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# Bibliometric Analysis Application of Blockchain Technology in Accounting and Audit using Vosviewer

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**Abstract**. The research aims to assess trends in the use of blockchain technology in accounting and auditing for transparent financial governance, as well as map research based on scientific publications. The research method used is quantitative, utilizing bibliometric analysis methodology. Data analysis was carried out using the VosViewer application and Google Scholar data sources. The sample that meets the criteria is 108 documents from 200 papers taken from 2019-2024. Through literature clustering analysis, articles are grouped into three clusters: blockchain aspects in auditing, blockchain implementation in accounting, and blockchain research in Indonesia related to transaction transparency. Research trend analysis is conducted to identify changes and developments in research topics, understand the dynamics and direction of scientific development, and identify topics that are on the rise or have just emerged. This analysis helps in planning future research and directing resources in potential directions.

**Keywords:** Blockchain, Accounting, Auditing, Bibliometrics.

## I. Introduction

Blockchain is an innovative technology that lends itself to continuous development. Initially blockchain was used in Bitcoin trading where it implemented a decentralized system that provided a secure infrastructure used for transactions with various parties without the need for central authority intervention, minimizing additional costs and speed in various ways. Blockchain plays an important role in IoT by improving security, making supply chains more efficient and making transactions smoother (Wilianto, W., & Kurniawan, A., 2018). This technology can certainly help reduce various fraud risks because of its transparent system.

Blockchain technology is an innovative application concept that integrates distributed data storage, consensus mechanisms, cryptographic algorithms, peer-to-peer networks, and various other technologies (Riswandi, B. A., & SH, M., 2022). This technology can be used to develop consensus mechanisms for governance and collaboration. Blockchain technology allows us to check the status of the system and prevent data loss and there is a guarantee of data integrity without the need for a central intermediary. Blockchain makes it easy for users to verify and track Bitcoin transactions and makes the various information stored in the blocks can act as an element of trust.

Blockchain-based information security systems store data in blocks that validate each other. As a result, data is now impossible to branch and change without the consent of all nodes on the network (Maulani, I. E., et al., 2023). By utilizing blockchain technology, important data such as in accounting and auditing can be protected more effectively and the risk of attacks from unauthorized parties can be avoided. It can also help minimize the risk of intervention or manipulation of data by third parties who do not have authorization in this field. Therefore, blockchain's useful functions of protecting data integrity, instantaneous exchange of critical information, programmability and automated process control will facilitate the development of a new accounting ecosystem. In the field of auditing, blockchain can provide automatic assurance in storage systems such as during stock-taking. The utilization of blockchain can enable stock transaction records to be automated and verified in real time. Therefore, it allows the stock taking process to be faster and more transparent.

Previous research on the application of blockchain technology in accounting and auditing can be done with a variety of different approaches and research focuses. Here are some topics that form the basis of research: Pratiwi's research (2022) states that the implementation of blockchain in accounting and auditing in Indonesia can enable a timely, transparent, and verified accounting ecosystem. Research conducted by Arwin, et al. (2023) examined the characteristics and architecture of blockchain to ensure its implementation is compatible with existing approaches in accounting, auditing, public sector, and supply chain management. The results showed that blockchain can optimize existing accounting and supply chain management in Indonesia.

Research conducted by Rahmawati (2023) examines IoT in blockchain from an accounting perspective. The findings of this study indicate that blockchain technology and IoT can improve the quality, timeliness, comparability, and relevance of accounting data. The purpose of this study is to identify strategies to increase the benefits of using accounting information by reaching real-time accounting information. According to research conducted by Septiawan and Fartika (2022), the implementation of three-entry bookkeeping using

blockchain technology has advantages in terms of traceability, timeliness, security against tampering, and high transparency. In addition, this bookkeeping can solve transparency and fraud problems that current accounting practices have not been able to solve.

Blockchain is still not widely used in accounting or auditing, despite its rapid development. The few studies conducted in this area indicate this. Therefore, the purpose of this study is to identify current research themes in the financial industry around blockchain technology. Utilizing a bibliometric approach, it is expected to obtain an evaluation of existing article publications and can then be utilized by academics in particular to discuss the correlation between blockchain technology in accounting and auditing.

The formulation of the problem raised is What are the factors that cause the low adoption of blockchain technology in accounting and auditing? What are the research trends related to the application of blockchain technology in accounting and auditing over the past 6 years? What are the main topics of research related to the application of blockchain technology in accounting and auditing that are most published in leading accounting journals? And the research objective is to contribute to the hotly discussed blockchain topics in the accounting community. Using bibliometric analysis, various blockchain studies can be explored quickly and systematically, resulting in a transparent and scalable literature review. This helps scholars to find the most relevant blockchain research articles, objectively map research topics, and improve the quality of literature reviews through consistent evaluation.

## II. Literature Review

### Blockchain Technology

The history of blockchain technology begins with Satoshi Nakamoto's 2009 white paper invention that took Haber and Stornetta's distributed ledger concept and added financial incentives to keep the interconnected copies of the ledger linked (Riswandi, B. A., & SH, M., 2022). The key development in Nakamoto's mining invention allows people to earn coins in the form of bitcoins through solving mathematical puzzles that aim to verify transactions in available blocks.

According to Riswandi (2022) simply defines blockchain as a decentralized way to record any data that is not limited to financial transactions which are encrypted and cannot be continuously changed. The data is recorded in the form of values or assets in a ledger. Blockchain is an ever-expanding collection of data called blocks, connected and secured using cryptographic techniques (Nugraha, A. C., 2020). Existing blocks contain cryptography, timestamps, and transaction data from previous blocks that are interconnected.

According to Rahmawati, M. I., & Subardjo, A. (2023), blockchain adoption occurs in three phases: (1) Digital currencies such as Bitcoin are used with Blockchain 1.0. (2) BC 2.0 brings smart contracts, which run on an Ethereum-like system. (3) Decentralized autonomous communities (DAS), decentralized autonomous businesses (DAC), and decentralized autonomous organizations (DAO) realize BC 3.0. Blockchain's increased openness, trust, and efficiency have the potential to revolutionize project management and industrial operational processes (Arwin et al., 2023). The mechanisms used in blockchain to ensure security can be explained as follows:

1. Digital sign mechanism: This involves the use of cryptography to alter each block on the blockchain to create a unique digital signature. This digital signature ensures that each block is authentic and cannot be altered without compromising the integrity of the entire chain.
2. Proof-of-work mechanism: Proof of work (PoW) is a consensus process that forces miners to solve difficult math problems to mine new blocks.
3. Peer-to-peer mechanism: Blockchain uses a P2P network where every node on the network has a complete copy of the blockchain ledger. This allows for decentralized validation of transactions across the entire network instead of just at a central authority. This means that there is no single point of failure to attack. By combining these three mechanisms, blockchain can create a system that is secure, transparent, and resistant to unauthorized changes.

### Blockchain Technology in the Accounting Ecosystem

The utilization of blockchain technology in accounting is useful for tracking financial data and transferring asset ownership in a secure manner. According to Jayalakshmi (2024) the advantages of this technology for accountants are:

1. Reducing fraud and increasing the level of transactional trust
2. Increase transaction security and decrease inaccurate data.
3. Transactions are settled and recorded instantly due to distributed ledger technology.

The existence of smart contacts, centralized and distributed ledger technology and easily verifiable financial records are three features of blockchain that have an influence in the accounting ecosystem. Transactions are

executed automatically using smart contacts when certain requirements are met. This allows business and accounting professionals to automate tasks such as payroll processing and reconciliation. This allows companies to reduce costs such as administrative costs due to manual input errors. On the other hand, the use of blockchain accounting is not meant to replace traditional accounting or the role of accountants but enhance the existing system.

**Blockchain Technology in the Audit Ecosystem**

Blockchain is useful for increasing auditability by securing the data posted on it and showing audit-related documents. According to Pratiwi (2022), an example of the application of blockchain in auditing is that each inventory item is registered on the blockchain when it arrives at the company's warehouse and information regarding its location and status is continuously updated, the complete history of each inventory item will be available. This allows for real time and remote confirmation of inventory. Facts on the ground show that major technical developments can lead to fundamental errors, such as potential fraud and new types of negligence (Nugrahadi & Sukiswo, 2019). Therefore, blockchain technology is needed to overcome the impact of other technological advances. Blockchain technology can be the right solution in terms of data security and transparency. In fact, audit trails can be captured on the blockchain to facilitate future tracking and verification. Similarly, information contained in documents such as electronic invoices, bills of lading, letters of credit, and receipts can also be documented on the blockchain.

## III. Research Method

This research takes a quantitative approach with bibliometric analysis. The term bibliometrics, which in English is known as bibliography, comes from two words, namely biblio and metrics. Biblio means book, and metrics means measurement (Royani & Idhani, 2018). The bibliographic approach is a method to measure and analyze various aspects of scientific publications. Quantitative data such as the number of papers, number of citations, and collaboration patterns are used to evaluate research performance, identify trends in a particular field, and understand the relationship between different scientific studies. According to Singleton (2010) in Jannah, et al (2024) said that the bibliometric method is a literature review method that uses statistical and quantitative analysis of published research, and focuses on the structure of articles included in references. The research conducted took a number of samples from the Google Scholar database. The goal is to effectively determine the trend of scientific research.

The data collection technique in this study came from Google Scholar data by developing a data collection procedure that involved searching for blockchain, accounting, and auditing terms in three dimensions: article title, abstract, and keywords. The sample taken was 200 documents in the Google Scholar database during the research period 2020 - 2024, through re-sorting the criteria, 108 documents were obtained. The research elimination criteria include: 1) research whose study substance is not relevant to studies related to blockchain technology in accounting and auditing; 2) research that is not in the form of journals, such as books and articles; and 3) the same research. Based on these results, there are 108 documents that are ready to be researched and used as the subject of this research. Furthermore, from the 108 documents, bibliometric analysis was carried out on subcomponents such as the number of publications, types of publication documents, publication sources, and the number of publications most frequently cited. The results of the bibliometric analysis were then mapped and visualized using VOSviewer software, resulting in several clusters grouped into several main research themes.

## IV. Results and Discussion

The dataset used in this study consists of 108 journal articles published between 2019 and 2024. Based on predetermined criteria, these publications were selected resulting in 108 papers with a total of 107,211 citations. An average of 4.03 citations were found for each work, with an average of 87 citations per year. With an average of 56.22 papers per author and 2.46 authors per work, each author averaged 188.55 citations. If the h-index reaches 12, it means that 12 publications have received at least 12 citations. The g-index, or the number of papers cited at least eighteen times. In addition, the hI,norm and hI,annual were 7 and 1.40 respectively, while the hA index reached 9. These data provide a comprehensive picture of the impact and productivity of scientific publications during the period, showing the citation rate, individual author contributions, and the quality of published papers. Furthermore, hI,norm and hI,annual were 7 and 1.40 respectively, with an hA index of 9. These data provide a comprehensive view of the impact and productivity of scientific publications over time, including citation rates, individual author contributions, and article quality.

**Table 1. Research Data Metrics**

| *Metrics Data* | *Information* |
|---|---|
| *Publication years* | 2019 – 2024 |
| *Citation years* | 5 (2019 – 2024) |
| *Papers* | 108 |
| *Citations* | 435 |
| *Cites/year* | 87.00 |
| *Cites/paper* | 4.03 |
| *Cites/author* | 188.55 |
| *Papers/author* | 56.22 |
| *Author/paper* | 2.46 |
| *h-index* | 12 |
| *g-index* | 18 |
| *hI,norm* | 7 |
| *hI,annual* | 1.40 |
| *hA-index* | 9 |

**Source: Publish or Perish output, 2024**

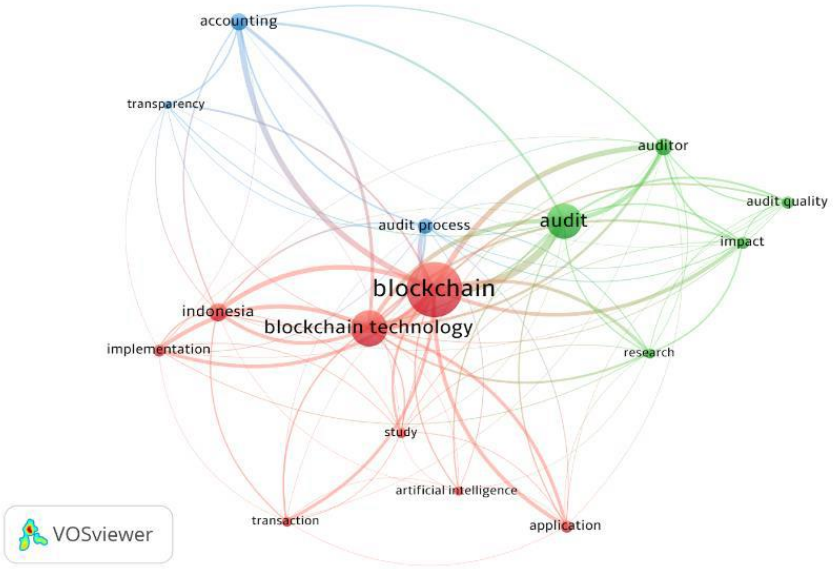
The bibliometric approach consists of four analysis components: literature clustering, research trend analysis, future research potential analysis, and author collaboration analysis (Judijanto et al., 2024). The purpose of the literature clustering analysis is to organize research articles into various groups that represent similar themes or research subjects. Therefore, this analysis helps identify research trends, priorities, and collaboration patterns between researchers in a particular field. These groupings allow researchers to understand how research in the field is evolving, discover research gaps that may not have been explored, and identify topics that receive the most attention.

Research trend analysis is conducted to identify changes and developments in a research topic over time. The aim is to understand the dynamics and direction of scientific development and identify up-and- coming or emerging topics. This will help plan future research and direct resources to areas of high potential. In the research potential analysis the focus is on examining current research trends, identifying the contribution of research to scientific development, and assessing the impact of citations on the recognition and relevance of research. The author collaboration analysis aims to identify collaborations between authors.

**Table 2. Number of Publications by Year**

| Year | Number of Publication Titles |
|---|---|
| 2019 | 1 |
| 2020 | 5 |
| 2021 | 6 |
| 2022 | 21 |
| 2023 | 36 |
| 2024 | 39 |
| **Total** | **108** |

The literature clustering process in this study starts with the following steps. First, we collected 108 documents and extracted their abstracts and titles.From this extraction process, we obtained 712 terms grouped into 19 categories that appeared at least 5 times.VOSviewer then automatically selected 60% of the most relevant terms, but we loaded 100% and later filtered the terms that could be used and those that could not, resulting in 16 most relevant terms. These terms were used to describe the cluster structure in the literature.




**Source: Database Analysis with VOSViewer, 2024**

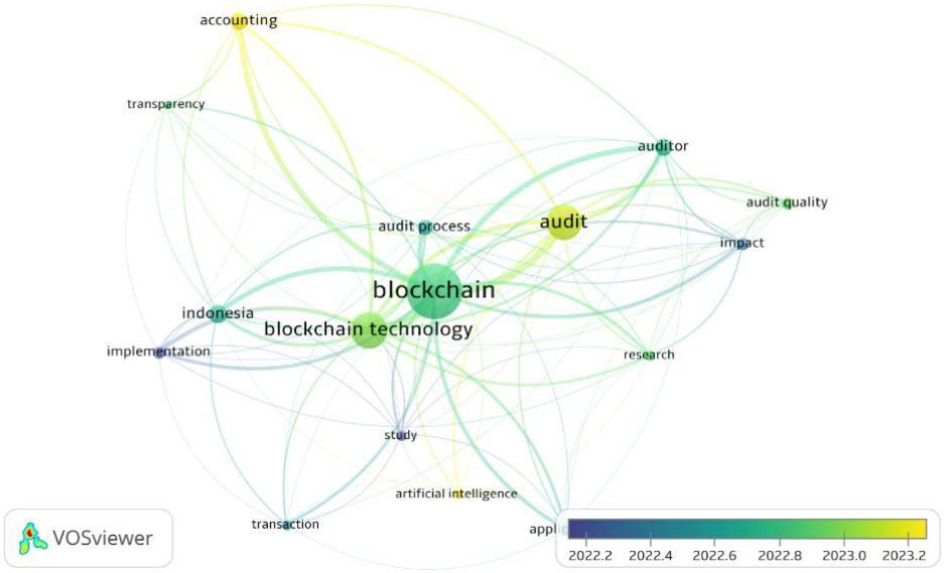
The analysis illustrated in Figure 1 depicts the cluster mapping in the network representation, with different colors representing different clusters. The first cluster (red) has 8 items at the bottom left, the second cluster (green) has 5 items in the center, and the third cluster (blue) has 3 items. The table below will explain the most relevant items in each cluster.

Table 2. Clusters and Items

| Cluster | Item Composition (Emergence) |
|---|---|
| 1 | Application (10), artificial intelligence (7), blockchain (97), blockchain technology (53), implementation (11), indonesia (19), study (8), transaction (8) |
| 2 | Audit (51), audit quality (10), auditor (18), impact (11), research (8) |
| 3 | Accounting (17), audit process (14), transparency (6) |

**Source: Database Analysis with VosViewer, 2024**

Based on a clustering analysis of literature related to blockchain technology in accounting and auditing, 3 main clusters were identified. Cluster 1 focuses on blockchain implementation in Indonesia with the integration of artificial intelligence in transactions that occur. Cluster 2 discusses how auditors, audit quality and research are influenced by blockchain technology. Cluster 3 focuses on the added value of using blockchain technology in the accounting field, especially in terms of maintaining transaction transparency and facilitating the audit process.




**Gambar 2. Visualisasi Overlay**
**Sumber: Analisis Basis Data dengan VOSViewer, 2024**

The next step is to analyze study trends using overlay visualization. The findings of this research, as seen in Figure 2, show color gradations ranging from dark to light. Darker color intensity suggests that an item and its material were popular in previous years, but lighter colors, such as light green to yellow, highlight new trends from recent years. For example, the terms "implementation," "impact," and "transaction" have been researched extensively since 2022. The research subject expanded in the mid-to-late 2022 period, with the creation of terminology such as "audit quality," "audit process," "transparency," and "blockchain." Then, between 2023 and now, terms like “blockchain technology,” “auditing,” and “accounting” became major subjects of research. Table 3 lists a number of articles that have had a major impact on the progress of research in this area.

**Table 3. Most Cited Articles**

| Citations | Author and Year | Title |
|---|---|---|
| 78 | MS Setyowati, ND Utami, AH Saragih, ... (2020) | *Blockchain technology application for value-added tax systems* |
| 23 | D Apriliasari, BAP Seno (2022) | *Innovation in Using Blockchain in Increasing the Security of Educational Intellectual Property* |
| 21 | TI Bandaso, F Randa, FFA Mongan (2022) | *Blockchain Technology: How to Deal With It?–In Accounting Perspective* |
| 18 | SD Haryanto, E Sudaryati (2020) | *The Ethical Perspective of Millennial Accountants in Responding to Opportunities and Challenges of Blockchain 4.0* |
| 17 | LL Pratiwi (2022) | *Blockchain Implementation in Accounting and Auditing in Indonesia* |
| 13 | A Faturahman, NPL Santoso, ... (2022) | *Saas platform for blockchain based e-document authentication applications* |
| 9 | AO Ajayi-Nifise, T Falaiye, O Olubusola, ... (2024) | *Blockchain In Us Accounting: A Review: Assessing Its Transformative Potential For Enhancing Transparency And Integrity* |

**Source: Output Publish or Perish, 2024**

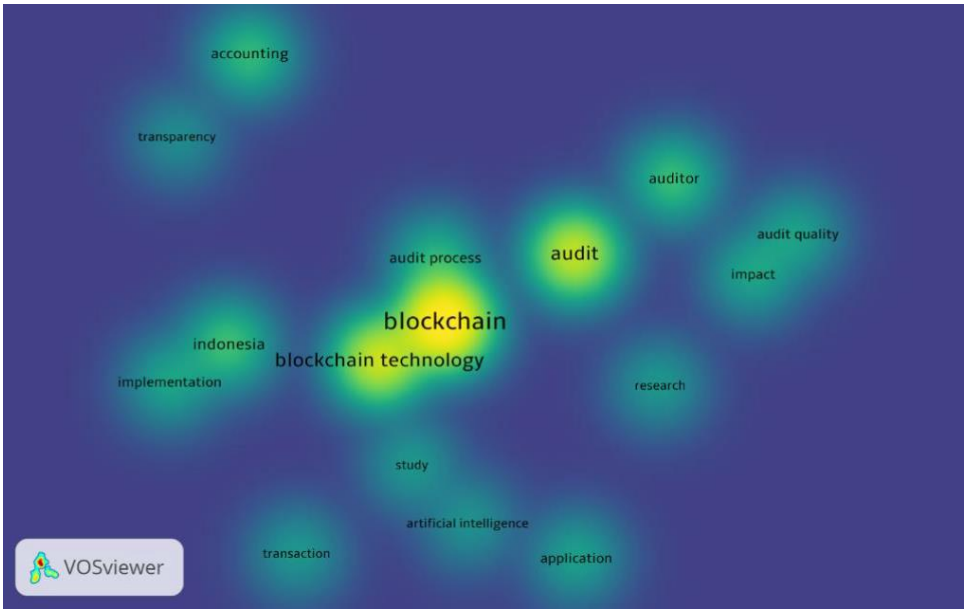



**Figure 3. Depth Visualization**

Next, an analysis of potential topics for future blockchain research was carried out using the density visualization feature. The analysis is depicted in Figure 3, terms related to blockchain are displayed with varying color intensity. Higher color intensity indicates the occurrence of terms that are discussed more frequently and the complexity of the discussion is greater. Based on this data, the phrase "blockchain" appears most frequently, indicating great research potential. These findings support the conclusion that blockchain research in accounting and auditing is still in its infancy and needs to be expanded. Table 4 strengthens this analysis by showing the most and least frequently occurring items. This can be a reference for researchers to identify topics that still have minimal exploration and require further research.

**Table 4. Most and Least Terms**

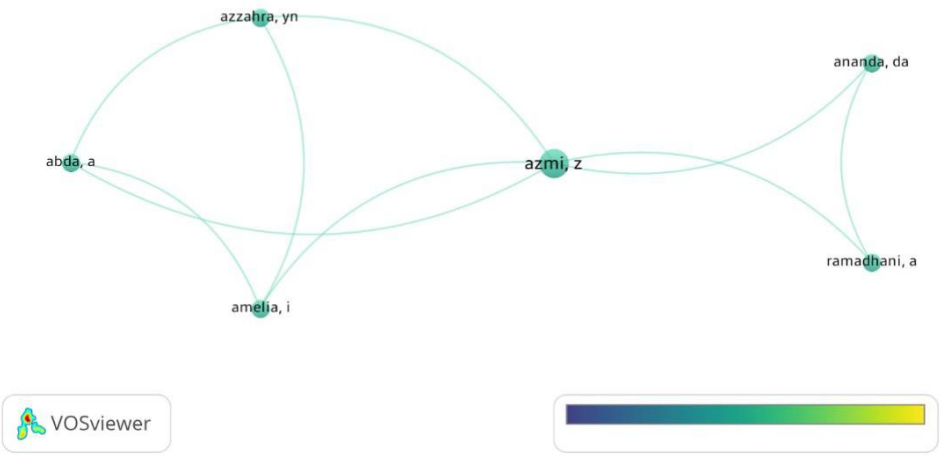
| Most Appearing Terms | | Least Occurring Terms | |
|---|---|---|---|
| **Items** | **Kemunculan** | **Item** | **Kemunculan** |
| Blokchain | 97 | Impact | 11 |
| Blokchain technology | 53 | Application | 10 |
| Audit | 51 | Audit quality | 10 |
| Indonesia | 19 | Study | 8 |
| Auditor | 18 | Transaction | 8 |
| Accounting | 17 | Research | 8 |
| Audit process | 14 | Artificial intelligence | 7 |
| Implementation | 11 | Transparency | 6 |

**Source: Database Analysis with VosViewer, 2024**

The table above shows that the terms blockchain, blockchain technology, and auditing appear frequently. "Blockchain" was mentioned 97 times, making it the most frequently used term. In contrast, the term "transparency" appears only six times. These findings demonstrate a significant level of interest in blockchain research in the audit context. Accounting is less discussed than auditing; perhaps this is a topic that could possibly be explored further by including blockchain technology. The next phase in this research is to discover collaborative networks of writers. It is known that among those who have at least one publication on this topic, there are six authors classified into two categories. Different clusters

indicate the presence of authors with strong collaboration. Further analysis of publications shows that most research focuses on the potential benefits of blockchain in improving the efficiency and security of audit processes. Future research may benefit from expanding this collaborative network to integrate broader and more innovative perspectives. This research can also identify specific challenges faced in implementing blockchain in the accounting and auditing sector, as well as potential solutions that can be proposed.

**Figure 4. Visualization of the Writers' Network**




**Source: Database Analysis with VosViewer, 2024**

Analysis using VosViewer that has been carried out shows that the blockchain trend associated with accounting and auditing is still not widely implemented. In the midst of the lack of bibliometric research that examines blockchain technology in the accounting realm, this research is here to fill this gap and reveal the transformative potential of blockchain in revolutionizing accounting practices and the accounting profession. Transactions recorded on blockchain offer an innovative solution to increase transparency and accountability in accounting, enabling the preparation of more accurate and reliable financial reports. More than just an accounting tool, blockchain presents the potential to redefine the role of accountants. Accountants of the future are predicted to shift from traditional roles as transaction recorders to data analysts and strategic consultants, harnessing the power of blockchain to optimize accounting processes and provide more valuable business insights.

This research identifies key themes related to the application of blockchain in accounting, including blockchain ensuring the integrity of accounting data by being permanent and resistant to manipulation, transactions recorded on the blockchain can be accessed and verified by all relevant parties, increasing transparency and accountability in the accounting process, blockchain enables the automation of repetitive accounting processes, increasing efficiency and reducing the risk of human error and blockchain facilitates easier and more secure integration of accounting systems with various platforms and business applications. The findings of this study pave the way for further qualitative and quantitative research to test the identified themes. By combining bibliometric analysis and qualitative research, a more comprehensive understanding of the potential of blockchain in accounting and its implications for the accounting profession can be gained.

## V. Conclusion

Blockchain from an accounting perspective is considered as a new technology that can support the development of accounting and auditing in a more advanced direction. This research uses bibliometric analysis by taking literature that contains the keywords accounting, auditing and blockchain. The data source from Google Scholar is very helpful in analyzing this research trend. The database is set between 2019 and 2024 by entering the specified criteria. The results of data processing show that publications on accounting and blockchain topics will increase quite significantly in 2022 to 2024. In addition, based on VosViewer, three clusters have been formed which reflect the grouping of each main topic.

The results of this research show the trend of research development on blockchain every year and how blockchain is integrated with accounting. This research is of great interest to researchers, with a focus on the financial sector. Blockchain will show more benefits in the future, especially in increasing transparency and accountability in financial reporting. Increasing global demands for good corporate governance are driving the integration of blockchain in accounting, offering innovative solutions to increase the transparency, accountability and efficiency of accounting processes. The application of blockchain opens up new opportunities to develop business models and accounting services that are more transparent and accountable. Therefore, further research is urgently needed to support a deeper understanding of the benefits of blockchain in accounting and develop effective integration models.

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