malevolent entities to tamper with financial data (Kozlowski, 2018; Sheldon, 2018). This high level of security is especially important in industries where financial data is a prime target for fraud (McCallig et al., 2019). Blockchain also provides real-time audit trails that are essential for maintaining data integrity (Bystrom, 2019). Auditors can track the history of transactions and verify the accuracy of financial records with a higher degree of confidence (Smith, 2018b). The system's transparency and tamper-proof nature reduce the opportunity for fraudulent activity, making blockchain an essential tool for improving the integrity of financial reports (Sheldon, 2019; Pascual Pedreño et al., 2021).

Challenges of Blockchain Technology in Accounting

Despite its advantages, blockchain technology faces significant scalability challenges. Current blockchain networks, particularly those based on PoW consensus mechanisms, struggle to handle large transaction volumes, which limits their application in high-volume environments such as multinational corporations (Gomaa et al., 2019; Vincent et al., 2020). As the number of participants in a blockchain network grows, so does the complexity and computational power required to validate transactions, leading to slow processing times and reduced efficiency (Kolísnyk et al., 2023).

Efforts to address these scalability issues, such as the development of PoS and other alternative consensus mechanisms, have shown promise, but challenges remain in achieving the efficiency needed for large-scale adoption (Desplebin et al., 2019; Cai, 2021). Blockchain's inefficiency is particularly problematic for organizations that require real-time transaction processing, as the time required to validate and record transactions can result in delays and hinder workflow efficiency (Kiviat, 2015; Gomaa et al., 2019). The extensive application of blockchain in accounting is severely hampered by this problem.

Blockchain's reliance on PoW for validating transactions comes with a high environmental cost. The process of mining new blocks requires substantial computational power, which translates into significant energy consumption (Inghirami, 2019; Ferri et al., 2021). This energy-intensive nature of blockchain networks raises concerns about their sustainability, particularly as environmental regulations become more stringent (Matskiv et al., 2023). The growing demand for blockchain solutions has led to increased scrutiny of the environmental impact of PoW, especially as organizations look to reduce their carbon footprints (Bansal et al., 2018). The development of more energy-efficient consensus mechanisms, such as PoS, is critical for mitigating blockchain's environmental impact and ensuring its long-term viability in accounting and other industries (Inghirami, 2019; Kolísnyk et al., 2023).

While blockchain offers enhanced transparency, it also raises significant privacy concerns, particularly in public blockchains where transaction details are visible to all participants (Kiviat, 2015; Sarkar, 2018; Yu et al., 2018). This lack of privacy can be a major drawback for industries that deal with sensitive financial information, where confidentiality is crucial (Anis, 2023; Giang and Tam, 2023). Private, permissioned blockchains provide a potential solution to these privacy concerns by restricting access to authorized users only (Wang and Kogan, 2018). However, managing access controls in private blockchains can be complex, and ensuring that sensitive information remains secure is an ongoing challenge (Pascual Pedreño et al., 2021). Balancing the need for transparency with the demand for privacy will be essential for blockchain's successful implementation in the accounting profession (Sinha, 2020; Giang and Tam, 2023).

The lack of clear regulatory guidelines presents another major challenge to the adoption of blockchain in accounting. Current auditing standards were not designed with blockchain in mind, and the lack of a standardized framework for auditing blockchain-based financial records creates uncertainty for auditors and regulators (Brender et al., 2019; Fuller and Markelevich, 2020; Chowdhury et al., 2023). Together with advancements in blockchain technology, the need for clear regulatory guidelines and standardized auditing practices becomes increasingly important (Dyball and Seethamraju, 2021; Gauthier and Brender, 2021). Without regulatory clarity, firms may be reluctant to adopt blockchain, fearing that their accounting practices may not comply with existing legal frameworks (Rîndaşu, 2019; Lardo et al., 2022; Li and Juma'h, 2022;).

The cost and complexity of implementing blockchain technology present significant barriers to its adoption in accounting (Carlin, 2019; Calderon and Stratopoulos, 2020). Incorporating blockchain into current accounting systems necessitates substantial investment in technology and training, especially as the majority of accounting professionals lack the requisite competence to engage with blockchain (Li and Juma'h, 2022). This complexity is further compounded by the need to develop new organizational processes and workflows to accommodate blockchain (Rooney et al., 2017). For smaller firms, the cost of implementing blockchain may be prohibitive, making it difficult to justify the investment despite the potential benefits (Cai, 2021). Large organisations may encounter difficulties in shifting from conventional accounting systems to blockchain, especially when managing legacy systems that lack compatibility with new technology (Tiron-Tudor et al., 2021). Overcoming these financial and technical hurdles will be critical for blockchain's widespread adoption in the accounting profession (White et al., 2020).

Discussions

The growing demand for digitization, transparency, and trust within financial institutions and the accounting profession makes blockchain technology (BCT) a focal point of contemporary research. Blockchain's potential to enhance data integrity and automate processes has been widely recognized, yet its adoption in accounting remains limited, with empirical studies in their early stages (Bonson and Bednarova, 2019). While blockchain offers opportunities to improve accounting, the complexities surrounding its practical application, particularly in asset valuation, remain a challenge (Sinha, 2020). One of blockchain's key strengths is its ability to provide immutable records, ensuring certainty over the history of transactions. This capability reduces the need for manual reconciliations and can enhance the efficiency and accuracy of financial reporting (Smith, 2018a). However, BCT alone cannot determine the real-time value of assets, requiring further expert judgment for the valuation of intangible assets such as data, which poses new challenges for accountants (Anis, 2023).

The literature presents conflicting perspectives on blockchain's role in the accounting profession. On the one hand, researchers such as Coyne and McMickle (2017) and Kokina et al. (2017) advocate for blockchain's potential to enhance accuracy and reliability, particularly through innovations like triple-entry accounting (Carlin, 2019), which adds a cryptographic seal to traditional double-entry systems, offering greater transparency and fraud prevention (Chowdhury et al., 2023). On the other hand, some scholars highlight the potential disruption caused by automation, fearing that

blockchain could displace roles traditionally held by accountants (Tiron-Tudor et al., 2021). The need for upskilling is paramount, as future accountants must develop blockchain-related competencies to effectively manage and audit these systems (Watson and Mishler, 2017; Alles and Gray, 2023).

While blockchain presents substantial advantages, such as reducing the time and effort required for reconciliations and enhancing data security, its broader adoption remains slow. This is due to several factors, including technological complexity, high costs, and the need for further development and standardization (Rooney et al., 2017; Sarkar, 2018). Many organizations are still exploring blockchain's applications at the proof-of-concept stage, with few progressing beyond pilot projects (Smith, 2018b). Several studies stress the importance of creating strategies that encourage BCT adoption in the accounting and auditing sectors, emphasizing the need for professional training and the development of best practices (Liu et al., 2019; Vincent et al., 2020; Lardo et al., 2022). Additionally, researchers have pointed out the scarcity of empirical evidence supporting blockchain's real-world effectiveness, underscoring the need for further investigation (Yu et al., 2018; Abu Afifa et al., 2023; Matskiv, 2023). Therefore, although blockchain shows great promise for enhancing accounting practices, its broad adoption hinges on overcoming challenges like privacy concerns, scalability, and regulatory compliance.

Conclusions

Blockchain technology possesses significant potential to revolutionise the accounting and auditing industries. By providing a decentralized, immutable ledger, blockchain enables multiple parties to establish a single, trustworthy source of truth without the need for intermediaries (Sheldon, 2018). This capability aligns well with the primary goals of the accounting profession: ensuring transparency, accuracy, and accountability (Bansal et al., 2018; Pflueger et al., 2022; Kolísnyk et al., 2023). This study contributes to the understanding of blockchain's influence on accounting by consolidating existing literature and recognising research trends via a structured literature review (SLR). While blockchain's potential is widely acknowledged, the academic discourse remains in its early stages, with most studies focusing on theoretical explorations and highlighting both the opportunities and challenges blockchain presents (Kwilinski, 2019; Kitsantas and Chytis, 2022).

Positively, blockchain promises to increase accounting efficiency through real-time reporting, expediting procedures like reconciliation, and improving the quality and dependability of financial data (Kokina et al., 2017; Karajovic et al., 2019). For these benefits to be fully realized, accountants will need to expand their expertise in BCT and data analytics (Sinha, 2020). However, researchers have also noted blockchain's risks, including technological limitations, data security concerns, and high implementation costs (Sarkar, 2018; Rozario and Thomas, 2019). Additionally, the need for more empirical evidence to substantiate blockchain's theoretical benefits remains a pressing issue (Dai and Vasarhelyi, 2017). The studies reviewed indicate a balanced approach to blockchain's potential, with most researchers acknowledging its advantages while remaining cautious due to the technology's early stage of adoption. Unlike other disruptive technologies, blockchain has been approached with both optimism and a healthy degree of scepticism, particularly regarding its long-term viability (Fuller and Markelevich, 2020).

This study identifies several areas for future research. First, the adoption of blockchain will likely impact not only the accounting profession but also related areas such as educational systems, regulatory bodies, and technical development teams. Future studies should explore how these stakeholders can collaborate to facilitate blockchain's integration into accounting practices (Dyball and Seethamraju, 2021; Li and Juma'h, 2022). Moreover, since much of the current research is conceptual and driven by academics with technical backgrounds, future studies should focus on real-world case studies and pilot projects that demonstrate blockchain's practical applications in accounting and auditing (Lombardi et al., 2022). Understanding how regulatory bodies and professional organizations will adapt to blockchain's growing presence will be crucial for its successful implementation (Lardo et al., 2022).

Researchers should also investigate how decentralized blockchain systems will function in different organizational contexts, considering factors such as company size, public versus private sectors, and national versus international operations (Chowdhury et al., 2023). As blockchain evolves, it is essential that future studies provide empirical evidence to support the technology's benefits and address its limitations, such as scalability and regulatory compliance. Addressing these issues will require further research and collaboration between blockchain developers, accounting professionals, and regulators (Lardo et al., 2022; Sunde and Wright, 2023). In conclusion, while blockchain has the potential to reshape accounting and auditing, its success will depend on continued research, empirical validation, and the development of industry standards (Gauthier and Brender, 2021). Future researchers can contribute to the development of blockchain in accounting by filling in the research gaps found in this study (Pascual Pedreño et al., 2021; Alles and Grey, 2023).

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