THE USE OF BLOCKCHAIN TECHNOLOGY IN IMPROVING THE RELIABILITY AND SECURITY OF ACCOUNTING INFORMATION SYSTEMS: IMPACTS AND CHALLENGES

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Abstract

The use of blockchain technology in the context of Accounting Information Systems (SIA) has become an important topic in the academic and industry literature. By leveraging blockchain, the Triple Entry Accounting System application can improve information transparency and reliability while reducing fraud in business, improving audit efficiency, and improving data protection. This study aims to analyze the impacts and challenges associated with the implementation of blockchain technology in improving the reliability and security of accounting information systems. The research method used in this scientific paper is a type of qualitative method through the Systematic Literature Review (SLR) study. The results of this analysis show that the use of blockchain technology has a significant impact on the reliability and security of accounting information systems. Blockchain allows financial transactions to be recorded transparently, immutable, and trustworthy automatically through network consensus. However, there are several challenges that need to be addressed in implementing this technology, including scalability issues, high transaction fees, complex regulations, and a lack of understanding and awareness of blockchain technology among accounting practitioners. The reason for the choice of the title is that blockchain technology in Accounting Information Systems is not only relevant, interesting, and offers great opportunities, but also has the potential to make a significant contribution to the field of industry practice.

Keywords: Blockchain, Accounting Information Systems, Triple-Entry

Introduction

Blockchain-based Accounting Information Systems (SIAs) are characterized by their ability to organize data in a distributed, decentralized, and shared blockchain. So, creating a database managed by many users distributed on the network that allows direct interaction between several parties in a transaction (Alkan, 2021). The use of blockchain technology has been a major focus. In its application to Accounting Information Systems, it is an interesting and relevant topic in today's digital era. Blockchain has emerged as a promising solution as decentralized and encrypted databases offer a highly effective solution to improve the reliability and security of accounting information systems.

The Triple-Entry concept is an evolution of the traditional accounting system consisting of single entry and double entry. In Triple-Entry, each transaction is recorded in three different entries i.e., Debit Entry: this is a traditional entry that records the addition of assets or the reduction of liabilities or capital. Credit Entry: a traditional entry that records a decrease in assets or an increase in liabilities or capital. Third Entry (Trebit): It is an innovation in triple-entry accounting. This third entry records transactions at the public blockchain layer and cannot be changed. With the entry of trebit into the blockchain, triple-entry accounting is expected to increase trust, transparency, and efficiency in the accounting process (Cai, 2021).

By leveraging the principles of distribution, transparency, and cryptographic security, blockchain has the potential to revolutionize the management and exchange of accounting data storage. In particular, it is important to consider how blockchain can improve the accuracy of accounting data, reduce the risk of data manipulation or loss and improve the confidentiality of financial information. As with the application of other new technologies, the use of blockchain in accounting information systems also poses a number of

impacts and challenges. The presence of human resources who have extensive knowledge of this technology is one of the reasons. In addition, changes in business processes and corporate policies it is also necessary to integrate blockchain technology effectively.

However, there are still many challenges that need to be overcome when implementing blockchain technology into accounting information systems. One of the main challenges is scalability, which can be a problem when it comes to handling large transaction volumes. In addition, integration with existing accounting systems is also complicated and incurs large costs. Compliance regulations can pose challenges to the utilization of blockchain technology. The purpose of this scientific paper is to conduct a thorough examination of how blockchain technology can be leveraged to improve the reliability and security of accounting information systems, as well as investigate its potential impacts and challenges. Therefore, this research is expected to contribute to the development of a safer and more reliable accounting information system.

1. The following are the goals to be achieved in writing this scientific paper
   a. Knowing the impact of the application of blockchain technology in the Accounting Information System (SIA).
   b. Knowing the challenges of applying blockchain technology in Accounting Information Systems (SIA).
2. Benefits for authors
   c. Students can meet the graduation requirements in pursuing the S-1 Accounting program at the Open University.
   d. As an additional insight for the author about the application of technology blockchain in Accounting Information Systems.
3. Benefits for the Open University
   It can be used as an additional learning theory for students about the application of blockchain technology in Accounting Information Systems.
4. Benefits to the community
   As education and science development regarding the application of blockchain technology in Accounting Information Systems.

Methods

A qualitative approach allows researchers to find the views, perceptions and experiences of experts or practitioners in the field being studied. Systematic Literature Review (SLR)with the qualitative research method used in this study. Where this cannot be explained through numbers, but through a description of the application of blockchain in accounting information systems. Because this study is a literature review, this study does not use a specific location. This research was carried out for 2 months, namely in April and May 2024.

Reviewing national and international journals on Google Scholar that are relevant to the application of blockchain technology in Accounting Information Systems is the data collection method used in this study. Using keyword disbursement as a report in this scientific paper on "Analysis of the Use of Blockchain Technology in Improving the Reliability and Security of Accounting Information Systems: Impacts and Challenges". Interpretation of the results of the analysis to illustrate the implications of using blockchain technology in the context of accounting information systems.

Results and Discussions

Blockchain technology is a decentralized database system used to record transactions in a structured and secure manner. Blockchain allows transaction information to be stored in interconnected and cryptographically encrypted blocks. Each block in the blockchain has transaction information, a timestamp, and a link to the previous block, creating an immutable block chain (Ibrahim, 2023). In the context of Blockchain 3.0 applications, the integration of IoT and blockchain technology has the potential to support and facilitate elements that enable remote accounting management, as well as the possibility of converting different data sources into standard languages, for example working hours are included in costs, and products sold can be included in revenue (Arwin et al., 2023, as quoted in Rahmawati et al., 2022).

The existence of blockchain makes accountants more focused on planning and evaluation rather than just taking notes. Accountants no longer spend a lot of time on reconciliation and with the implementation of blockchain will have the same records as clients. So that's the beauty of blockchain, a lot of work will be affected and it will be easier for accountants to do it. (Bandaso et al., 2022, as quoted in Gidwani, 2021). With blockchain, data is tracked and verified by many network participants, thus creating trust between

parties. Blockchain data is open and transparent, so all stakeholders can see it. However, due to the nature of cryptographic links, data in the blockchain is also highly secure and cannot be manipulated. (Surbakti, 2023).

Conveyed by Arwin (as quoted in Kshethri, 2021) some of the characteristics of blockchain include:

1. Decentralization, Due to its decentralized model, blockchain can increase transparency and create trust in sustainability-related activities. Blockchain eliminates the need for trusted third parties to transfer value, allowing for faster and easier transactions.
2. Immutability , which means that once an object is created and recorded in software code, it cannot be altered, deleted, or forged. Blockchain transparency and verification are enhanced with this feature.
3. Cryptographic-based authentication, Digital signatures that are based on cryptography are used in the blockchain to authenticate users. The user signs the transaction using a private key in the form of a very long and random alphanumeric code. In addition, in a blockchain system, it is also possible to generate a public key from a private key and exchange information with each other.
4. Consesus driven, a consensus model used to independently verify and validate each block on the blockchain. Since each participant has a copy of the ledger, every time a new transaction is added to the blockchain, consensus from all participants in the network is required. Each blockchain has its own protocol agreement. This memorandum of understanding is called an agreement mechanism. These protocols contain mechanisms or rules that will verify the authenticity and correctness of transactions before they are added as new blocks on the blockchain. New transactions will be added if the majority of network participants agree to approve them. So, in blockchain, data control is not centralized like in traditional blockchain databases, control is not carried out by a single participant but is distributed to all participants in the network (Ramadhani et al., 2024 as quoted in O'Leary et al., 2019)

To make optimal use of blockchain technology in accounting information systems, here are some steps that can be taken (ALSaqa et al,.2019):

1. An In-Depth Understanding of Blockchain:
   Useful in having a mature understanding of how blockchain works, its functions, and its potential application in accounting. This will help design a solution that fits the needs of the business.
2. Identify Relevant Use Cases:
   Identify application cases where blockchain technology can add value to a company's accounting information system. Focusing on areas where transparency, reliability, and process efficiency are critical.
3. Development of Standards and Policies:
   Develop clear standards and policies related to the use of blockchain in accounting information systems. It includes security, data access, and transaction management procedures that all users must follow.
4. Training and Skills Development:
   Educating accounting and IT personnel on how to use blockchain technology and how to manage accounting information systems integrated with blockchain. Ensuring each team has the skills needed to manage this technology effectively.
5. Integration with Existing Accounting Systems:
   Planning for blockchain integration with existing accounting systems needs to be done carefully. Ensure the integration process runs smoothly and data can interact well between the two systems.
6. Trial and Evaluation:
   Conduct testing of the application of blockchain in accounting information systems to identify potential problems, fix weaknesses and ensure the system is operating properly before official implementation.
7. Collaboration with External Parties:
   Collaborate with external parties such as auditors, regulators, and financial service providers to ensure blockchain implementations comply with applicable industry standards and regulations.

By following the steps and ensuring that blockchain implementation is based on a strong understanding, proper use case identification, good integration with existing systems, development of clear standards and policies, and training of competent teams, companies can make optimal use of Blockchain technology in their accounting information systems.

The Impact of Blockchain Application on Accounting Information Systems

Challenges related to the digitization of accounting information systems (SIA) are an important aspect that needs to be considered by companies. One of the main challenges is data security. In an increasingly open digital environment, data security and privacy risks are becoming increasingly complex. Businesses need to protect their financial data from cyber threats such as hacking and malware attacks. Poor data security can have a serious impact on a company's reputation and credibility in the eyes of customers and other stakeholders (Tan et al., 2024 as quoted in Kustiwi et al., 2021). Therefore, companies must make decisions in the form of applying blockchain to accounting information systems.

Blockchain is another promising innovation in Accounting Information Systems. Blockchain technology can be used to improve the integrity and transparency of financial transaction data. In a rapidly evolving business environment with complex systems and global connections, blockchain can improve security by eliminating potential risks such as data manipulation and fraud. Additionally, blockchain facilitates faster and more secure financial transactions, eliminating costly intermediaries. However, the application of blockchain in Accounting Information Systems also requires investment in infrastructure development and staff training (Tan et al., 2024).

Conveyed by Ramadhani et al., (2024) that by applying blockchain technology, it can improve the accounting information system. The application of blockchain also has an impact on the accounting profession,

1. Technology can improve the efficiency of the accounting process. The ability of this technology is to eliminate reconciliation work and replace most of the administrative work, so that the rate of serious errors is reduced and accountants have more time to focus on their activities.
2. Blockchain technology can improve data security, increase the transparency of accounting records, and improve the integration of accounting data. With transparency, blockchain technology networks can observe and authenticate incoming transactions. Before a transaction is recorded, it must first be approved by the user of blockchain technology, this is to avoid fraud in incoming transactions.
3. Blockchain technology can change the focus of accountants. In the future, accountants will deal more with data due to work that uses smart contacts and triple entry accounting systems. However, that way, accountants in recording transactions and preparing financial position reports are increasingly reduced.
4. Increased speed and accuracy, blockchain allows transactions to be processed quickly and accurately as its system is designed to reduce processing time and human error. This can improve the speed and accuracy of financial reporting. The application of blockchain in accounting information systems can open up opportunities for innovation in business models, such as cryptocurrency payments or the development of smart contracts to automate accounting processes (Cai, 2021).

By utilizing blockchain technology, the accounting process can become more efficient. By improving the efficiency of the accounting process, it can help reduce the time and cost required for accounting, which can also help organizations achieve operational efficiency.

Likewise the impact on data integrity, data integrity is a key element of the blockchain revolution. The blockchain uses a unique cryptographic signature for each transaction, which is used to authenticate and protect the integrity of the data. Data stored in the blockchain cannot be modified without using the appropriate cryptographic keys. This means that the data entered into the blockchain is valid and cannot be changed (Surbakti, 2023). In addition, accountants do not need to be developers with detailed knowledge of blockchain functions. But they need to learn how to provide advice on blockchain accreditation and understand its impact on companies and their consumers. They must also be able to act as a liaison, after discussions with engineers and investors. The expertise of accountants also needs to be expanded to include an appreciation of the core features and functions of blockchain (ALSaqa et al,.2019).

The concept of triple-entry bookkeeping is an evolution of the traditional Double-Entry Bookkeeping system. In triple-entry accounting, each transaction is recorded by both parties to the transaction as in a double-entry system, but there is a third entry called a verification receipt. So, in addition to debit and credit entries, there is a third layer entry called trebit. This third entry serves as proof of transactions verified by a third party or blockchain system, thus strengthening the reliability and transparency of accounting information (Alkan, 2021).

Implementing triple-entry accounting using blockchain can address reliability and transparency issues in accounting systems. Transactions can be made on the blockchain through payments in the form of tokens, archiving them in real time and permanently, and provides an easy-to-verify audit trail. While there is great

potential in developing triple-entry accounting using blockchain, there are still barriers to its wider adoption. Some of the challenges include legal issues, security threats, and uncertainty of investment results. Therefore, triple-entry accounting with blockchain offers a more sophisticated and transparent approach to recording financial transactions, potentially improving the integrity and efficiency of the accounting process (Cai, 2021).

According to Bandaso et al., (2022) A blockchain-based triple-entry accounting system provides solutions to various problems in the current system, such as trust and transparency issues. The time required for audits can be reduced and at the same time reduce the necessary costs, which will ultimately improve the company's performance. Additional efforts can then be made to prevent fraud and fraud beyond just verifying information.

The following are the uses of blockchain in preventing accounting fraud as follows:

1. The introduction of blockchain technology (cryptobanking) eliminates the need to verify and research accounting information from various databases, saves time and costs, and provides real-time reporting, which greatly improves the reconciliation process for investment banks. (Luthfiyyah et al., 2023, as quoted in Ravi, 2021).
2. Transactions are recorded securely and transparently in a distributed digital ledger known as a blockchain. The terms of the contract between the buyer and the seller are written into a line of code, making it a self-executing contract as a smart contract (Luthfiyyah et al., 2023, as quoted in Dhillon et al., 2022).
3. Optimizing supply chains by optimally utilizing technologies and resources such as blockchain can improve the efficiency and performance of supply chains. (Luthfiyyah et al., 2023, as quoted in Al-Zaqeba et al., 2022).

Challenges of Applying Blockchain to Accounting Information Systems

Bandaso conveyed (as quoted in Pimentel, 2020) that blockchain in the future will replace many accounting roles, especially in bookkeeping and calculations which are often prone to human error. In addition, by profession as an accountant, the accountant still serves as a business consultant, using his expertise to assist companies in solving financial problems that cannot be solved with blockchain or other similar technologies.

Despite its potential, the application of blockchain technology to accounting also faces several challenges. Scalability is an important issue that needs to be addressed to handle large transaction volumes. In addition, integration with existing accounting systems and regulatory complexity are also challenges that must be overcome. The following are the challenges in the application of blockchain technology in Accounting (HM et al., 2023):

1. Scalability
    The scalability problem is one of the main challenges in the application of blockchain technology in accounting. As transaction volumes increase, the performance of the blockchain network can be affected. Therefore, it is necessary to find a solution to overcome these problems.
2. Integration With Existing Accounting Systems
    Existing accounting processes may require a lot of time and effort to integrate blockchain technology. It is important to adapt existing systems to blockchain technology without disrupting existing accounting processes.
3. Regulation and Compliance
    Regulations regarding the use of blockchain technology in accounting must be clearly explained. Compliance with applicable regulations is important to ensure   the legal and appropriate application of blockchain technology. This can make it difficult for companies to comply with applicable legal provisions, if they are still not fully defined.
4. Implementation Costs
    The use of blockchain technology in accounting information systems can incur significant costs, especially those related to system development, training, and maintenance. This cost may be a barrier for some organizations looking to adopt this technology.

To face the challenges of using blockchain, here are some steps that can be taken (Ibrahim, 2023):

1. Education and Training
    Provide education and training to the company's internal team regarding blockchain technology, its benefits, and how to integrate it into the accounting information system. With a better understanding, teams will be better prepared to face challenges that may arise.
2. Cooperation with Regulators

Communicate and collaborate with regulators to understand current regulations regarding the use of blockchain in accounting. By establishing good relationships with regulatory agencies, companies can ensure compliance with applicable regulations.

3. Infrastructure Development

Ensuring the company's technology infrastructure is ready to integrate the blockchain. This includes developing systems that are compatible with blockchain technology, as well as ensuring the security of data stored within the blockchain.

4. Submission and Evaluation

Conduct careful testing and evaluation before fully implementing blockchain in accounting information systems. By conducting testing and evaluation first, companies can identify potential problems and find solutions before actual implementation.

5. Community Engagement

Participate in the community and interact with other stakeholders in the accounting and blockchain ecosystem. By sharing information and discussing it with others, companies can gain valuable insights and help create effective use cases.

By taking these steps, companies can better prepare themselves for the challenges that may arise when using blockchain in accounting information systems and ensure successful implementation.

Conclusion

The use of blockchain technology in accounting information systems has great potential in improving the reliability and security of transactions by reducing the risk of fraud and improving data integrity. Blockchain provides better transparency, integrity, and traceability than traditional systems and facilitates automated and real-time monitoring and verification of transactions. Thanks to its decentralized nature and strong cryptography, blockchain can prevent data manipulation and fraud, thereby increasing user trust in accounting information systems. However, the application of blockchain technology in accounting information systems also poses a number of challenges, such as scalability, integration with existing systems, implementation costs, etc and immature regulatory challenges. High implementation costs and the need for specialized expertise are also important considerations for organizations.

Given the complexity of blockchain technology, it is important for an organization to invest in education and training aimed at their staff to be able to understand blockchain technology and its implementation in Accounting Information Systems. The government also needs to cooperate in developing clear and consistent standards and regulations in the application of blockchain technology in accounting. It is also important to conduct a thorough audit to ensure alignment with the needs of the organization and understand its impact on existing accounting information systems. Overall, despite the challenges, the benefits that blockchain technology offers to improve the reliability and security of accounting information systems are significant. With the development of technology and appropriate regulations, blockchain has the potential to become the mainstay of future accounting information systems.

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