# *Exploring the Core Themes and Future Directions in Accounting Research on Blockchain Technology during the period 2017-2023*


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**Abstract :**

This study aimed to assess the landscape of accounting research on blockchain technology by employing a hybrid approach that combines content analysis of ten literature reviews directly related to the subject and bibliometric analysis of 469 international publications listed in the Scopus database, published between 2017 and 2023.

The study concluded that the core research themes revolve around bookkeeping nature and procedures, Accountants and auditors Tasks and competencies, technical challenges, and legislative issues. Future research is expected to focus on topics such as the triple-entry system, education, accounting education methodologies, technology acceptance models, stakeholders, and intellectual property. The dominance of descriptive and exploratory studies over experimental research was also noted, a factor that should be considered in future studies.


**Keywords:** Blockchain, Accounting Ecosystem, Accounting Research, Content Analysis, Bibliometric Analysis.

**JEL classification codes:** O33; M41

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## Introduction

Amidst the vast technological advancements and the determined shift towards embracing the digital economy and meeting its demands, accounting, like other sciences and professions, strives to keep pace with this momentum to enhance efficiency and improve task performance. Contemporary information technology contributes to the modernization of accounting and administrative procedures, and through its innovative nature, it enhances the capacity to absorb the volume of accounting data and facilitates its processing. Moreover, it goes beyond this to create a sophisticated accounting environment that ensures the implementation of the latest international laws and regulations aimed at increasing the transparency of accounting transactions and reporting on them. In this context, blockchain technology has emerged as a technical solution that combines all the technological requirements necessary to achieve these goals (Kwilinski, 2019, p.01). Blockchain technology is defined as a distributed ledger and a shared database managed and operated by a network of participants, where transactions are recorded and stored through digital encryption (Bencherif, 2023, p.404). This contributes to providing a decentralized, consensus-based ecosystem for processing various data and transactions, presenting them as unified, credible, and tamper-proof information. This has attracted the attention of major accounting bodies, organizations, and research circles, a fact reflected in numerous studies, research, and reports in recent years.

Scientific research is considered one of the most noble and significant tasks in the world today, and as such, it undergoes constant and continuous evaluation across various scientific and humanistic fields. Bibliometric analysis is one of the modern methods that can be utilized for this purpose (Åström et al., 2009, p.25). It helps in identifying current and future trends in scientific research, and exploring the underlying intellectual structure (Donthu et al., 2021, p.285), thereby facilitating the measurement of their impact and the evolution of related knowledge. Given that accounting constantly seeks to adopt the latest and most effective methods to enrich its research aspect and organize the knowledge gained from it especially those that address topics providing a modern and futuristic dimension and proposing solutions for its development as a science and profession blockchain technology is among those topics that accounting research pioneers have sought to enrich using the bibliometric approach. This involves studying and analyzing the bibliometric characteristics of related accounting research and identifying its future directions, as evidenced by numerous studies. For instance, the study by Secinaro et al., (2021) highlighted the importance of blockchain-supporting business models in

developing the accounting and auditing professions, while the study by Lardo et al., (2022)examined the changes in administrative and accounting practices in light of blockchain adoption. Moreover, the study by Atanasovski & Tocev, (2022) aimed to bridge the research gap between accounting researchers and practitioners regarding this technology and its contributions to the field.

On the other hand, literature review also holds significant importance in the field of scientific research. Some argue that the need to comprehend and analyze previous studies outweighs the necessity for new research and studies (Massaro et al., 2016, p.768). In the accounting literature, the significance of reviewing research contributions in analyzing and assessing research and scientific output have been emphasized (Chiu et al., 2019, p.25). Among the studies that have employed this approach in addressing the subject under study are those by (Bellucci et al., 2022; Bonsón & Bednárová, 2019; Demirkan et al., 2020; Garanina et al., 2021; Han et al., 2023; Kitsantas & Chytis, 2022; Kroon et al., 2021; Pimentel & Boulianne, 2020; Schmitz & Leoni, 2019; Tiron-Tudor et al., 2021). Collectively, these studies have provided a comprehensive critical evaluation and analysis of the accounting literature on blockchain technology, seeking to monitor and track the progress of knowledge related to this emerging research field and identifies its key research elements. In light of this, the following questions can be posed: **What is the current and future trajectory of accounting research on blockchain technology? What are its fundamental elements?**

From this standpoint, and given the numerous advantages that both content analysis and bibliometric analysis offer in enriching research on a given topic, the current study will seek to combine these two approaches to provide a comprehensive review of accounting research on blockchain technology and assess its research development. The goal is to identify the core research elements and offer a forward-looking perspective on the research trends related to this topic. This will enable researchers, professionals, and all those interested in this technology and its prospects within the accounting ecosystem to chart a roadmap for their research curiosity, aimed at enhancing and advancing knowledge in this field.

## I. Data and Methodology:

## 1. Content Analysis Data:

In order to provide an analytical overview and a general review of the key topics and considerations addressed by researchers when exploring and examining the emerging relationship between blockchain technology and

accounting practices, a selection of literature reviews on this topic was utilized, as shown in Table (01). These reviews cover a period from 2015 to 2021, encompassing the majority of the research timeframe on this modern topic. This allowed for the identification of the core research elements.

**Table (01): Literature Reviews Used in Content Analysis**

| Literature | Time range |
|---|---|
| Schmitz & Leoni, (2019) | 2016-2018 |
| Bonsón & Bednárová, (2019) | 2016-2018 |
| Demirkan et al., (2020) | 2016-2019 |
| Pimentel & Boulianne, (2020) | 2017-2020 |
| Tiron-Tudor et al., (2021) | 2017-2020 |
| Garanina et al., (2021) | 2015-2020 |
| Kroon et al., (2021) | 2017-2020 |
| Bellucci et al., (2022) | 2017-2021 |
| Kitsantas & Chytis, (2022) | 2017-2021 |
| Han et al., (2023) | 2017-2021 |

**Source:** Prepared by researchers.

It is worth noting that the year 2017 marked the actual beginning of accounting research on blockchain technology, with the emergence of several seminal studies in this field, including those by (Coyne & McMickle, 2017; Dai & Vasarhelyi, 2017; Kokina et al., 2017; O'Leary, 2017). The differences between the aforementioned studies in identifying the initial year covered by the accounting literature survey on this topic, is due to the inclusion of several reports, such as those by (Deloitte c, 2016; EY, 2016; KPMG, 2016b; PwC, 2016). The aforementioned reports were published by leading auditing firms on their official websites in 2016, seeking to capture the attention and raise awareness among the accounting profession about blockchain technology's prospects beyond the financial sector and crypto currencies, and it's potential to transform accounting and auditing practices. Additionally, some studies discussed a range of accounting issues related to crypto currencies, with a primary focus on Bitcoin.

## 2. Bibliometric Analysis Data:

The goal of every rigorous and value-added research is to produce meaningful, credible, and generalizable results. To achieve this goal, a set of

bibliometric indicators was analyzed for a research sample drawn from the scientific database Scopus. Scopus primarily focuses on aggregating and indexing high-quality scientific research, providing full-text direct links (Burnham, 2006, p.01). Established in 2004 by the Dutch publishing house Elsevier, Scopus was the result of two years of collaboration and effort between researchers and librarians from various countries worldwide (Boyle & Sherman, 2006, p.147). Due to its high-quality outputs, user-friendliness, and ability to positively influence research results (Chadegani et al., 2013, p.19), Scopus is widely accepted and frequently used by key players and pioneers across different scientific and research fields.

To compile the data forming the study's sample, the following search terms were selected: "Blockchain" or "Block-chain" and "accounting" or "accountancy" or "bookkeeping" or "record keeping" or "AIS" or "accountants" or "international financial reporting standards" or "IFRS" or "financial reports" or "financial statements" or "financial reporting" or "reporting" or "disclosure" or "financial analysis", as the search subject in the Article Title and/or Abstract and/or Keywords. The research classification was narrowed down to include only those related to the field of business, management, and accounting to exclude studies that do not address blockchain from an accounting perspective. This process resulted in a final sample of 469 publications from various types and sources.

Moreover, creating high-quality bibliometric maps and presenting them in a meaningful and professional manner, is one of the main factors that determine whether bibliometric studies are successful in achieving their goals. In this regard, several software tools, such as VosViewer, Gephi, and Leximancer, have emerged, making bibliometric data analysis easy and practical (Donthu et al., 2021, p.286). For this study, one of the most widely used tools, VosViewer (version 1.16.19), will be employed. VosViewer is software developed by Nees Jan van Eck and Ludo Waltman, specializing in creating and displaying various types of bibliometric maps, regardless of the sample size (Eck & Waltman, 2009, p.524). Table (02) outlines the method used for extracting the study data and the bibliometric indicators employed in their analysis.

**Table (02): study Data and Analysis Indicators**

| Sample information | Bibliometric Analysis Indicators |
|---|---|
| • **Source:** Scopus Database<br>• **Date of Extraction**: 01/01/2024<br>• **Time Frame**: 2017 to 2023 | **Bibliographic Data:**<br>• Co-occurrence of keywords<br>• Citations: Analysis of citations for the most influential publications |

| | |
|---|---|
| • **Search Topic:** "Blockchain"<br>• **Search Scope:** Title and/or Abstract and/or Keywords<br>• **Research Field:** Business, Management, and Accounting<br>• **Extracted Sample Size:** 469 Publications<br>• **Search Tools:** VosViewer Software and Excel | **Textual Data:**<br>• Co-occurrence of terms in titles and/or abstracts of publications |

**Source:** Prepared by researchers.

## II. Results and Discussion:

## 1. Analysis of the Literature Content:

After Reviewing and analyzing the content of the literature previously presented in table (01), table (03) illustrates the results that were reached regarding the core research themes in blockchain accounting research.

**Table (03): Analysis of Accounting Literature on Blockchain Technology**

| Research Theme | Literature Content |
|---|---|
| **Bookkeeping nature and procedures** | The accounting literature unanimously acknowledges the significant role that blockchain technology plays in advancing accounting practices and making fundamental changes to accounting methods and procedures. Blockchain contributes to meeting the requirements of implementing a triple-entry system by providing a decentralized, shared ledger for all financial operations and transactions. These transactions are processed and validated through consensus among the majority of participants within the network, in a process known as "consensus mechanism," and then stored and secured within the block through digital encryption. Each participant retains their own copy of this ledger, resulting in accounting outputs characterized by transparency, credibility, security, and immutability.<br><br>Blockchain technology, through its support of smart contracts, automates and accelerates routine accounting processes, overcoming associated human errors. This creates an automated and immediate accounting and reporting system that facilitates decision-making by providing information in real-time as it occurs. It also enables the preparation and automation of various reconciliation processes, eliminating the need for intermediaries and reducing transaction complexity. In its private form (Private Blockchain), blockchain technology establishes levels of access to information based on need and authorization, enhancing information relevancy and privacy.<br><br>Furthermore, the accounting literature emphasizes the importance of blockchain technology in improving auditing procedures and practices. By providing an immediate accounting and reporting system, blockchain allows auditors to continuously monitor and review all transactions and processes, including up-to-date reports, thus achieving what is known as continuous auditing. This approach could potentially move beyond sampling methods to |

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| | comprehensive auditing. Additionally, blockchain facilitates and automates auditing tasks, particularly routine ones, such as verifying transaction accuracy and compliance with applicable regulations. This helps overcome human errors, reduce costs, save time and effort by enabling smart contracts to store, handle, and manage accounting and tax standards, as well as various laws and regulations, ensuring that all transactions, records, and reports comply with them. |
| **Accountants and auditors Tasks and competencies** | The accounting literature indicates that the significant changes brought about by blockchain technology, due to its unique mechanism and characteristics, have impacted the process of accounting and its related procedures, rendering traditional accounting services less necessary in this aspect. However, these services have evolved and expanded to include new tasks beyond the routine ones, such as data analysis and financial reporting, assessing financial positions, providing professional advice to decision-makers in an advisory role, and designing, developing, and managing information systems. Conversely, the role of auditors has also transformed and expanded to include auditing blockchain technology itself and evaluating its performance (smart contracts, data security, digital transactions, compliance with accounting rules and standards).<br><br>The new tasks assigned to accountants and auditors within the new accounting ecosystem imposed by blockchain implementation necessitate acquiring a range of competencies and knowledge on: the fundamentals and mechanisms of decentralized systems, smart contracts, cyber security, digital currencies, information systems, data and digital transaction monitoring and analysis techniques, and regulatory frameworks for digital currencies. This underscores the importance of continuous accounting education, which must adapt its curricula and courses to the various changes and advancements in the accounting ecosystem.<br><br>The listed literature emphasizes that the role of accountants and auditors remains ongoing and indispensable, despite the additions provided by blockchain technology. In fact, their current role may even surpass the previous one in significance, especially given the limitations and challenges faced by this technology due to its novelty in the accounting environment and its digital nature, which brings its own set of challenges. |
| **Legislative and regulatory issues** | This research element is discussed in various accounting literatures under the heading of "Challenges of Blockchain Technology." However, to distinguish between challenges arising from the regulatory environment and those of a technical nature inherent to blockchain technology itself, regulatory issues have been separated as an independent element focusing on three main topics:<br><br>**Regulatory Compliance**: The capability of Blockchain-based accounting systems in implementing and adhering to accounting, tax, regulatory, and legal standards is a crucial discussion point. This concern primarily arises from the absence of unified regulatory framework to govern this technology's application and usage within the accounting ecosystem.<br><br>**Regulatory Alignment and Coalition:** The unification of efforts and regulatory endeavors by legislative bodies and stakeholders within the accounting ecosystem, including accountants, auditors, investors, and others, is |

| | |
|---|---|
| | an imperative emphasized by accounting literature. This aims to create a cohesive and advanced regulatory environment that can address the regulatory and legislative issues facing blockchain technology.<br><br>**Regulations for Digital Currencies:** Accounting literature has highlighted that the increasing reliance on digital currencies within the accounting and financial ecosystem, coinciding with the adoption of blockchain technology, has introduced certain regulatory and legislative challenges. This necessitates the establishment of unified standards to:<br>• Regulate accounting and tax practices for digital currencies;<br>• Manage and monitor digital currency transactions and mitigate associated risks;<br>• Regulate disclosure policies for digital currencies within financial reports. |
| **Technical challenges** | Despite the numerous advantages offered by adopting blockchain technology within the accounting ecosystem, accounting literature identifies several technical challenges that hinder the full utilization of this adoption. Most of these challenges are associated with the nature and characteristics of the technology itself, including:<br><br>**Scalability**: Blockchain ability to handle large volumes of transactions, which most companies experience, is one of the major challenges due to its decentralized digital nature and unique operational mechanism. An increase in transaction volume may lead to longer processing times, resulting in slower system performance and reduced efficiency.<br>**Cyber security**: The digital nature of blockchain technology makes it susceptible to cyber security threats that endanger the security and reliability of systems based on this technology in combating manipulations.<br>**Data Privacy**: Issues concerning data privacy in blockchain and its associated systems stem primarily from the decentralized nature of this technology and its disclosure policies, which may compromise the confidentiality of sensitive information such as client data, products, marketing policies, etc., thereby affecting the competitive edge of the organization.<br>**Integration Difficulties with Existing Accounting Systems**: This is due to the blockchain technical complexity and the significant adjustments that must be made to adopting institutions' technological infrastructure, necessitating considerable commitment, time, effort, and resources.<br>**Adoption Costs**: Adopting blockchain technology incurs several costs, such as design costs, training expenses, digital storage costs, and others, which may be a primary reason for the reluctance of companies, especially those with weaker financial positions, to integrate this technology into their systems.<br>**Energy Consumption**: Implementing blockchain-based systems, which rely on mining and consensus mechanisms for transaction processing, requires substantial computational power, which in turn demands significant amounts of electricity, mostly from non-renewable sources.<br>**Resistance from Employees**: The ability of blockchain to perform accounting and auditing tasks, especially routine ones, more efficiently and effectively may lead employees to adopt a defensive stance against this technology due to concerns over job security, potentially impeding its adoption within the accounting information system. |

**Source**: Prepared by researchers based on the literature reviews.

## 2. Discussion of Bibliometric Results:

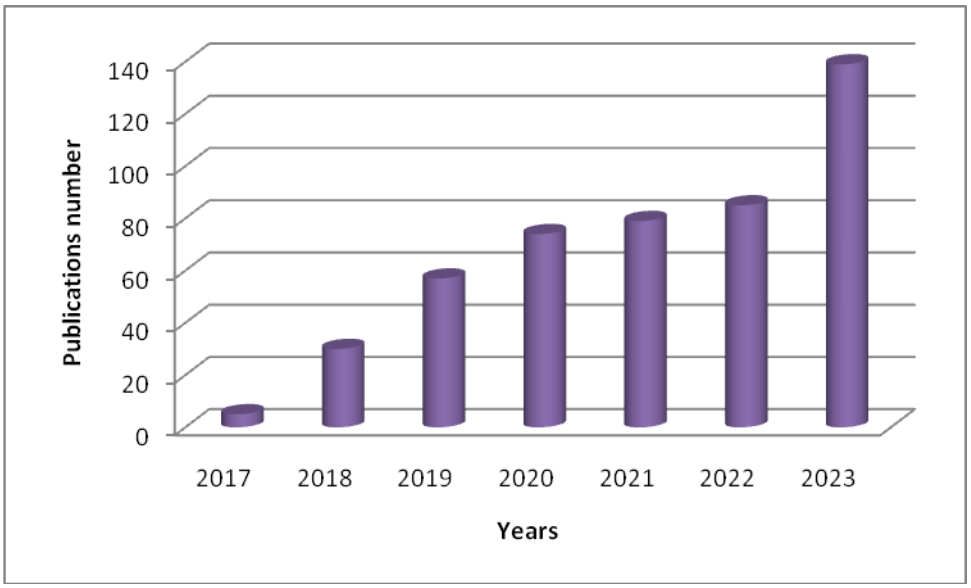
## 2.1 Analysis of Publications Quantitative Development:

The analysis of the quantitative and temporal evolution of research output on a specific topic allows us to gauge the ability of related knowledge to attract and garner interest within the research community. As illustrated in Figure (01), the quantitative evolution of accounting research publications on blockchain technology reveals two distinct phases:

**2.1.1 Phase One (Pre-2017):** Characterized by the absence of publications exploring the core relationship between blockchain technology and accounting practices and domains. This may be attributed to blockchain's emergence primarily as a platform for digital currency trading, such as Bitcoin, and subsequently as a financial technology to support and enhance financial services.

**2.1.2 Phase Two (2017-2023):** Marked by the genuine emergence of publications exploring and investigating blockchain technology capabilities within accounting ecosystems, beginning with 5 publications in 2017. The number of publications has increased annually at a growing rate, reaching its peak in 2023 with 139 publications. This indicates a growing interest in blockchain technology across the accounting research community over the last few years.

**Figure (01): Quantitative evolution of accounting research publications on Blockchain**




**Source:** Prepared by researchers based on Scopus data.

## 2.2 Analysis of Co-occurrence of Keywords:

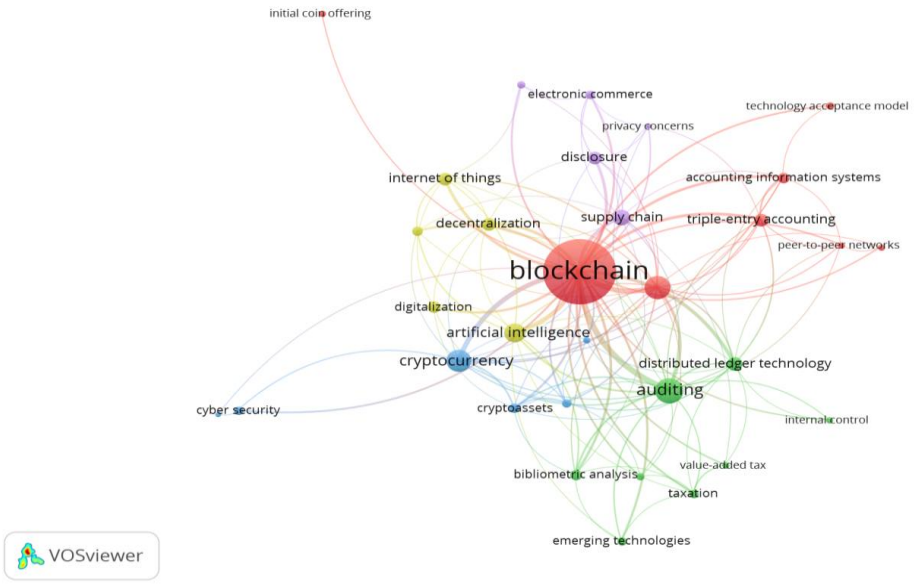
The aim of this part is to explore and analyze the interrelationships that arise from the Co-occurrence of keywords within accounting research publications on blockchain. VOSviewer software was used to construct maps based on co-occurrence matrices (Eck & Waltman, 2009, p.530). After setting the minimum appearance threshold to at least twice and using the Thesaurus to avoid repetition of similar or synonymous terms, only 32 out of 1607 keywords were represented. Table (04) displays the twenty most frequent keywords in the publications under study, showing those terms such as "blockchain," "audit," "smart contracts," "crypto currencies," and "artificial intelligence" are the most prevalent and strongly connected with other represented keywords.

**Table (04): The twenty most frequent words in the keywords of accounting research publications on Blockchain**

| Rank* | Keywords | occurrence | Link strength | | Rank* | Keywords | occurrence | Link strength |
|---|---|---|---|---|---|---|---|---|
| **1** | blockchain | 353 | 346 | | **10** | disclosure | 13 | 21 |
| **2** | auditing | 54 | 98 | | **12** | digitalization | 12 | 14 |
| **3** | Smart contracts | 44 | 85 | | **13** | Accounting information system | 10 | 21 |
| **4** | Crypto currency | 40 | 58 | | **13** | Bibliometricanalysis | 10 | 23 |
| **5** | Artificial intelligence | 30 | 49 | | **15** | Industry 4.0 | 09 | 15 |
| **6** | Supply chain | 21 | 33 | | **16** | Crypto asset | 08 | 22 |
| **7** | Distributed leger technology | 17 | 39 | | **17** | Emerging technologies | 07 | 13 |
| **8** | Triple entry accounting | 15 | 29 | | **17** | Electronic commerce | 07 | 12 |
| **9** | Internet of things | 14 | 24 | | **18** | tokens | 06 | 19 |
| **10** | decentralization | 13 | 21 | | **18** | taxation | 06 | 16 |
| * The same rank is given to keywords with equal number of occurrence. | | | | | | | | |

**Source**: Prepared by researchers based on VOSviewer program.

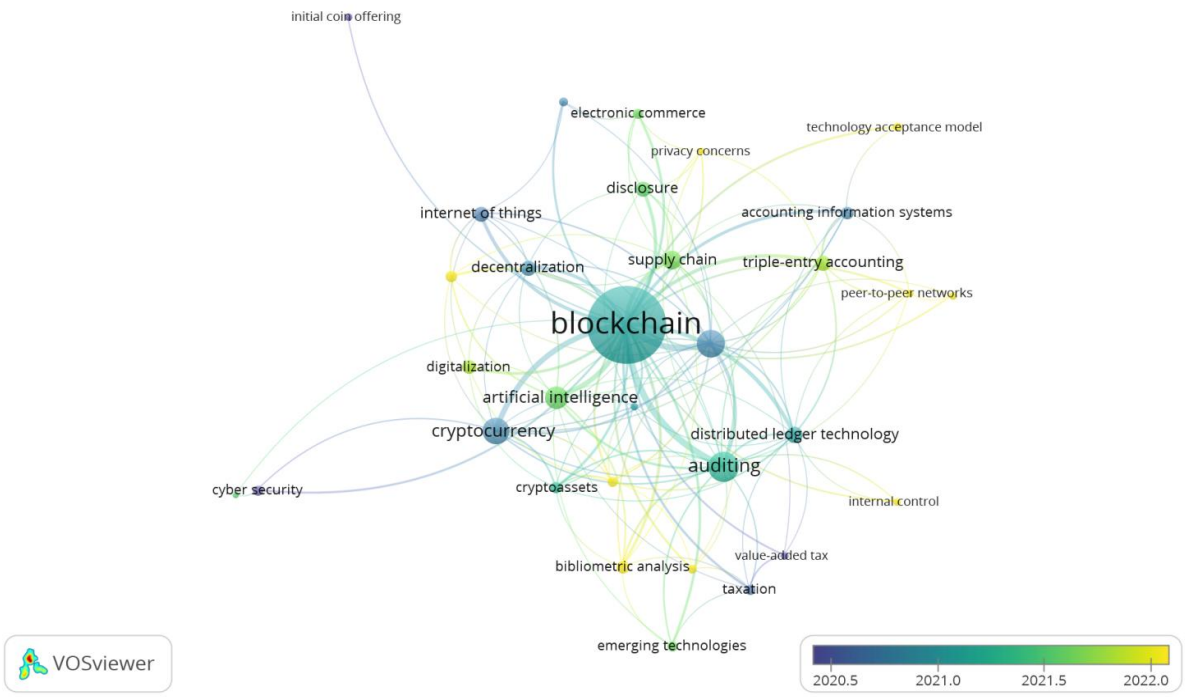
**Figure (02): Co-occurrence of keywords for accounting research publications on Blockchain**




**Source**: Prepared by researchers based on VOSviewer program.

Figure (02) displays the relationship network of keywords in blockchain accounting research publications, which are interconnected by 132 links with overall connection strength of 522 and average link strength of 16.31 per keyword, grouped into 5 main clusters. **The first cluster (red)** located at the top right of the map includes "blockchain" at the center, along with "peer-to-peer system", "smart contracts", "accounting information system", "triple-entry system", "stakeholders", and "Technology Acceptance Models (TAM) ". This cluster appears to explore the various aspects of the emerging relationship between blockchain and its core applications and the components of accounting ecosystem. **The second cluster (green)** at the bottom right addresses issues of auditing and taxation within emerging technological contexts, including terms like "audit", "internal control", "tax", "value-added tax", and "emerging technologies". **The third cluster (blue)** at the bottom left focuses on diverse topics primarily related to "digital assets," "digital currencies," and "cyber security". **The fourth cluster (yellow)** at the top left includes terms like "artificial intelligence", "digitization", "decentralization", and "Internet of Things", suggesting a focus on modern digital technologies. **The fifth and final cluster (purple)** at the top center deals with various topics related to "disclosure", "e-commerce", "supply chains", "data privacy", and "privacy-related issues".

**Figure (03): Temporal distribution of keywords for accounting research publications on Blockchain**




**Source**: Prepared by researchers based on VOSviewer program.

Figure (03) shows the distribution of keywords by their appearance date. According to the scale below, the most recent keywords include "(TAM) Technology Acceptance Models", "peer-to-peer system", "internal control", "privacy-related issues", "stakeholders", and "bibliometric analysis". Observing this figure and additional information from VOSviewer about the temporal map, it is evident that most of these keywords are associated with terms such as "blockchain", "accounting information system", "triple-entry system", and "disclosure". Moreover, bibliometric analysis is among the widely used methods by accounting researchers when addressing topics related to blockchain technology.

## 2.3 Analysis of Terms in Textual Data:

This section aims to study and analyze the relationships within the units forming the text data of accounting research publications on blockchain technology. From a bibliometric perspective, the concurrent appearance of two analytical units within the same descriptive field indicates a relational connection between them (Åström et al., 2009, p.15). With significant advancements in this type of analysis over the past decade due to the emergence of various software packages and applications that facilitate rapid and organized analysis, VOSviewer was utilized to streamline the analysis of terms co-occurrence in the titles and/or abstracts of the examined publications. After

establishing the minimum co-occurrence threshold to 7 and using the Thesaurus to avoid repeating similar or synonymous terms, and excluding some general terms, 93 out of 9648 terms were represented. Table (05) displays the twenty most frequently occurring terms in the titles and/or abstracts of the studied publications, indicating that terms such as "blockchain", "company", "audit", "development", "auditor", and "disclosure" are the most prevalent and relevant in relation to other represented terms.

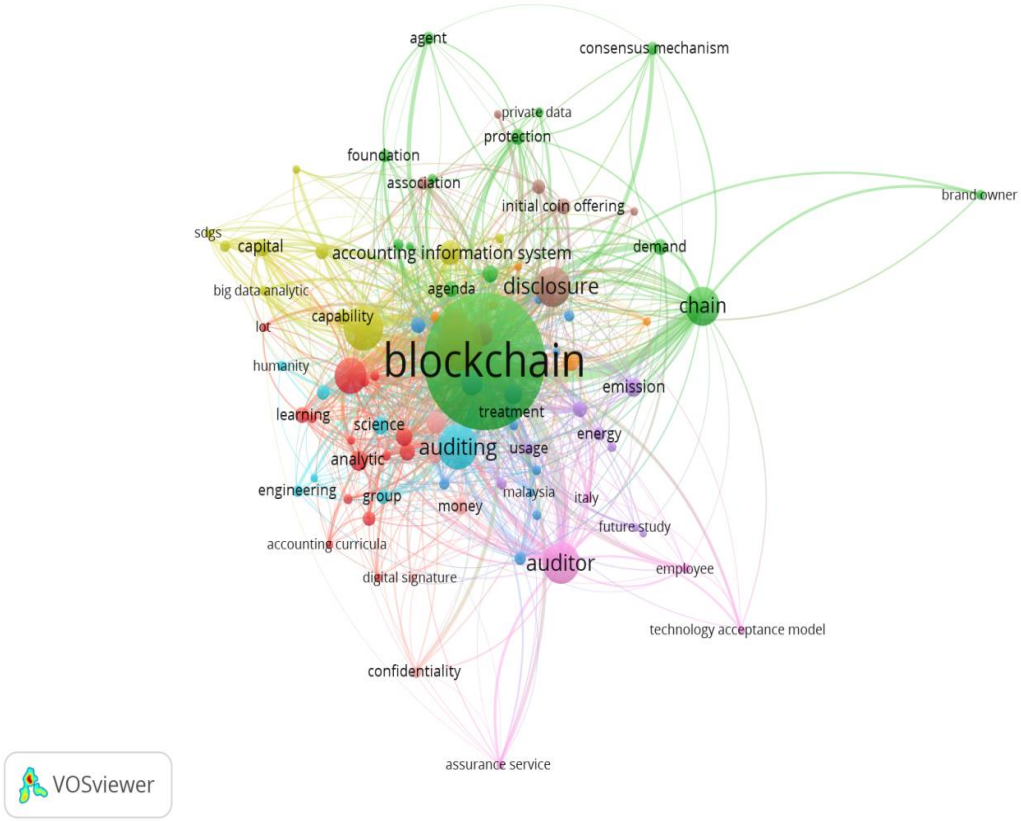
**Table (05): The twenty most frequent terms appearing in the textual data of accounting research publications on Blockchain**

| Rank* | Title and Abstract Words | Occurrence | | Rank* | Title and Abstract Words | Occurrence |
|---|---|---|---|---|---|---|
| **01** | blockchain | 1431 | | **11** | Methodology approach | 48 |
| **02** | company | 203 | | **12** | Blockchain adoption | 44 |
| **03** | auditing | 151 | | **13** | currency | 37 |
| **04** | Development | 150 | | **14** | analytic | 34 |
| **05** | auditor | 133 | | **14** | direction | 34 |
| **06** | disclosure | 128 | | **16** | emession | 28 |
| **07** | chain | 117 | | **16** | education | 28 |
| **08** | intelligence | 98 | | **18** | Crypto asset | 27 |
| **09** | digitalization | 57 | | **19** | capital | 26 |
| **10** | Accounting information system | 50 | | **20** | support | 25 |

* The same rank is given to terms with equal number of occurrence.

**Source**: Prepared by researchers based on the VOSviewer program.

**Figure (04): Co-occurrence of terms in textual data of accounting research publications on Blockchain**




**Source:** Prepared by researchers based on the VOSviewer program

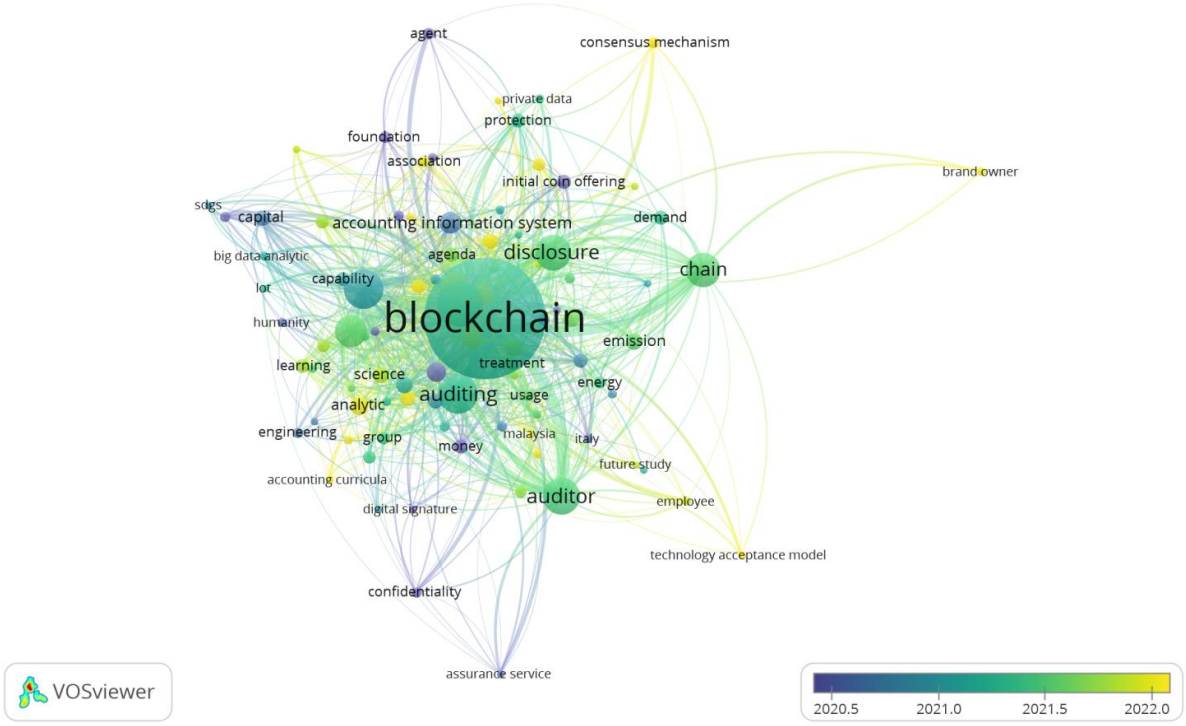
Figure (04) displays the relationship network of terms in the text data of blockchain accounting research publications, with 1,245 links, an overall connection strength of 13,525, and an average link strength of 13.39 per term, organized into ten main clusters.

- **The first cluster (red)** in the middle left of the map includes terms such as "accounting study methods", "learning", "education", "training", "blockchain adoption", "Internet of Things", "cloud computing", "digital economy", and "data analysis." This cluster appears to focus on accounting education in the context of the ongoing economy's and accounting's digitization.
- **The second cluster (green)** in the middle top right features "blockchain" at the center, along with terms like "brand ownership", "consensus mechanism", "process mining", "private data", "support", and "protection". This cluster seems to explore the role of blockchain technology in supporting and safeguarding operational data and commercial ownership.
- **The third cluster (dark blue)** in the top center includes terms like "digital currency planning", "financial instruments", "standard setters", "efficiency",

"growth", and "processing". It appears to address topics related to managing digital currencies, financial assets, and their regulatory and legislative aspects.

- **The fourth cluster (yellow)** on the upper left focuses on both blockchain and big data role in developing and protecting accounting information systems and creating value within organizations, featuring terms like "accounting information system", "triple-entry accounting system", "big data analytics", "data security", "development", "organization", and "value creation".
- **The fifth cluster (dark purple)** encompasses terms like "blockchain applications", "construction", "energy", "logistics industry", and "usage". This cluster likely examines the applications of blockchain technology in supply chains and other specialized sectors such as construction and energy.
- **The sixth cluster (light blue)** includes terms such as "audit", "computer science", "engineering", "humanities", and "sciences". It seems that this cluster addresses the relationship between blockchain and both exact sciences and humanities.
- **The seventh cluster (orange)** seems to address the prospects of digitalization and digital assets in the financial and marketing sectors, including terms like "financial services", "digital assets", "marketing", "digitalization", and "best practices".
- **The eighth cluster (brown)** contains terms like "disclosure", "Initial Coin Offering (ICO) ", and "settlement processes". This cluster appears to study the relationship between fundamental accounting practices and the financing processes of startups in the digital currency field.
- **The ninth cluster (daisy)** located at the bottom right features terms such as "auditor", "Technology Acceptance Models (TAM) ", "assurance services", and "workers". It seems to examine the relationship between modern technologies and professionals in accounting and auditing.
- **The tenth cluster (pink)** focuses on issues related to the security and protection of digital financial transactions, with terms like "data confidentiality", "digital signature", "currency", and "coins".

**Figure (05): Temporal distribution of terms in textual data of accounting research publications on Blockchain**




**Source**: Prepared by researchers based on the VOSviewer program.

Figure (05) illustrates the distribution map of text data terms by their appearance date, obtained using the temporal overlay technique provided by VOSviewer. According to the scale below, yellow terms indicate the most recent additions. The most recent terms appearing in the text data of the publications are: "triple-entry system", "consensus mechanism", "accounting education methods", "settlement processes", "Technology Acceptance Models (TAM) ", "workers", and "brand ownership". These terms suggest that topics related to accounting information systems, accounting education, protection of ownership, and professional behavior towards blockchain represent the future research directions in this field.

## 2.4 Citation Analysis:

Citation is a key indicator used by researchers to validate their findings, attract attention, and demonstrate the transfer and transformation of knowledge. Historically, citations have been a fundamental tool in scientific and academic analysis (Ding et al., 2014, p.1822). This section aims to analyze the knowledge contained in the most frequently cited publications within the research sample. Combined, the studied publications have been cited 7,049 times, with an average of 15.03 citations per publication. Publications with at least 10 citations make up 30.7% of the total, those with at least 50 citations account for 7.9%, and those with at least 70 citations, indicating strong impact, represent 4.7%. Meanwhile,

publications with no citations, considered to have weak or no impact, make up 26.6% of the total.

Table (06) lists the twenty most cited publications in accounting research on blockchain technology. With each publication received an average of 147.5 citations, they collectively account for 41.8% of the research sample total impact. The "International Journal of Information Management" and "Journal of Emerging Technologies in Accounting" have the most publications in this list with two publications apiece.

Regarding the methodology of the publications listed in the table, 80% were qualitative and exploratory due to the nascent state of accounting research on blockchain technology, while only 20% were quantitative. In these publications, the one by Dai & Vasarhelyi, (2017) is the most cited with 377 citations, this paper explores blockchain's potential to transform and develop accounting and auditing practices by creating an efficient, effective, and secure automated system with high-quality outputs. While the most impactful paper, by Shen et al., (2022), examines how private blockchains can fight counterfeit products and counterfeiters through various strategies and stages in the supply chain, aiming to determine the optimal structure for this technology's effective application.

Other notable publications such as those by (Bonsón & Bednárová, 2019; Demirkan et al., 2020; Kokina et al., 2017; Moll & Yigitbasioglu, 2019; Schmitz & Leoni, 2019), which provide a comprehensive literature reviews on blockchain technology in accounting, evaluating research outputs, and outlining future research directions. Studies such as (Coyne & McMickle, 2017; Kwilinski, 2019) investigated the impact of blockchain on accounting practices and financial reporting efficiency, while Mosteanu & Faccia, (2020)explored the role of integrated digital technology systems. Di Vaio & Varriale, (2020) examined blockchain's role in supporting supply chains, focusing on process management and decision-making, and Kshetri, (2021) analyzed its impact on monitoring and sustainability standards.

O'Leary, (2017) assessed the effects of various blockchain applications on accounting practices and supply chain management. Other diverse topics covered include environmental sustainability Parmentola et al., (2022), disclosure Choi et al., (2020), development of AI services in financial transactions Montes & Goertzel, (2019), blockchain convergence with the Internet of Things (IOT) and industrial internet (IIOT) Q. Wang et al., (2020), data security and privacy Y. Wang & Kogan, (2018), auditing using smart

contracts Rozario & Vasarhelyi, (2018), and audit quality during the COVID-19 pandemic Albitar et al., (2020).

**Table (06): The twenty most cited references in accounting research publications on Blockchain technology**

| R * | Author/Year ** | Methodology | Objective | T.C | A.A.C |
|---|---|---|---|---|---|
| **1** | Dai & Vasarhelyi, (2017) | Qualitative study | Exploring blockchain technology capabilities in transforming and developing accounting and auditing practices by creating an efficient, effective, and secure automated system with high-quality outputs. | 377 | 53.85 |
| **2** | Di Vaio & Varriale, (2020) | Qualitative study | Analyzing the major effects of blockchain technology implementation on supply chain management, concentrating primarily on decision-making processes and procedures. | 241 | 60.25 |
| **3** | (Q. Wang et al., 2020) | Qualitative study | Exploring the prospects of blockchain technology integration with Internet of Things and Industrial Internet of Things (IIoT), focusing on its role and potentials to support and develop these technologies, while also maintaining security and protection, and enabling the emergence of distributed IoT applications. | 222 | 55.5 |
| **4** | Moll & Yigitbasioglu, (2019) | Qualitative study | Providing a critical review of accounting literature that examines the effects of IoT-related technologies on accounting procedures, management techniques, and the evolving role of accountant, aiming to encourage more empirical studies on this topic. | 189 | 37.8 |
| **5** | Choi et al., (2020) | Quantitative study | Supporting disclosure strategies for information related to rental service platforms by developing an economic model to analyze and evaluate blockchain-supported disclosure systems and determining their role in revealing consumer surplus and service provider profits. | 177 | 44.25 |
| **6** | Schmitz & Leoni, (2019) | Qualitative study | Offering a comprehensive review of accounting literature, professional reports, and pertinent sources addressing blockchain technology effects across accounting and auditing professions, aiming to enrich research by identifying key research elements and knowledge gaps to guide future research. | 166 | 33.2 |
| **7** | (Kokina et al., 2017) | Qualitative study | Offering a throughout overview of the current and potential effects of blockchain application across the accounting environment, enriching research by outlining a roadmap for future studies on the | 164 | 23.43 |

| | | | | | |
|---|---|---|---|---|---|
| | | | subject. | | |
| **8** | O'Leary, (2017) | Qualitative study | Chow casing and analyzing the various impacts of blockchain different forms on accounting transaction processing and supply chain management, and discussing the prospects of integrating this technology with other digital applications. | 163 | 23.28 |
| **9** | Y. Wang & Kogan, (2018) | Quantitative study | Proposing a framework demonstrates how to use blockchain technology to creat a real-time accounting system and continuous monitoring system, ensuring data confidentiality and security against tampering, and evaluating its functionality compared to relational databases. | 134 | 22.33 |
| **10** | Shen et al., (2022) | Quantitative study | Investigating the implications of adopting private blockchains to combat counterfeit products within supply chains, and analyzing the role of this technology in gaining customer satisfaction and achieving social welfare. | 127 | 63.5 |
| **11** | Coyne & McMickle,. (2017) | Qualitative study | Assessing the feasibility of adopting blockchain technology as a secure alternative to current accounting records, and examining its effectiveness as a tool for comprehensive financial reporting, while discussing the key challenges and obstacles to this adoption. | 122 | 17.43 |
| **12** | Demirkan et al., (2020) | Qualitative study | Providing a review of accounting literature exploring blockchain technology main applications in accounting, auditing, and cyber security, with a focus on its role in combating fraud and highlighting the main issues to consider. | 111 | 27.75 |
| **12** | Bonsón & Bednárová, (2019) | Qualitative study | Providing a throughout review of accounting literature addressing blockchain technology transformational capabilities in accounting and auditing, identifying key methods contributing to the development of accounting information quality, and discussing challenges in integrating it into accounting systems. | 111 | 22.2 |
| **14** | Parmentola et al., (2022) | Quantitative study | Illustrating and interpreting the multidimensional relationship between blockchain adoption and environmental sustainability, discussing its role in achieving sustainable development through a review and analysis of related literature. | 105 | 52.5 |
| **15** | Kwilinski, (2019) | Qualitative study | Investigating the effects of blockchain technology implementation on the accounting practices and financial reporting development, highlighting its role in | 104 | 20.8 |

| | | | | | |
|---|---|---|---|---|---|
| | | | accelerating internet transactions and improving automatic data recognition systems. | | |
| **16** | Kshetri, (2021) | Qualitative study | Examining the role of blockchain technology in enhancing oversight and enforcing sustainability standards within supply chains in developing countries, focusing on economic feasibility, environmental sustainability, and social responsibility. | 102 | 34 |
| **17** | (Albitar et al., 2020) | Qualitative study | Discussing the impacts of the COVID-19 pandemic and social distancing policies on audit quality and standards, emphasizing the role of digital technologies like blockchain and artificial intelligence in addressing related challenges. | 87 | 29 |
| **17** | Mosteanu & Faccia, (2020) | Qualitative study | Discussing the role of digital technology-supported financial systems, such as blockchain and artificial intelligence, and extensible business reporting languages in enhancing financial management and control procedures and improving financial reporting efficiency. | 87 | 21.75 |
| **19** | Montes & Goertzel, (2019) | Qualitative study | Exploring the prospects of using blockchain technology and decentralized records as a new direction for developing artificial intelligence services and financial transactions, and facilitating their exchange among relevant parties. | 86 | 17.2 |
| **20** | Rozario & Vasarhelyi,. (2018) | Qualitative study | Presenting smart contracts as a modern technical tool for data analysis and improving the auditing process, offering real-time and updated audit reports. | 75 | 12.5 |

***Using the same rank for two consecutive publications indicates that they have the same number of citations but a different annual citation rate.**

****For more bibliographic information about the publications listed in this table, you can check bibliography List at the end of paper.**

**Source**: Prepared by researchers.

## III. Conclusion

The field of accounting research on blockchain technology is both fertile and relatively nascent, necessitating continuous enrichment and evaluation to further develop its knowledge structure. This study has been undertaken to achieve these objectives and provide a comprehensive overview of this research domain by adopting a hybrid approach that combines content analysis of relevant reviews with bibliometric analysis of various indicators, such as quantitative growth analysis, co-occurrence matrices of keywords and terms in textual data, and the analysis of the most cited publications. This analysis

covered 469 publications from Scopus database spanning the period from 2017 to 2023, leading to several significant findings within the constraints inherent to such studies, including the origin and timing of sample extraction, the bibliometric indicators used in the analysis, and the type of study and its intended goals. These findings can be summarized as follows:

- The essential research elements in the field of blockchain in accounting primarily revolve around bookkeeping nature and procedures, Accountants and auditors Tasks and competencies, technical challenges, and legislative issues, as reflected in the majority of related research publications.
- Accounting research on blockchain technology has successfully garnered significant interest among researchers and the broader accounting academic community, as evidenced by the rapid quantitative growth of such studies from their inception in 2017 up until 2023.
- Emerging research topics in this domain include the Triple entry accounting, accounting education, technology acceptance models, data privacy, and intellectual property, while bibliometric analysis has increasingly become a prevalent analytical method in recent years.
- Publications on blockchain accounting research have collectively garnered a total of 7,049 citations, with an average of 15.03 citations per publication. Remarkably, 41.8% of these citations stem from just twenty publications, which achieved an impressive average of 147.5 citations per publication.
- The study by Dai & Vasarhelyi, (2017) holds the distinction of being the most cited publication in this field, with 377 citations, serving as a seminal work in blockchain accounting research. Meanwhile, the study by Shen et al., (2022) is noted as the most impactful publication, with an average annual citation rate of 63.5.
- Literature reviews and studies addressing topics such as the quality of financial reports, financial reporting, supply chains, technological alliances, data privacy, cyber security, and audit quality are among the most influential and attention-grabbing within the blockchain accounting research landscape.
- Descriptive and exploratory studies dominate the citation landscape, particularly within the realm of blockchain accounting research.

Based on the study's findings, which highlight the growing interest in blockchain technology within the accounting field, several recommendations can be put forth to further advance research and practice in this area.

- Explore additional databases such as Google Scholar, W.O.S, PubMed, and Dimension, incorporating their outputs for content and bibliometric analysis.
- Adopt other content analysis methods, such as retrospective, automated and active analysis, as well as advanced bibliometric techniques like analyzing cooperation matrices between countries, research institutions, and researchers, along with co-citation matrices.
- Increase the volume of experimental studies and case studies aimed at exploring the practical and field realities of blockchain technology within the accounting ecosystem.
- Expand research endeavors to explore the prospects of blockchain technology within the Arab and African accounting systems.

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