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Revolutionizing Accounting and Audit with Blockchain Technology: Scientific Literature Review

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ABSTRACT

Blockchain technology is disrupting traditional practices in accounting and audit fields. This article explores how blockchain's transparency, immutability, and decentralization are reshaping financial transactions and record-keeping. Conventional accounting faces challenges like data accuracy and fraud prevention, which blockchain addresses through an unalterable, decentralized ledger for real-time financial transaction records. Each transaction is securely linked using cryptography, forming a tamper-proof chain that reduces fraud risk and ensures an auditable trail. Blockchain's impact on accounting lies in its ability to automate processes through smart contracts. These self-executing codes enable instant revenue recognition, automated intercompany transactions, and compliance with standards. Blockchain also enhances audit efficiency by granting auditors access to immutable financial data and automating audit procedures. Despite challenges like scalability and privacy, blockchain's transformative potential is evident in real-world applications across sectors. Its implementation demands stakeholder collaboration to navigate technical and ethical considerations. As blockchain evolves, its role in accounting and audit is set to redefine financial transparency and accountability.

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INTRODUCTION

Blockchain technology has emerged as a groundbreaking innovation that has the potential to revolutionize various industries, including accounting and audit. This decentralized, transparent, and secure technology has the capacity to transform traditional accounting practices and enhance the efficiency of auditing processes. In this article, we will explore the application of blockchain technology in accounting information systems and auditing, highlighting its numerous benefits potential implications. In recent years, the world has witnessed the rapid ascent of blockchain technology, a revolutionary innovation that has fundamentally transformed various industries. Among the myriad applications of blockchain, its impact on accounting and audit practices stands out as a beacon of disruption and potential.

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The convergence of financial management, record-keeping, and the blockchain's inherent attributes has paved the way for a new era in the fields of accounting and audit. This paper delves into the exciting prospects that blockchain technology brings to these disciplines, outlining how its transparency, immutability, and decentralization are reshaping conventional processes, and the challenges and opportunities that lie ahead.

Blockchain technology, often with cryptocurrencies like Bitcoin, is a distributed ledger system. It allows for the secure and transparent recording and validation of across multiple computers or nodes. Unlike traditional centralized systems, blockchain technology relies on consensus algorithms and cryptography to ensure data integrity, immutability, and transparency [1].

Integration into Accounting Information Systems

The integration of blockchain technology into accounting information systems presents a multitude of benefits. By providing a transparent and tamper-proof record of transactions, blockchain technology enhances the accuracy and reliability of financial information. This can significantly reduce the risk of fraud and errors, as the data stored on the blockchain is immutable and auditable at any given time. Additionally, blockchain technology can streamline reconciliation processes in accounting [2]. The decentralized nature of the blockchain eliminates the need for intermediaries, resulting in faster and more cost-effective transactions. This increased efficiency can enhance the productivity of accounting departments and mitigate the risk of inaccuracies arising from manual processes. Moreover, the implementation of smart contracts, which are self-executing contracts with predefined rules on the blockchain, can automate various accounting processes [3]. Smart contracts can facilitate the automatic recording of transactions, generation of financial statements, and even the execution of payments. This automation reduces the reliance on human intervention, eliminating potential errors and enhancing overall process efficiency [4].

Blockchain Technology's Impact on Auditing

Audit procedures can also be significantly enhanced through the integration of blockchain technology. By utilizing blockchain, auditors can gain access to an accurate, real-time record of transactions, providing them with greater transparency and assurance [5]. The tamper-proof nature of the blockchain ensures that auditors have reliable data for their analysis. Additionally, blockchain technology can enable auditors to perform more comprehensive testing, as the entire transaction history is stored on the blockchain. This facilitates the tracing of transactions and allows auditors to verify the authenticity and integrity of financial information with ease. The ability to conduct detailed analysis in real-time can improve the efficiency of auditing processes, ultimately reducing the time and effort required [6].

Furthermore, blockchain-based audit trails provide a more secure and trustworthy system for storing audit evidence. The inherent characteristics of blockchain, such as data immutability and consensus mechanisms, enhance the credibility of audit reports. This transparency offers increased confidence in the accuracy and reliability of financial statements and audit opinions [7].

METHODS

This study focuses on testing and implementing blockchain technology in the context of accounting and audit practices within Small and Medium-sized Enterprises (SMEs). The research methodology comprises three main phases: exploratory research, application testing, and implementation assessment. The working steps used in this study are:

1. Exploratory Research

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a. Literature Review: A comprehensive literature review is conducted to establish a theoretical foundation for the study. Relevant academic papers, articles, and reports on blockchain technology, accounting practices, audit procedures, and the challenges faced by SMEs are thoroughly reviewed. The literature review provides insights into the potential benefits and limitations of integrating blockchain technology into accounting and audit processes for SMEs.
b. Case Study Selection: A selection of SMEs from diverse industries is made to serve as case studies for the application and implementation phases. The SMEs are chosen based on their willingness to participate and their potential to showcase the impact of blockchain technology on their accounting and audit practices.

2. Application Testing:
   a. Blockchain Technology Selection: A suitable blockchain platform is chosen for the testing phase, considering factors such as scalability, security, and ease of implementation for SMEs. The selected blockchain platform will be tailored to meet the specific needs of the SMEs' accounting and audit processes.
   b. Development of Prototypes: Prototypes of blockchain-based accounting and audit applications are developed for each participating SME. These prototypes are designed to address the unique requirements and challenges faced by the SMEs while aligning with established accounting and audit standards.
   c. Data Integration: The SMEs' financial and audit data is integrated into the blockchain prototypes. This involves digitizing existing records and transactions, ensuring data accuracy, and designing secure data entry mechanisms.
   d. Testing Phase: The prototypes are tested extensively in simulated environments to assess their functionality, accuracy, and usability. Various scenarios are created to evaluate the performance of the blockchain-based applications in real-time accounting and audit simulations.

3. Implementation Assessment:
   a. Field Implementation: Upon successful testing, the blockchain-based accounting and audit applications are implemented in the participating SMEs' operational environments. The implementation process involves integrating the blockchain technology with the SMEs' existing accounting and audit systems.
   b. Training and Support: Comprehensive training is provided to the SMEs' accounting and audit teams to ensure a smooth transition to the new technology. Ongoing technical support is offered to address any challenges or concerns that arise during the initial implementation phase.
   c. Data Collection: Quantitative and qualitative data is collected during the implementation phase. Metrics such as transaction processing speed, data accuracy improvement, and reduction in manual reconciliation efforts are measured and compared against pre-implementation benchmarks.
   d. User Feedback: Feedback from the SMEs' accounting and audit teams is gathered to assess user experience, identify challenges, and understand the perceived benefits of the blockchain-based applications.

4. Analysis and Evaluation.

Quantitative data collected during the implementation phase is analyzed using statistical methods to measure the effectiveness and efficiency of the blockchain-based applications. Qualitative data, including user feedback and insights from SME representatives, is analyzed thematically to understand the broader implications of the implementation on the accounting and audit processes.

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Method Rough Set

The Rough Set Method is a powerful data analysis approach to uncover hidden relationships within complex datasets. In the context of this study, the Rough Set Method will be used to analyze data obtained during the testing and implementation phases of blockchain technology in accounting and audit processes within SMEs.

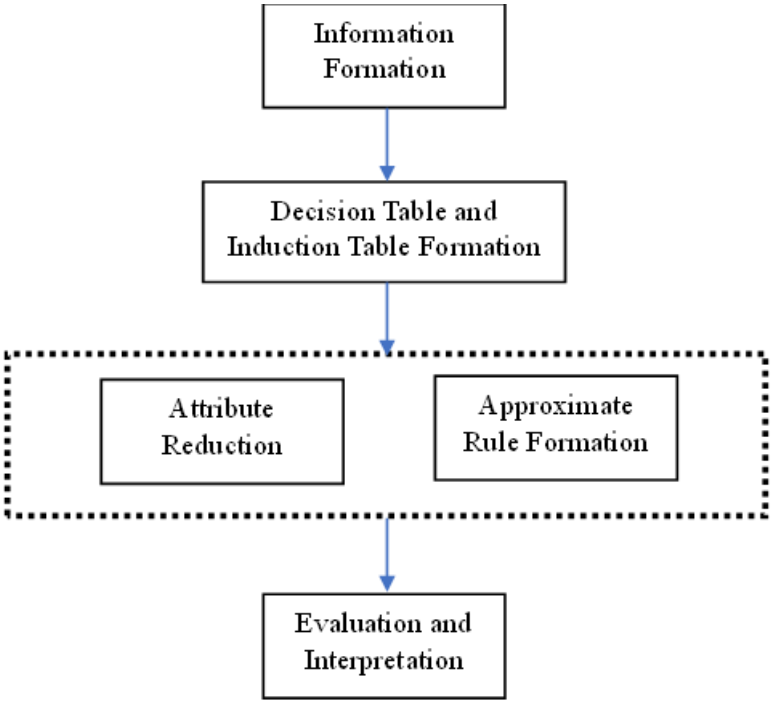

Figure 1. Process Rough Set Method

Various kinds of blockchain exist, as illustrated in figure 2. The categorization includes open, closed, and consortium blockchains. An open blockchain stands out due to its inclusive nature, allowing anyone to join the public network. Participants can read, contribute new data, and engage in blockchain operations without external oversight in this format. Conversely, a closed blockchain mandates authorization for user entry, implementing multiple constraints and overseeing individuals eligible for network membership and their transaction involvement [8].

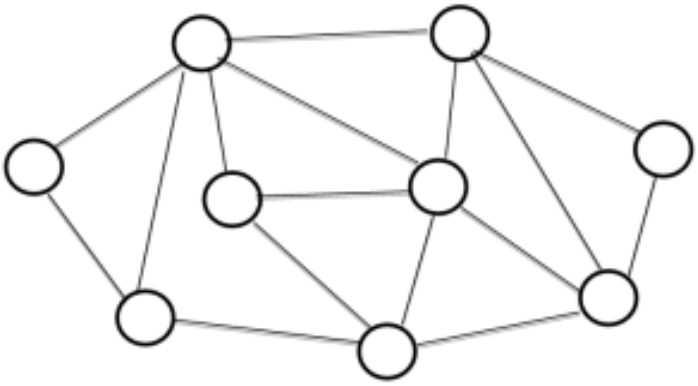

Figure 2. Process Rough Set Method

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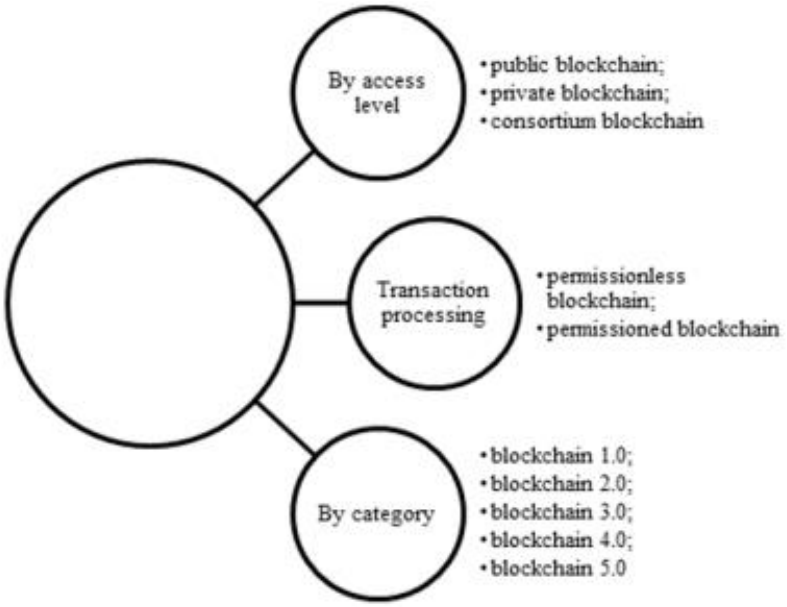

Figure 3. Classification of Blockchain technology

Table 1
Benefits of Blockchain-based Accounting.

Current accounting challenges	Value driver	Blockchain benefits
Manual documents	Operational simplification/efficiency	Digitize documents, increase efficiency, reduce costs, reduce human error, automate reconciliation.
Time-consuming process	Transaction settlement time reduction	Blockchain-powered smart contract enables contracts to execute automatically once pre-set conditions are met and facilitates real-time transactions.
Lack of mechanism to track transactions from different ledgers	Counterpart risk reduction	Agreements are codified and executed in a shared, immutable environment, forming an audit trail.
Prone to fraud	Fraud minimization	Blockchain provides transparency, visibility, provenance, and immutable records, which enhances security. Any suspicious fund transfer will be observed and detected in real-time.
Regulatory complexity, costly to organizations	Regulatory efficiency improvement	Provides faster and more accurate reporting by automating compliance processes through a smart contract. It permits real-time monitory between regulators and regulated entities.
Intermediaries are involved in many processes	Liquidity and capital improvement	Blockchain eliminates imbalance of information among market participants, increases transparency

RESULTS AND DISCUSSION

The research findings within our dataset (N = 179) are predominantly theoretical in nature, which is unsurprising given the early developmental stage of blockchain research. This trend parallels other fields like business, energy, and industrial strategy literature (e.g., BEIS, 2020; Toufaily et al., 2021). Moreover, our review identified an increasing frequency of blockchain-related research being published in accounting and information systems journals. For instance, the International Journal of Accounting Information Systems (Alles and Gray, 2020; McCallig et al., 2019; Sogaard, 2021; Vincent et al., 2020; Wang and Kogan, 2018; Yen and Wang, 2021); Australian Accounting Review (Carlin, 2019; Karajovic et al., 2019; Schmitz and Leoni, 2019; Tan and Low, 2019); British Accounting Review (Brennan et al., 2019; Moll and Yigitbasioglu, 2019); Current Issues in Auditing (Sheldon, 2018, 2019); Journal of Emerging Technologies in Accounting (Coyne et al., 2016; Coyne and McMickle, 2017; Issa et al., 2016; Kokina et al., 2017; Marshall and Lambert, 2018; Raschke et al., 2018; Rozario and Thomas, 2019; Cong et al., 2018); Accounting Today (Antoinette, 2018; Boillet, 2017; Hood, 2018; Ketz, 2017; Pitter, 2018); Journal of Accountancy (Carlozo, 2017; Drew, 2018,

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2019; Drew and Tysiac, 2020; Tysiac and Drew, 2018; Vetter, 2019); and Journal of Information Systems (Dai and Vasarhelyi, 2017; Appelbaum and Nehmer, 2020; Sheldon, 2020), among others, have begun to publish blockchain-related studies. Furthermore, Figure 2 provides a comprehensive overview of four central themes extracted from the blockchain-enabled accounting literature and outlines considerations for its adoption. These emerging themes also extend to how blockchain will influence accounting and auditing practices utilizing AI tools. These themes encompass the event-based accounting approach, real-time accounting, triple-entry accounting, and continuous auditing through blockchain tools. Utilizing traceable and auditable blockchain data can enhance the efficiency of auditing processes.Blockchain presents avenues for research in the event-centric accounting paradigm, given its enhancement in accessing real-time accounting information (Wu et al., 2019). Employing blockchain for maintaining accounting records enhances their traceability and visibility, thereby

Table 2
Manually screened list of quality academic journals.

Journal	ABS	No. of Articles	Keywords	Illustrative references
Review of Financial Studies	4*	4	Blockchain, FinTech, innovation	Biais et al. (2019), Chen et al. (2019), Cong and He (2019), Goldstein et al. (2019)
Review of Finance	4	1	Blockchain, corporate governance	Yermack (2017)
Journal of Management Information Systems	4	5	Information based transformation, blockchain, Fintech	Benlian et al. (2018), Clemons et al. (2017), Giboney et al. (2019), Gomber et al. (2018), Yin et al. (2019)
Technovation	3	2	Innovation, disintermediation	Linton (2018), Urbinati et al. (2019)
Information and Organization	3	2	Digital innovation and transformation, blockchain	Hinings et al. (2018), Zachariadis et al. (2019)
Information Society	3	2	Bitcoin, data governance	Holub and Johnson (2018), Winter and Davidson (2019)
Journal of Strategic Information Systems	3	3	Blockchain, platform, digital transformation	Du et al. (2019), Shafiei et al. (2019), Vial (2019)
British Accounting Review	3	2	Cloud, big data, blockchain, and artificial intelligence (AI)	Brennan et al. (2019), Moll and Yigitbasioglu (2019)
Long Range Planning	3	1	Digital transformation (blockchain)	Warner and Wäger (2019)
Decision Sciences	3	1	Blockchain	Kumar et al. (2019)
Harvard Business Review	3	1	Blockchain	Iansiti and Lakhani (2017)
Total		**24**		

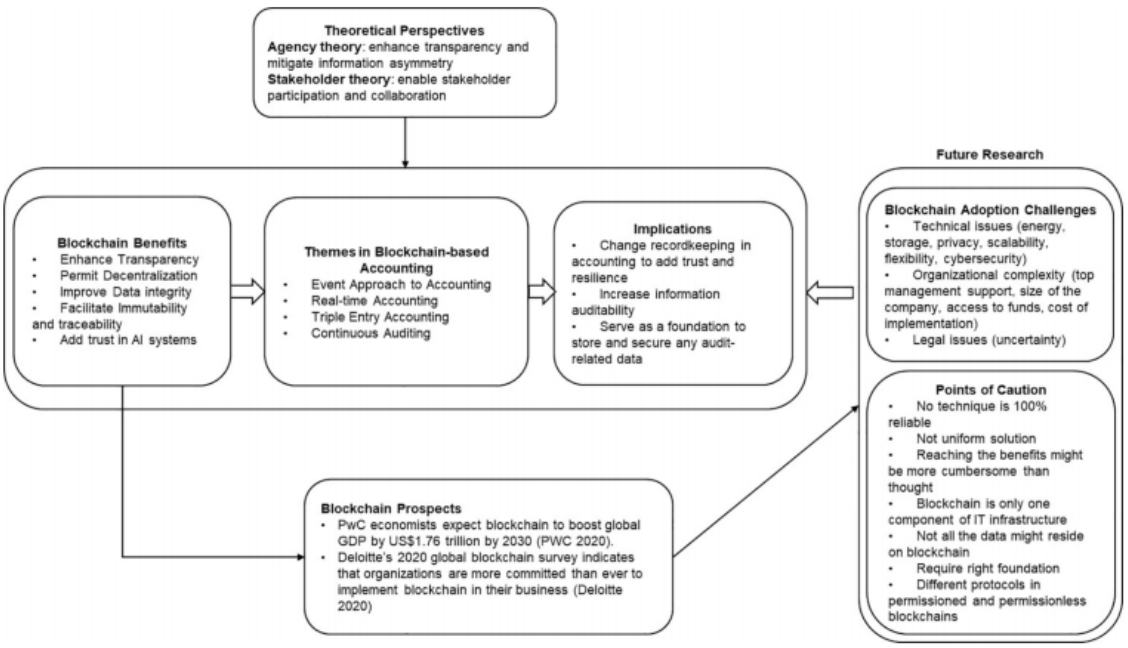

Figure 4. Summarized topics covered in this review.

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CONCLUSION

The application of blockchain technology in accounting and auditing brings forth immense potential for transformative change. With its ability to enhance transparency, efficiency, and security, blockchain technology offers a promising future for the accounting industry. As organizations embrace this technology, they can streamline their accounting information systems, automate processes through smart contracts, and elevate the effectiveness of audit procedures. It is imperative for accounting professionals and auditors to stay informed and adapt to this evolving technological landscape, as blockchain's impact is set to reshape the realm of finance.

Based on the results of the above discussion, I attach a comparison and gap in the form of a bibliography between accounting and auditing information systems using blockchain technology.

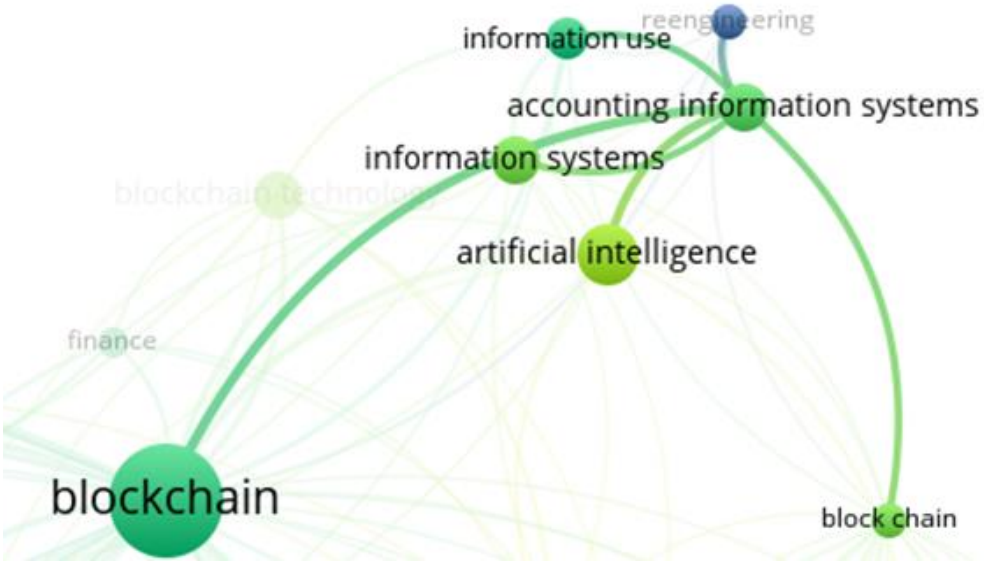

Figure 5. comparison by using Bibliography

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