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ROLES AND CHALLENGES OF BLOCKCHAIN TECHNOLOGY ADOPTION IN ACCOUNTING AND AUDITING

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ABSTRACT

The transformation of digital technology has had a significant impact on various industries, one of which is in accounting and auditing practices, where blockchain technology offers a potential in increasing transparency, security, process efficiency, and data reliability in accounting and auditing. This study examines various literatures to evaluate the benefits and constraints faced in implementing blockchain technology adoption in accounting and auditing through a literature review. Blockchain, as a decentralized technology that offers high transparency and security, has the potential to develop accounting and auditing practices by improving efficiency, effectiveness, security, accuracy, and reliability of data. However, there are several significant challenges that still hinder the widespread adoption of this technology, such as regulatory constraints and cyber and hacker threats. This study contributes to providing a comprehensive understanding of how blockchain technology can be integrated into accounting and auditing processes. The findings of this study are expected to help practitioners and researchers in developing more detailed and in-depth effective strategies by utilizing the potential of blockchain technology to increase transparency, efficiency, security, and trust in financial information management.
Keywords: *Blockchain, Accounting, Auditing, Technology, Literature*

1. INTRODUCTION

The development of digital technology has brought about major changes in the industrialized world. These advancements affect the way companies operate and change consumer needs. Various digital innovations require companies to continue to adapt amidst increasing industry competition. The huge surge in the quantity and quality of available digital technology is able to challenge traditional business practices [23]. These encourages related sectors, especially in accounting and auditing to adjust the changes that occur and adopt relevant innovations. Factors such as stakeholder pressure, increased use of big data and digital information, automation of entry-level procedures, and integration of technology into accounting processes have all changed the tasks performed by accounting practitioners [63][27]. An additional factor that is also emerging and has great potential to influence the accounting and auditing field is blockchain technology [28]. Blockchain technology comes as a major breakthrough that will change the way the financial industry operates in the future [2]. The main reasons for integrating blockchain technology into companies are to eliminate human error, increase efficiency, reduce distractions, suppress accounting fraud, save time and costs [5][14][57].

Blockchain has been recognized as a technological innovation that affects various sectors, simplifying business processes including accounting and auditing. As new blockchain-based methodologies and processes emerge, the role and competencies of auditors may change, with a number of advantages that blockchain offers in auditing [8]. Academic studies and practitioner experience show that blockchain provides significant benefits to both fields in reducing workload in financial statement audits, bringing consistent financial data format standards, providing real-time access that supports real-time audits, and reducing routine tasks for accountants and financial managers in the long run. Moreover, blockchain provides benefits in reducing annual audit preparation time, making it easier to trace the origin and history of transactions, eliminating some internal control functions through direct data certification, and facilitating reporting processes [13]. In this context, although blockchain technology provides significant benefits in improving transaction time efficiency as well as automation in accounting and auditing processes, it

cannot be ignored that blockchain technology has several risks attached to its implementation [22].

The application of this technology brings challenges and opportunities that auditors must understand and take advantage of, so adjustments to new risks and challenges are required [32]. In its application, 4 Public Accounting Firms (Delloite, KPMG, PWC, and EY) evaluated the latest blockchain platform that allows auditors to verify transactions directly and simplify the confirmation of external balances, which is a complex audit task [14]. The use of blockchain technology also helps address the issue of insufficient data security and confidentiality by providing a secure and reliable data storage and transmission system without the need to rely on intermediaries, as well as reducing the risk of errors. With a decentralized structure, each network user has control over their own data, keeps it confidential, and reduces the risk of data loss or disclosure [28]. This reflects the audit industry's commitment to understanding and utilizing the latest technology to improve efficiency and accuracy in the audit process.

In most of the previous studies, it is said that blockchain technology has a role in improving the transparency and efficiency of financial reporting, auditing and governance through accounting systems [1][50][26][21][24][43]. Blockchain technology is also considered to improve data security and user privacy. This is in line with how blockchain can play a role in minimizing the possibility of fraud in the health insurance system of the Social Security Administration for Health (BPJS). With the transparency, reliability, and verifiability properties of blockchain technology, BPJS can build a more accountable and secure transaction recording system. Every health insurance claim transaction will be recorded in a distributed and immutable manner, thus reducing the risk of fraud such as false claims or fictitious procedures [6]. Prior work has also examined how blockchain can enable real-time data access, verification, and reduce time and costs in accounting and auditing processes [22][12]. Additionally, researchers have investigated the integration of blockchain with other technologies like smart contracts, IoT, and AI to enhance its functionality in accounting and auditing [16][59].

Other previous research on blockchain applications has also utilized machine learning algorithms such as XGboost and random forest to classify the model and calculate the confusion matrix. These classification results allow the model to separate between fraudulent and real data, with simulation results showing that the proposed algorithm is able to detect fraudulent transactions well. In addition, two attacker models were also tested to test the effectiveness of the system against bugs and attacks, showing that the proposed system can overcome Sybil Attacks [7].

Blockchain is a highly influential technological innovation in various fields including finance [61]. Given that accounting and auditing are critical pillars in maintaining integrity and trust in business, understanding how blockchain can be applied in these fields is important. However, the adoption of this technology also faces various challenges, such as regulatory issues, implementation costs, and resistance to change. Therefore, this study aims to identify these roles and challenges through a comprehensive literature review, to provide practitioners and academics with in-depth insights into the potential as well as the barriers that may be faced in adopting blockchain technology in accounting and auditing. This research is expected to provide a strong theoretical foundation as well as practical recommendations to maximize the benefits of blockchain, while addressing the barriers that exist. With this, the following questions were formulated: 1) What is the significance of blockchain technology in the accounting and auditing fields? 2) What are the key barriers and challenges impeding the implementation of blockchain in accounting and auditing practices?

Within this framework, it is important to emphasize that this research makes a substantial contribution to the theoretical understanding of the evolution of technology in the increasingly complex context of accounting and auditing. It is hoped that this research will lead to the development of appropriate blockchain adoption strategies in accounting and auditing practices. The research also underscores the complex challenges faced in adopting blockchain technology, from regulatory aspects to integration with existing infrastructure. Unlike prior work that has mostly focused on the advantages of blockchain, this study also delves deeper into the various challenges and barriers that organizations face in implementing this technology, such as regulatory issues, integration with existing systems, and resistance to change [1][38][12][4]. By conducting a thorough literature review and a SWOT analysis, this research provides a holistic understanding of the

current state of blockchain adoption, highlighting both the opportunities and the complexities involved. The bibliometric analysis in this study also offers a unique perspective on the evolving research trends and gaps in the field, guiding future research directions. Furthermore, this research emphasizes the importance of collaboration between academics, practitioners, and regulators to develop effective strategies for overcoming the challenges and maximizing the benefits of blockchain technology in accounting and auditing [9][15]. By highlighting the challenges and potential solutions offered by blockchain technology, this research details discusses and explores further the benefits and consequences of implementing this technology in the ever-changing and evolving world of accounting. Through a thorough analysis of the literature on this technology, it is also expected to provide benefits to stakeholders, academics, researchers, and practitioners in this field.

The next section of this research will present a literature review that discusses blockchain in more depth. The third section will present the research methodology used. The fourth section will summarize the findings and present the discussion. Finally, the fifth section presents the research conclusions and some suggestions for more in-depth research in the future.

2. LITERATURE REVIEW

2.1 Definition of Blockchain

The definition of blockchain can be found in many variations that reflect different perspectives and approaches. Nonetheless, researchers have attempted to summarize the various views into one more comprehensive definition. The definition was chosen because it is considered capable of encompassing the essential elements underlying blockchain technology. By summarizing these various perspectives, the main goal is to provide a clearer and more thorough understanding of blockchain technology, so that it can be easier to understand its function in a broad context.

Blockchain is a decentralized and distributed digital technology that facilitates the recording of transactions through peer-to-peer networks [28][19][1]. Blockchain uses cryptographic techniques to build trust, transparency, and accountability by creating immutable and shareable transaction records that enable transparent verification and auditing of transactions [18].

2.2 Structure of Blockchain

Blockchain consists of blocks that contain an ordered record of transactions, each block is connected to the previous block through a hash (linking blocks in a chain), thus forming an immutable record of transactions [28][38]. Blockchain uses consensus mechanisms, such as Proof of Auditing Frequency (PoAF) to verify and approve each transaction recorded in a block, as well as verify data integrity [36]. Blockchain technology can be integrated with other technologies, such as smart contracts, Internet of Things (IoT), and artificial intelligence (AI) to enhance its functionality [16][59].

2.3 Benefits of Blockchain

In this modern era, accounting and auditing face several challenges that need to be addressed to improve their performance and reliability. One of the main issues is the lack of transparency and reliability in the financial information presented [1]. In addition, the risk of accounting errors and low information security are also serious concerns [28]. Another problem that often occurs is the inefficient and less comprehensive audit process [9]. Companies also often experience difficulties in managing their company assets [57].

With the many challenges faced, the application of blockchain technology is needed to overcome the issues that exist in the field of accounting and auditing. Blockchain technology has various benefits that can be felt, especially in the field of accounting and auditing. One of the main benefits is in increasing transparency, reliability, and security in recording transactions, where blockchain provides an immutable and verifiable record of transactions, thereby increasing accountability and trust [1][28][56][30][47]. Blockchain technology is also beneficial in improving efficiency, as it enables real-time data access and verification, and reduces time and costs [22][12].

Blockchain creates a clear audit trail that can improve reliability, accuracy, and efficiency in financial reporting, as well as reduce the possibility of errors and fraud or data manipulation [7][11][20]. Blockchain can create new roles such as smart contracts to accept certain inputs and will provide outputs based on preset rules [9]. Blockchain technology also facilitates more secure and

distributed data management, including in the context of healthcare [36][16]. Blockchain can improve efficiency, transparency, and tracking in the supply chain [56][34]. In addition, blockchain also enables business process automation and more effective decision-making through integration with other technologies such as IoT and artificial intelligence [59][10]. Overall, blockchain has the potential to transform the field of accounting and auditing by offering various advantages in terms of transparency, security, and efficiency.

2.4 Challenges of Blockchain Adoption

The application of blockchain in accounting and auditing can provide various benefits. However, the adoption of blockchain technology in accounting and auditing also faces several challenges. Lack of understanding and knowledge of the benefits of blockchain, complex integration with existing accounting systems, and increased costs are the main barriers [1][38]. In addition, blockchain does not guarantee full protection against fraud and transaction errors can result in significant financial losses [38].

To overcome these challenges, large investments, high-quality staff training, and the development of accounting rules and standards that are compatible with blockchain technology are required [38][12]. In addition, accounting professionals must continue to expand their knowledge of blockchain technology in order to effectively integrate it in accounting practice [12]. Overall, blockchain has great potential to transform the accounting profession by improving the efficiency, transparency, and reliability of financial information. However, the adoption of blockchain in accounting and auditing requires collaborative efforts between academics, practitioners, and regulators to overcome existing challenges and maximize the benefits of this technology [9][15].

3. RESEARCH METHODOLOGY

The methodology in this study uses a literature review. Literature reviews play an important role in academic research, aiming to gather existing knowledge and assess the situation of a field of study [29]. Through this process, researchers can gain an in-depth understanding of the relevant theoretical foundations based on the intended research, then summarize it into a new paper output. The selection of literature is based on several criteria, namely scopus-indexed journals (Q1 to Q4), year of publication (2018 - 2024), as well as the relevance of research keywords, and the relevance of the information presented that focuses on the use of blockchain in accounting and auditing. This step ensures that the selected literature supports the arguments and findings expressed in the research. As such, the literature review can form the basis for building the conceptual framework and structuring the research arguments.

Successful research methods create a solid foundation for advancing knowledge and theory, starting with conducting a thorough search across various sources such as academic databases, journals, conferences, and other references. Literature reviews serve as the basis for developing new conceptual models or theories, which have proven to provide significant benefits when exploring a particular research domain throughout history [54]. In this research, a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis is used to examine the potential, advantages, challenges, and impacts of the application of blockchain technology in the accounting and auditing field. By applying the literature review methodology, this research increases the understanding of the optimization of accounting and auditing processes through the use of blockchain technology. In this study, bibliometric analysis was also conducted using VOSviewer software, a tool that has proven to be very useful in evaluating and categorizing scientific literature, as well as identifying influential authors, institutions, and works [33]. VOSviewer can be used to map the current state of knowledge in a particular field, identify research gaps, and reveal trends [40]. Bibliometric analysis can reveal that research in a particular field is still relatively sparse, indicating potential areas for further research.

4. RESULT AND DISCUSSION

This literature review aims to map out existing research related to the role and challenges of blockchain technology adoption in the field of accounting and auditing. Through in-depth analysis of various studies, this research will develop a comprehensive conceptual framework.

4.1 Bibliometric Analysis

The purpose of this bibliometric analysis is to mapping out research trends, identifying influential works in the field of blockchain, accounting, and auditing. To achieve this goal, the researcher utilizes the Scopus database as the main source of data. Through this database, researchers collected

data consisting of 399 journals published between 2018 and 2024, which contained keywords related to blockchain, accounting, and auditing. The journals used in this bibliometric analysis can be seen in this Journal Table.

Next, the researcher downloaded this data in a format compatible with VOSviewer, specifically CSV (Comma-Separated Values). Then, the researcher imports the dataset into VOSviewer. In this case, the researcher carefully removes criteria that are not related to the selected keywords. This method ensures that the analysis focuses only on relevant publications, facilitating a precise examination of research trends and contributions within the specified domain.

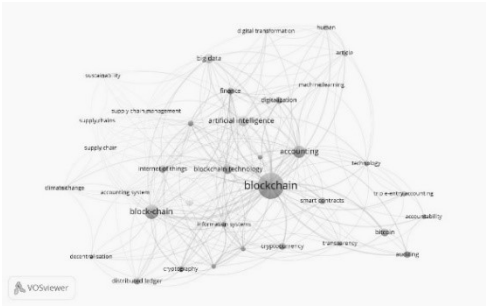

Figure 1: Network Visualization for Blockchain in Accounting in VOSviewer

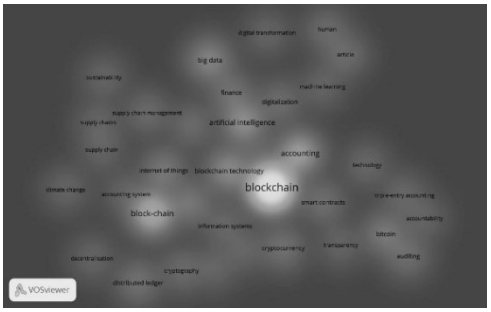

Figure 2: Density Visualization for Blockchain in Accounting in VOSviewer

In *Figure 1* and *Figure 2* describes how blockchain plays a role in the field of accounting. Blockchain is at the heart of research discussions, which are closely related to various aspects such as artificial intelligence, information systems, and cryptocurrencies. The strong relationship between blockchain and accounting shows that blockchain technology has the potential to revolutionize the way financial data is managed, with a focus on transparency and security [31][1][28]. Related terms such as "smart contracts" and "supply chain management" demonstrate the application of blockchain in automating processes and improving operational efficiency, as explained in journals [46] and [34]. In addition, the linkage between "artificial intelligence" and "big data" indicates the potential for blockchain integration with other advanced technologies for more in-depth and predictive data analysis [22][24]. This shows that research in this field focuses not only on the development of technology but also on its application in solving real problems in the world of accounting and business. Overall, this visualization reflects the important role of blockchain as a driver of innovation across various disciplines, expanding the scope of research, and opening up new opportunities for efficiency and security in the management of financial information. In addition, *Figure 1* and *Figure 2* is a concept map that shows the relationship between blockchain and various other aspects. Blockchain serves as the core of a network that connects various interrelated topics.

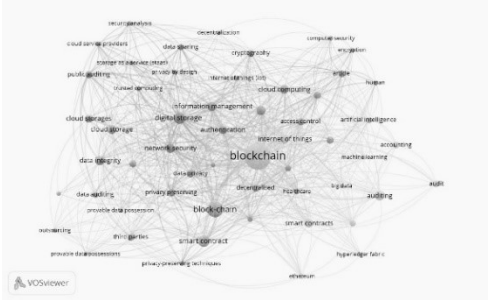

Figure 3: Network Visualization for Blockchain in Auditing in VOSviewer

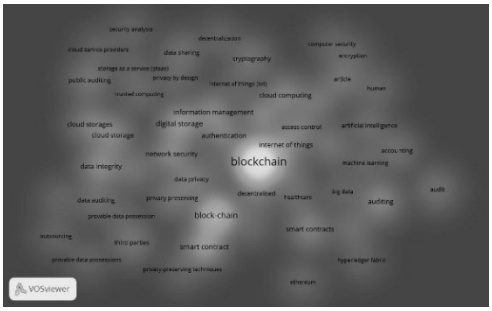

Figure 4: Density Visualization for Blockchain in Auditing in VOSviewer

Figure 3 and *Figure 4* provide visualization of how the relationship between blockchain and auditing affects each other. Blockchain, as a technology that offers significant transparency and security, is a key element in auditing. In this context, blockchain can strengthen audit reliability by providing an immutable and traceable record of transactions in real-time [28]. This technology interacts with various other aspects, such as cryptography for data security, smart contracts for process automation, and artificial intelligence for

more efficient data analysis [46][22]. In addition, integration with cloud technology and the Internet of Things (IoT) expands the potential of blockchain in managing and verifying data from various sources [16]. Blockchain not only improves efficiency in the audit process but also ensures data integrity, which is crucial in information-based decision-making [28].

Based on the findings of this bibliometric analysis [22][31][43][25][28][49], in the context of the relationship between blockchain and accounting and auditing shows that there is an opportunity for researchers to explore and contribute more deeply to blockchain-related topics in accounting and auditing that are crowded in academic circles.

4.2 SWOT Analysis

4.2.1 Strength

There are several strengths that can be leveraged in blockchain research in accounting and auditing. First, the interest and adoption of blockchain technology in both fields (accounting and auditing) has steadily increased over time. As explained in journal [31], which states that the adoption of blockchain in accounting and auditing has grown along with the increasing amount of research. In addition, several other studies have also been conducted in this realm that indicate ongoing academic activities [17]. Another strength is that blockchain itself has great potential to transform accounting and auditing practices, especially in improving transparency, security, process efficiency, and data reliability in accounting and finance [19]. This is supported by a number of other studies that show that the application of blockchain can minimize doubts in data integrity [1][28][38][49][22].

In addition, blockchain also enables continuous auditing and real-time accounting [1][28], which shows that blockchain technology provides convenience in financial supervision and reporting. Another strength of this blockchain technology is its ability to reduce the risk of errors and fraud in accounting and auditing processes. As explained in journals [38][49][14][50], shows that the use of blockchain can improve data accuracy and reliability. In addition, the efficiency and effectiveness of accounting and auditing processes can also be improved through this technology, as explained in [28][38][49][12][13]. Blockchain technology allows for better integration of accounting data across the supply chain, as discussed in several journals [37][5][55]. With the ability to connect various parties in the ecosystem, blockchain has become an invaluable tool in improving collaboration and transparency between stakeholders.

4.2.2 Weaknesses

On the other hand, besides the existing strength aspect, there are also several weaknesses that need to be analyzed and considered in depth. Although interest in and adoption of blockchain technology continues to increase, the available academic literature is still limited. This shows that this topic is widely discussed but has not been explored in depth among academics. Additionally, there are still knowledge gaps related to specific issues, such as accountant skills, governance, and regulations required to adopt blockchain [19].

The complexity of blockchain technology can also be a challenge in its application in accounting and auditing practices, as revealed in research journals [4][12][13]. In addition, the costs required for blockchain implementation and infrastructure tend to be high are also an obstacle for many organizations [38][12][4][56][39]. In [38][12][62][35], suggests that while this technology offers many benefits, its limitations in terms of capacity to handle high transaction volumes can be a hindrance to its widespread adoption.

4.2.3 Opportunities

Research on the adoption of blockchain technology in accounting and auditing has many opportunities that can be used to maximize the benefits of this technology in the future. The development of clear standards and regulations to govern the use of blockchain is one of the important things. Research shows that the lack of an adequate regulatory framework is a major obstacle to blockchain adoption, so efforts to develop appropriate accounting rules and standards can drive wider adoption [12][4][51]. Some of the other contributions to exploration that can also be leveraged from blockchain technology related to accounting and auditing, such as skills, training, and education to support blockchain adoption in accounting and auditing, blockchain governance, and the impact of blockchain adoption on accounting standards [19].

The integration of blockchain with other technologies such as artificial intelligence and the Internet of Things (IoT) also has the potential to maximize the benefits of blockchain technology

adoption, where several studies show synergies between blockchain and other advanced technologies in improving data analysis and business process automation [22][24][16]. The development of new blockchain-based applications and business models in accounting and auditing is also an opportunity that can be taken advantage of. The unique characteristics of blockchain technology enable the exploration of new business models by utilizing this technology, thus opening up new opportunities for innovation in accounting and auditing practices [52]. Other research also emphasizes the importance of cooperation or collaboration between academics, practitioners, and regulators on the development of effective adoption strategies to overcome the challenges in adopting blockchain, so that a comprehensive approach can result in more successful adoption [9][15]. By taking advantage of these opportunities, the accounting and auditing profession can optimally utilize blockchain technology to improve transparency, efficiency, security, and innovation in the management of financial information in the future.

4.2.4 Threats

On the other hand, there are several threats that need to be considered in research on the adoption of blockchain technology in accounting and auditing. One of them is the industry's reluctance to adopt new technologies such as blockchain due to concerns such as issues related to the lack of clear regulations to regulate the use of blockchain in accounting and auditing practices [12][4][51][25][53]. In addition, although data security and privacy are guaranteed by encryption codes, there are concerns in the adoption of this blockchain technology, such as cyber threats and hackers [53][38][46][12][4][45][17]. Research [38][46][12] highlights that sybil attacks can be a threat to blockchain security resulting in blockchain networks being dominated and manipulated by hackers. Hackers can attempt to manipulate, alter, or steal financial data stored on the blockchain, which could result in significant financial losses for the company. In the context of blockchain-based accounting and auditing, sybil attacks can lead to manipulation of digital evidence and audit documents. Hackers can create many fake identities and use them to alter or manipulate financial transaction records, supporting evidence, and audit documents stored in the blockchain. For example, hackers can create many fake identities and use them to forge supporting documents, such as invoices and receipts.

5. CONCLUSIONS

This study provides a comprehensive review of blockchain adoption in accounting and auditing. Integration of bibliometric and SWOT analyses to provide a structured understanding of blockchain adoption, which was lacking in previous studies. However, this research also has several limitations. These include a lack of focus on industry-specific or regional challenges, as well as insufficient exploration of the ethical implications of blockchain adoption, such as data privacy and job displacement.

Based on the research methods of literature reviews that have been carried out, it can be concluded that blockchain technology has great potential in the transformation of accounting and auditing practices. The findings demonstrate that blockchain offers numerous advantages, such as enhanced transparency, security, efficiency, and reliability of financial data. By creating immutable transaction records, facilitating real-time audits, and reducing the risk of errors and fraud, blockchain technology holds the promise of revolutionizing the way accounting and auditing functions are performed. However, the review also uncovered several critical barriers that must be addressed to enable the successful integration of blockchain in these domains. The lack of technical skills and understanding among professionals, the high implementation costs, and the absence of clear regulatory frameworks emerged as major obstacles.

In addition, the industry's reluctance to adopt new technologies and concerns about data security such as cyber threats and hackers are also concerns that must be addressed. To maximize the benefits of blockchain technology, a collaborative effort between academics, practitioners, and regulators is essential. Further research should address these gaps by incorporating primary data, exploring industry-specific challenges, and examining the ethical and regional dimensions of blockchain adoption, identify effective adoption strategies, cost-benefit analyses, and developing clear regulatory frameworks and global standards, as well as conducting industry-specific studies to address varying challenges and opportunities. The impact of blockchain on the roles and competencies of accounting and auditing professionals remains underexplored, highlighting the need for studies on skill adaptation.

By addressing these multifaceted challenges through a coordinated approach, the accounting and auditing profession can harness the transformative potential of blockchain technology to increase transparency, efficiency, and trust in the management of financial information. This research provides a solid foundation for further in-depth exploration, ultimately paving the way for the successful integration of blockchain in the evolving landscape of accounting and auditing.

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