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A bibliometric analysis of blockchain's potential to transform accounting and auditing: Patterns and perspectives

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Abstract

This study uses a literature review methodology to examine how blockchain technology is transforming accounting and auditing. The R Studio tool is utilized to support the bibliometric approach, which is based on information taken from the Scopus database. 351 documents were selected based on the business, management, and accounting domains from the original 994 documents that were discovered using specific keywords. Following additional screening, bibliometric analysis was performed on 348 documents. The findings demonstrated that blockchain plays a significant role in enhancing the security and quality of accounting data as well as propelling the field's evolution towards the incorporation of new technologies, sustainability concerns, and research avenues focused on investment, economic analysis, and sustainable development. Furthermore, this technology offers substantial advantages in commerce and supply chain management. This study's distinctive contribution is its mapping of current research patterns that demonstrate how blockchain is starting to influence the field of modern accounting and auditing. To sum up, the implementation of blockchain technology has the potential to improve accounting and auditing processes overall. It is advised that future studies examine how blockchain is used in data management across businesses and how it affects the accounting and auditing industry economically on a large scale.

Keywords: Accounting, Audit, Bibliometric analysis, Blockchain, Literature review.

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1. Introduction

A bibliometric analysis of the evolution and patterns of research on the use of blockchain technology in accounting and auditing is the goal of this work. The distribution of scientific literature in a field across many publication sources, the linkages between elements, and the discovery of noteworthy patterns in the data are all examined in this study. It also shows how research productivity by national contribution has changed over time, demonstrating the productivity of publication sources and institutions. The study visualized the distribution and connections between several data categories in a hierarchical format by creating a visual representation of the terms that appeared most frequently in the text collection. In order to identify trends, this technique involved tracking how frequently important words or keywords were used in the literature. Lastly, it comprehends how important ideas or topics in the field of study develop and shift over time.

Over the past ten years, blockchain technology has gained a lot of attention. It is developing quickly and has the power to revolutionize practically every sector. In addition to its applications in banking, e-wallets, mining, and payment infrastructure, blockchain is regarded as one of the most innovative technologies since the internet's inception in the 1990s and one of the most highly funded industries. Blockchain is anticipated to usher in a new information era, despite its relative youth. It is anticipated that over $3 billion will have been invested in blockchain firms by the end of 2017. Funding for the sector was $2.4 billion as of September 2017, a 34% increase from the year before. Venture capital investments accounted for 25% of the funding, with initial coin offerings providing the remaining 75%. It is anticipated that the worldwide blockchain market will be worth $20 billion by 2024 [1].

Blockchain technology, for instance, is more than just a cryptocurrency platform. It is a global, decentralized platform that has the power to revolutionize industries like manufacturing, banking, insurance, telecommunications, and healthcare. The term "blockchain" refers to a decentralized database that stores lists of records and is composed of "blocks." There is a timestamp linked to every block. Blockchain is comparable to a distributed ledger that records ownership and value and makes it accessible to everyone for viewing and participation. Since the blockchain chain as a whole is updated continuously, every ledger copy is identical. Verification and updates can only be carried out with everyone's consent.

Apart from cryptocurrencies, blockchain technology is becoming increasingly prominent in the commercial sector. Blockchain is the basis for many online digital transactions, whether they involve products, services, or personal information, even if it is not yet generally accepted by the public and is rarely utilized directly by customers. Consider how blockchain is being used by major banks and IT firms to spur innovation. By 2022, blockchain technology could save banking infrastructure expenses by $15–20 billion annually, says a Santander InnoVentures analysis [1]. Although Bitcoin and the digital currency movement receive a lot of attention, blockchain is anticipated to be crucial in enhancing the effectiveness of banking and financial sector activities. One of blockchain's main benefits in the financial services industry has been its capacity to reduce the time and resources needed to complete transactions. Even though most transactions are now automated, the majority still use outdated systems that mimic paper-based approaches. The sector could undergo significant changes if the system is migrated to blockchain technology.

Blockchain is a very powerful contemporary technology that has fundamentally altered how businesses and organizations function. It makes a variety of corporate operations, such as accounting and auditing, more transparent, efficient, and data secure [2]. Blockchain technology can be used to store financial records in an unchangeable, encrypted manner, increasing the accuracy of financial reports and thwarting data manipulation. Smart contracts, which can expedite and streamline a variety of corporate activities, are another way that the technology facilitates automation. It is anticipated that the broad adoption of blockchain technology will contribute to improved corporate governance in the future.

Desai [3], one of the most significant developments in accounting since the double-entry system was introduced is blockchain, or distributed ledger technology. With increased efficiency, security, and openness, the technology has the ability to completely transform financial reporting and record-keeping. The "Big Four" accounting firms, Deloitte, PwC, EY, and KPMG, as well as a number of sizable businesses on the S&P 500 list, have all committed substantial resources to the development and implementation of blockchain technology. This action shows that they believe blockchain technology can improve the quality and integrity of financial data in the long run.

Beyond its application in cryptocurrencies, blockchain technology has emerged as a major invention with the potential to completely transform a number of industries, including banking, insurance, healthcare, manufacturing, and finance. The technology's capacity to boost efficiency, lower costs, and promote transparency is drawing a lot of attention from investors. Regulation, data security, and system adaptation are some of the issues it still faces, though. Nonetheless, blockchain is thought to spur innovation, create new opportunities, and radically alter how many businesses operate. Blockchain has the potential to serve as the foundation for a new, more dependable, efficient, and secure digital economy in the future.

According to earlier studies, blockchain technology significantly improves accounting and auditing operations. Oraby [4], the findings demonstrate that it can enhance the security, precision, and efficiency of financial transactions at Saudi Arabian organizations. Blockchain has been shown to be a useful tool for managing data in real time and lowering transaction risks. Blockchain technology is a useful tool for promoting the openness and dependability of financial accounts because of its potential to revolutionize accounting and auditing in the future. Furthermore, as explained by Warrad et al. [5], interest in the use of blockchain technology is growing as artificial intelligence systems in accounting and auditing become more and more prevalent. This implies that blockchain technology is becoming more and more recognized as a viable remedy that might enhance the accuracy and efficiency of accounting and auditing procedures. Blockchain is one of the most disruptive new technologies, according to Wang and Kogan [6] and it might have a big impact on the accounting and auditing industry.

According to Georgiou et al. [7], the expanding concept of digitalization and blockchain use in accounting and auditing offers several suggestions, including enhancing professional education and skills, fortifying governance, and preserving auditor independence. Furthermore, the study identifies the difficulties that the accounting and auditing professions are

having as a result of the implementation of blockchain technology and emphasizes the necessity of creating pertinent accounting standards and regulations. In their discussion of the relationship between IFRS, blockchain technology, and the audit process, Arianpoor and Borhani [8] found 52 indicators that could be broken down into eight different parts. According to the conceptual model, "predictive value," "timeliness," and "verifiability" were the most important elements. Furthermore, experts rated "Transparency of audit reports" and "Improved quality of auditor judgement" higher on average. This study emphasizes how complicated blockchain is and how little is known about how it integrates with IFRS. Consequently, it is critical that the audit and technology professionals focus more on how blockchain technology interacts with the qualitative aspects of financial data.

Zheng [9] blockchain technology is advancing quickly in many facets of social life and manufacturing, including the accounting and auditing sector, smart apps and blockchain technology, as well as creating a blockchain-based cloud-based data audit methodology. This study effectively finished building a cloud-based data auditing system that is powered by blockchain technology by combining the model with an evolutionary tools method. Blockchain technology is a good tool for accounting, according to Subramanian and Rahman [10], who begin by permanently documenting each transaction and recording it irrevocably. This procedure aids in keeping an exhaustive audit trail of all transactions. Blockchain makes it simple and time-efficient to track information. Blockchain has the potential to transform the accounting industry and present numerous opportunities for business system improvement.

There are numerous possible advantages to using blockchain technology for accounting and financial transaction audits. Blockchain can enhance data security, lower the possibility of accounting errors, and promote openness in the handling of financial data. Businesses may prevent accounting errors, expedite error detection and rectification without incurring extra expenses, and safeguard financial data from loss or misuse by careless individuals by implementing blockchain technology. This technology makes it possible to develop a financial management system that is more dependable, effective, and trustworthy [11].

The field of accounting and auditing is changing significantly as a result of the quick advancement of technology. Real-time monitoring and continuous auditing have made it possible for auditors to keep an eye on financial activity in real time, increasing productivity and guaranteeing compliance. Data analysis is sped up and errors are decreased with the use of tools like artificial intelligence and data analytics. Furthermore, because information systems and auditing are closely related, auditors must be tech-savvy in order to evaluate the security and dependability of the systems. In order to remain relevant in the digital age, these developments push accounting and auditing professionals to continuously improve their skills, Rabbani [12]. According to Desplechin et al. [13], blockchain is a disruptive technology that is affecting a number of industries, including accounting and auditing.

By combining a survey of the literature with a bibliometric analysis of blockchain advancements in accounting and auditing, this study presents a novel viewpoint. The approach is methodically planned, beginning with the preliminary phase to choose the research topic and concluding with a survey of the literature to comprehend the theoretical background. Next, data was gathered from the Scopus database to observe the trend of blockchain-related articles in accounting and auditing. To find patterns, trends, and connections across studies, bibliometrics was used in conjunction with R Studio software to analyze the data. Following a thorough discussion of the analysis's findings in the discussion stage, the findings are finally condensed in a conclusion that offers a thorough summary and suggestions for additional study. By using this method, the study offers a fresh perspective on fully revealing blockchain's potential in accounting and auditing.

2. Literature Review

According to several studies, blockchain's use in accounting and auditing is still in its infancy and is not yet widely accepted [13]. Professional scepticism and the belief that accounting standards are adequate become obstacles to use, which lessens the impact of knowledge on intention to use [14]. In order to make the financial recording and reporting process more transparent, effective, and secure against the possibility of data manipulation, efforts must be made to implement smarter accounting practices through the use of blockchain [15]. The goal of adopting blockchain technology is made possible by auditors' understanding of its consequences for auditing. Matskiv et al. [16] by lowering the likelihood of mistakes and fraud, blockchain implementation in the business increases system dependability and the effectiveness of accounting and auditing procedures. If the guidelines are followed, blockchain can greatly enhance the performance of accounting and auditing systems.

Blockchain is thought to be the next big technological development that might completely change the way businesses operate. In the upcoming years, it is anticipated that technology will significantly alter company practices and present new challenges and complexities for the accounting and auditing industries. Blockchain is having a big impact on accounting by increasing the effectiveness of transaction recording, storing evidence, and establishing a secure environment for commercial transactions. Research indicates that by offering a more effective and decentralized system, blockchain is revolutionizing audit procedures and strategies for auditors. With automated audit evidence, more transparent processes, and reduced costs, the technology offers a lot of potential to support traditional auditing Abdennadher et al. [17].

Cazazian [18] and Liu et al. [19] data can be updated in real-time, verified, and made transparent, blockchain can increase the timeliness of information and enable stakeholders to make more informed decisions more quickly. Furthermore, because blockchain technology reduces the possibility of data manipulation through its transparent and unchangeable nature, the quality of information produced by these systems is typically higher. Because data stored on the blockchain is authorized and automatically verifiable, it can save audit expenses by reducing the effort of auditors involved in data verification. In the accounting and auditing process, blockchain thus not only increases efficiency but also builds a more trustworthy ecosystem.

Blockchain technology has the ability to drastically alter business and accounting operations. Innovation in accounting and auditing is made possible by its decentralized, transparent, and safe features. By posing new possibilities and difficulties, the use of modern technology may have an impact on the work of external auditors and accountants. The development of blockchain in this field must take into account three key issues: (i) the shift to more accurate and efficient accounting methods; (ii) the evolution of more technologically driven work methods in accounting and auditing; and (iii) the substantial changes to the future job role, education, and skill requirements of auditors. This implies that blockchain is a catalyst for the growth of the accounting and auditing profession rather than only a tool [20].

Artificial intelligence (AI), smart contracts, blockchain, and the Internet of Things (IoT) are all technologies with distinct but complementary uses. All four are useful for resolving different issues in auditing and financial reporting [21]. Blockchain uses immutable records to guarantee data reliability and transparency. IoT enhances the quality of information used by assisting in the real-time collection of data from multiple devices. While artificial intelligence swiftly evaluates data to produce more precise insights, smart contracts allow financial procedures to be automated using predetermined rules. These technologies work together to improve the accuracy of financial reports and enable businesses to run more creatively and efficiently.

Adelowotan and Coetsee [22] blockchain has the potential to revolutionize accounting procedures and facilitate the creation of integrated accounting systems that are based on technology. Understanding the features of blockchain and its application to accounting necessitates a methodical approach. One of the main conclusions is that blockchain's rapid verification and data immutability properties guarantee the accuracy of data for accounting and auditing purposes. Although it hasn't entirely replaced the double-entry method of financial statement preparation, blockchain-enabled triple-entry accounting makes it possible for several stakeholders to securely and easily record accounting data. However, preserving data secrecy may be difficult given the real-time dissemination of information. Businesses can employ consortium-based or private blockchains to solve this. Blockchain is a significant advance in the field of modern accounting since it also creates chances for more frequent and effective auditing.

Schmitz and Leoni [23] the distributed ledger technology known as blockchain is anticipated to have a big impact on the accounting and auditing industries. Research results Schmitz and Leoni [23] demonstrate that issues of governance, transparency, and trust in the blockchain ecosystem, technology-enabled continuous auditing, intelligent applications, and paradigm shifts in the role of accountants and auditors are the most commonly discussed topics in the scientific literature and professional sources.

Distributed ledgers and blockchain technologies have revolutionized the handling and archiving of corporate and financial documents. These developments are causing fundamental shifts in accounting and auditing procedures and creating new avenues for deeper data analysis. Professional accountants (CPAs) must become knowledgeable about, adapt to, and use blockchain as the significance of these technologies grows in order to remain relevant in the rapidly changing digital era, Heister et al. [24].

Mosteanu and Faccia [25] blockchain technology is still developing and becoming more and more popular across a range of industries, such as auditing, accounting, and finance. Blockchain features like safe and transparent registry distribution are very beneficial to these industries. Key benefits of this innovative technology include reduced risk of errors, especially human errors, decreased risk of fraud, system automation, big data analytics capabilities, significant cost savings through increased efficiency and reduced errors, improved reliability of financial reports, and simplified workflows. Because of this, blockchain is a very useful tool for current corporate change.

This study offers a thorough and in-depth examination of the connection between blockchain technology and the accounting and auditing domains. This study adds to the theoretical knowledge of blockchain's revolutionary influence and provides unique insights into the academic landscape by utilizing a bibliometric approach with sophisticated tools like R Studio. The results highlight how blockchain might improve the quality, security, and transparency of accounting data while also influencing how accounting procedures change to meet new developments in economic analysis, sustainability, and technological integration.

This study examines the wider uses of blockchain in domains including supply chain management and trade, in addition to highlighting the technology's potential to improve financial reporting systems. The utilization of a strong bibliometric framework to pinpoint important research trends, gaps, and future directions is what makes this study unique. The study provides a strong theoretical basis for additional research by emphasizing transdisciplinary applications and sustainable development.

Future studies should dive deeper into cross-organizational data management, the economic consequences of blockchain at scale, and the technical and legislative difficulties impeding its adoption. This paper establishes a crucial foundation for further academic research and real-world innovation at the intersection of blockchain, accounting, and auditing by its breadth, uniqueness, and theoretical contributions.

3. Materials and Methods

This study's methodology uses bibliometric analysis to examine the evolution of the literature on blockchain's use in accounting and auditing. The Scopus database, one of the most important sources of scientific literature, provided the document data. Research trends are provided by the Scopus database [26]. Other credible international indexers are not taken into consideration in this analysis, only databases indexed by Scopus are Apriantoro and Susanto [27]. In order to guarantee relevance to the swift advancement of blockchain technology, this study concentrated on documents released between 2017 and 2025. The R Studio program was used to do a bibliometric analysis on the collected data.

Relationships between elements, the discovery of noteworthy patterns in the data, and the distribution of scientific literature in a field among various publication sources are all part of the analysis process. The study also looks at how research productivity by country contribution has changed over time, demonstrating the productivity of publication sources and institutions. The study visualized the distribution and connections between several data categories in a hierarchical format by creating a visual representation of the terms that appeared most frequently in the text collection. In order to identify trends, this technique involved tracking how frequently important words or keywords were used in the literature. Lastly, the study comprehends how important ideas or themes in the subject of study develop and shift over time. SCOPUS's search method yielded 994 documents using the following search terms:

Table 1.
Search strategy.

Database	Search
Scopus	(TITLE-ABS-KEY ("Blockchain") AND TITLE-ABS-KEY ("Accounting") AND TITLE-ABS-KEY ("Auditing") OR TITLE-ABS-KEY ("Accounting") OR TITLE-ABS-KEY ("Auditing"))

351 documents were found after restricting the Scopus search method to the Business, Management, and Accounting subject area. Nevertheless, following inspection, two documents were not found, leaving 348 genuine documents using the following search terms:

Table 2.
Search strategy.

Database	Search
Scopus	(TITLE-ABS-KEY ("Blockchain") AND TITLE-ABS-KEY ("Accounting") AND TITLE-ABS-KEY ("Auditing") OR TITLE-ABS-KEY ("Accounting") OR TITLE-ABS-KEY ("Auditing")) AND (LIMIT-TO (SUBJAREA , "BUSI"))

4. Results

4.1. Main Information

The bibliometric analysis of blockchain research data in accounting and auditing includes 348 papers from 189 sources, including books, journals, and other sources, and spans the years 2017–2025. With an average document age of 2.18 years, the annual growth of documents exhibits a negative trend of -18.22%. The average number of citations per document was 20.31, and there was only one reference in total. There were 854 author keywords and 357 extra keywords (Keywords Plus) related to the document content. Sixty-five writers produced single documents out of the 774 authors who participated in this study. Eighty-four of the total papers were written by a single author, whilst the average number of co-authors per document was 2.55. The rate of international collaboration was found to be 23.28%. Articles made up 213 of the total document types, with book chapters (70), conference papers (25), and reviews (20) following closely behind. Books (5), conference reviews (9), errata (1), notes (2), and a few additional combinations are examples of alternative document kinds. The variety of sources, partnerships, and document formats displayed in this data illustrates the interdisciplinary growth of blockchain research in accounting and auditing.

Table 3.
Main Information.

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2017:2025
Sources (Journals, Books, etc)	189
Documents	348
Annual Growth Rate %	-18,22
Document Average Age	2,18
Average citations per doc	20,31
References	1
DOCUMENT CONTENTS	
Keywords Plus (ID)	357
Author's Keywords (DE)	854
AUTHORS	
Authors	774
Authors of single-authored docs	65
AUTHORS COLLABORATION	
Single-authored docs	84
Co-Authors per Doc	2,55
International co-authorships %	23,28
DOCUMENT TYPES	
Article	213
Article article	3
Book	5
book chapter	70
conference paper	25
conference review	9
Erratum	1
Note	2
Review	20

4.2. Three-Field Plot

According to research by authors Schmitz and Leoni [23], Desai [3], Liu et al. [19], Oraby [4], and Kolisnyk et al. [11], the three-field plot pertaining to the topic of Blockchain emphasizes the intersection of important areas like accounting, information technology, and financial auditing. With an emphasis on auditing and information systems, this study investigates how blockchain technology may revolutionize accounting and financial procedures. Their research examines the quickly changing field of blockchain technology and how it is changing conventional methods in auditing, financial reporting, and accounting information systems in general. The report highlights how blockchain's decentralized structure and open ledger technologies present fresh chances to improve accuracy, efficiency, and confidence in financial transactions and audits. The convergence of these sectors is well visualized by the three-field plot, which also highlights the interdisciplinary approach needed to comprehend and use blockchain technology to enhance the security and accuracy of accounting data and financial reporting systems.

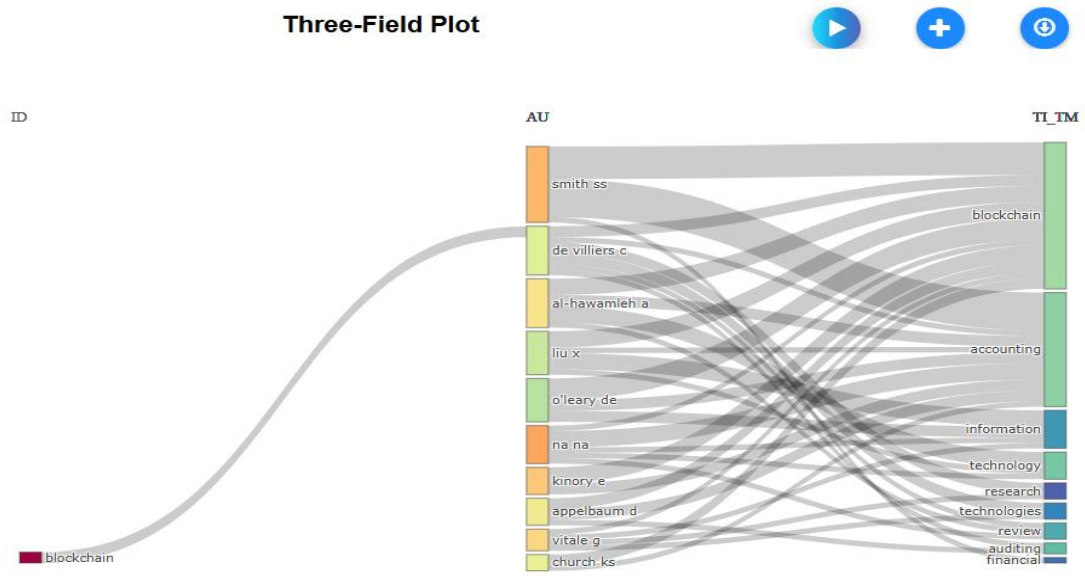

Figure 1.
Three-Field Plot.

4.3. Core Sources by Bradford's Law

Bradford's Law aids in classifying articles according to their degree of relevance to the research issue by concentrating on locating key sources in the scientific literature. Conferences like the 2023 IEEE International Conference on Blockchain and Cryptocurrency [2] and the 2024 ASU International Conference in Emerging Technologies for Sustainability and Intelligent Systems [2] fall under "Zone 2," which refers to publications that are regularly cited but not the primary core in the context of blockchain, cryptocurrency, and sustainability. Journals like the Accounting, Auditing and Accountability Journal and the Journal of Risk and Financial Management, on the other hand, are classified as primary sources with a high level of influence and come within "Zone 1". By using this method, researchers can systematically rank the literature according to its quality and degree of significance in developing theoretical frameworks and research applications.

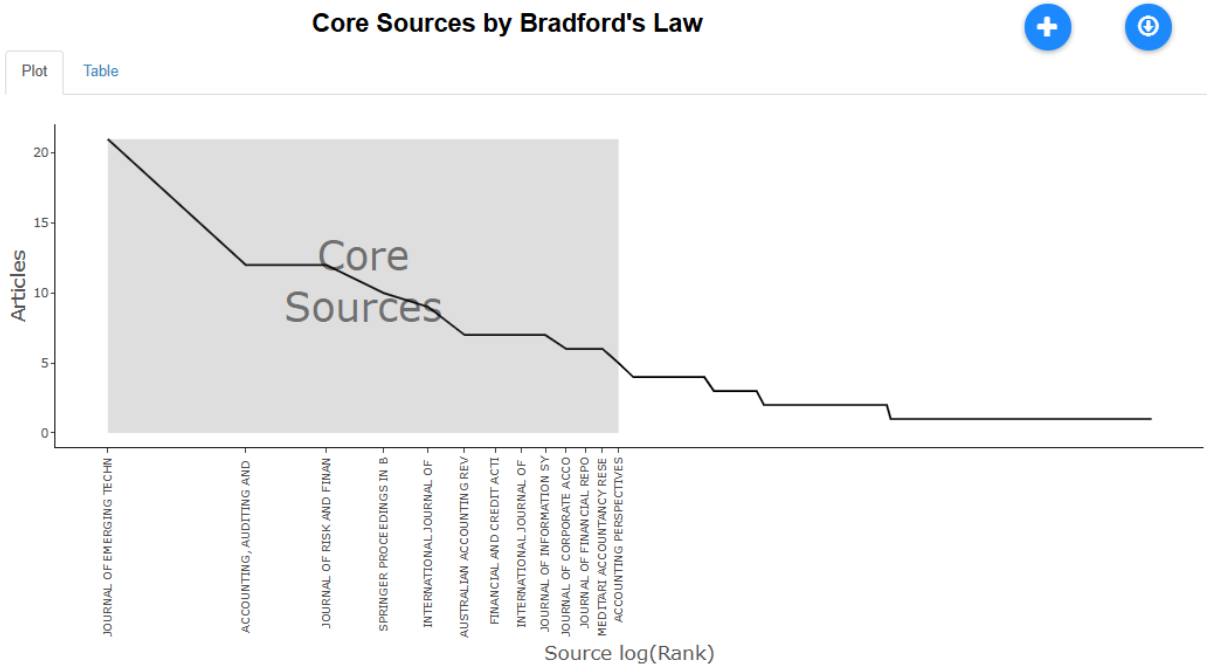

Figure 2.
Core Sources.

4.4. Sources' Production Over Time

Notable patterns in scholarly output across a range of accounting and finance-related periodicals can be seen when source production is examined over time. Beginning with just two articles in 2017, the Journal of Emerging Technologies in Accounting steadily led the production from 2017 to 2025, reaching a peak of 21 articles per year starting in 2024. The Accounting, Auditing, and Accountability Journal, on the other hand, began making a substantial contribution in 2021 and steadily produced 12 articles by 2022. There was no activity in the Journal of Risk and Financial Management until 2023,

but by 2024, there were 12 papers published. In a similar vein, the Springer Proceedings in Business and Economics showed steady expansion, going from one article per year in 2019 to ten by 2024. Last but not least, the International Journal of Digital Accounting Research showed steady expansion, peaking at nine articles per year starting in 2023. These trends show that digital and technological developments are becoming increasingly important in accounting research, and new journals are essential to covering these exciting fields.

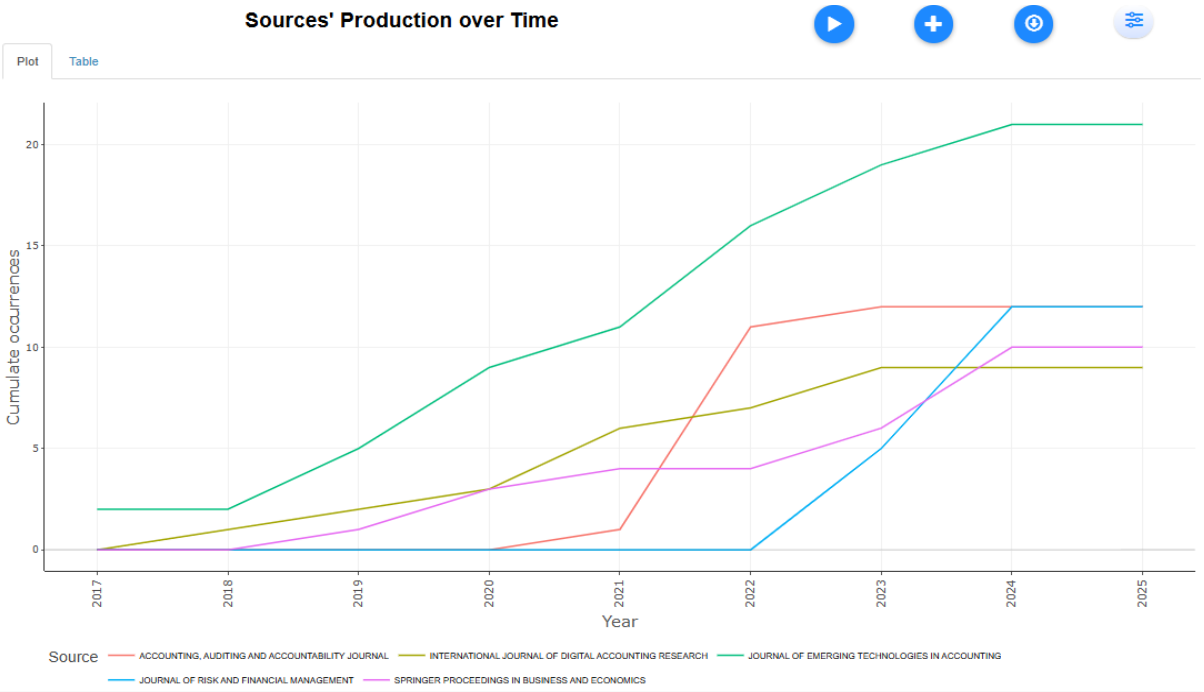

Figure 3.
Sources' Production over Time.

4.5. Affiliations' Production Over Time

The development patterns of article creation by affiliations differ throughout time. Between 2020 and 2025, Amity University continuously produced five articles annually, despite having no publications from 2017 to 2019. This is a reflection of the university's increasing academic output and research involvement. In the early years, Central Ukrainian National Technical University did not publish any publications. However, by 2023, it started to publish regularly, and by 2024 and 2025, it was expected to publish five articles annually. Similar patterns were seen at the Higher Colleges of Technology, which began producing very few articles in 2020 before progressively increasing to five articles per year starting in 2022. RMIT University grew slowly in the beginning, producing only one paper in 2019 before climbing to nine publications annually by 2023. This rate of productivity is anticipated to continue in the years to come. From continuously publishing two articles in 2017 to progressively increasing to seven articles annually by 2023, the State University of New Jersey follows a trajectory of stable growth that is expected to continue until 2025. After producing two articles in 2022, the University of Auckland witnessed a significant boost in output. In 2023, it published six articles, and through 2025, it is anticipated to write seven articles per year. Overall, the research productivity of these affiliations has fluctuated over time, with some universities exhibiting constant output in recent years and others undergoing progressive rises. This expansion demonstrates how these colleges' research contributions have changed throughout time.

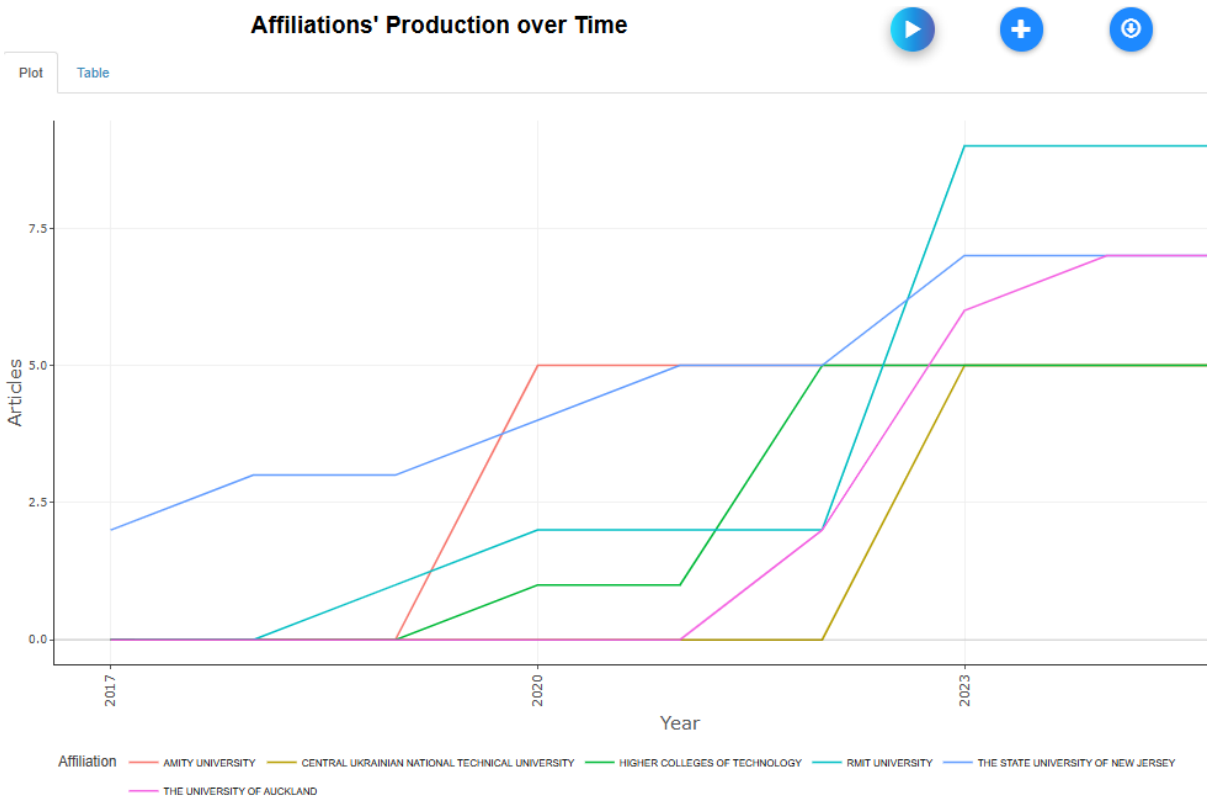

Figure 4.
Affiliations' Production over Time.

4.6. Countries' Production Over Time

Over time, the nation-by-nation production of articles has grown significantly, with considerable increases in a number of locations. Beginning with five articles in 2017 and growing quickly to reach 120 articles in 2024 and 2025, the USA continuously led the way. This indicates a sharp growth in research output, especially starting in 2020, when the USA observed a spike to 50 articles, which continued to rise each year. Starting with no publications in 2017, Australia's research output showed consistent development, progressively reaching 44 articles per year by 2024 and 2025. Beginning with just two pieces in 2018, the output increased gradually over the following years, with a notable spike in 2022 and 2023. With just one article produced in 2018 and 2019, China's output started out slowly but increased to 29 articles by 2024, with more growth anticipated in 2025 to reach 32 articles. The nation demonstrated a significant rise from 2020, indicating a greater focus on research. India likewise started late, as there were no articles published in 2017 or 2018. But starting in 2019, India's output increased, and by 2024 and 2025, it was producing 44 pieces annually. The output increased significantly from 21 to 44 articles between 2023 and 2024, which was the most notable rise. Similar trends were seen in Italy, which produced no articles in 2017 and 2018 but saw a steady increase in output that peaked in 2024 and 2025 at 40 pieces annually. Italy experienced steady expansion, especially after 2020, with a sharp rise in publications in 2021–2023. In conclusion, various nations have demonstrated different patterns in their research output, with the United States at the forefront and China, India, Italy, and Australia following suit. This indicates a more general global expansion in academic output over time.

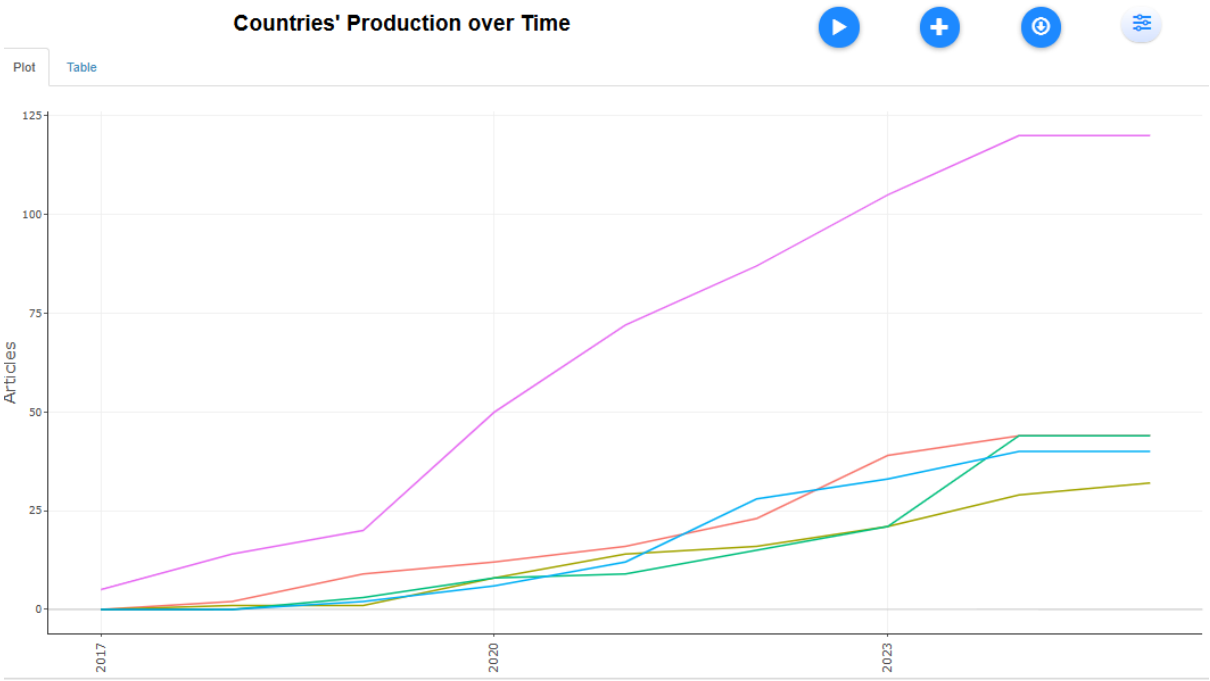

Figure 5.
Countries' Production over Time.

4.7. Word Cloud

Some terms appear more frequently than others in the word cloud of terms, which represents a wide variety of themes and concepts in the fields of technology and accounting. The most common term, "systematic literature review," came up ten times, demonstrating how important it is to scholarly study. Triple-entry accounting (5 occurrences) and accounting information systems (6 occurrences) come in close succession, indicating a focus on cutting-edge accounting frameworks and their integration with contemporary technologies like blockchain. With an emphasis on its application and ramifications, other phrases such as embrace blockchain technology, blockchain distributed ledger, and blockchain technology adoption draw attention to the expanding relationship between blockchain and accounting. A growing interest in how technology improves decision-making and streamlines accounting operations is reflected in ideas like enterprise resource planning, corporate data analytics, and business process management. The use of sustainability-related words, such as renewable energy projects, climate finance legislation, and complementary climate finance, indicates that accounting is becoming more environmentally conscious. The increasing interest in digital assets and their regulation is also reflected in non-fungible tokens (NFTs) and virtual asset accounting. All things considered, the word cloud provides a thorough overview of current trends in the discipline by highlighting how accounting has evolved to incorporate new technology, environmental issues, and future-focused research initiatives.

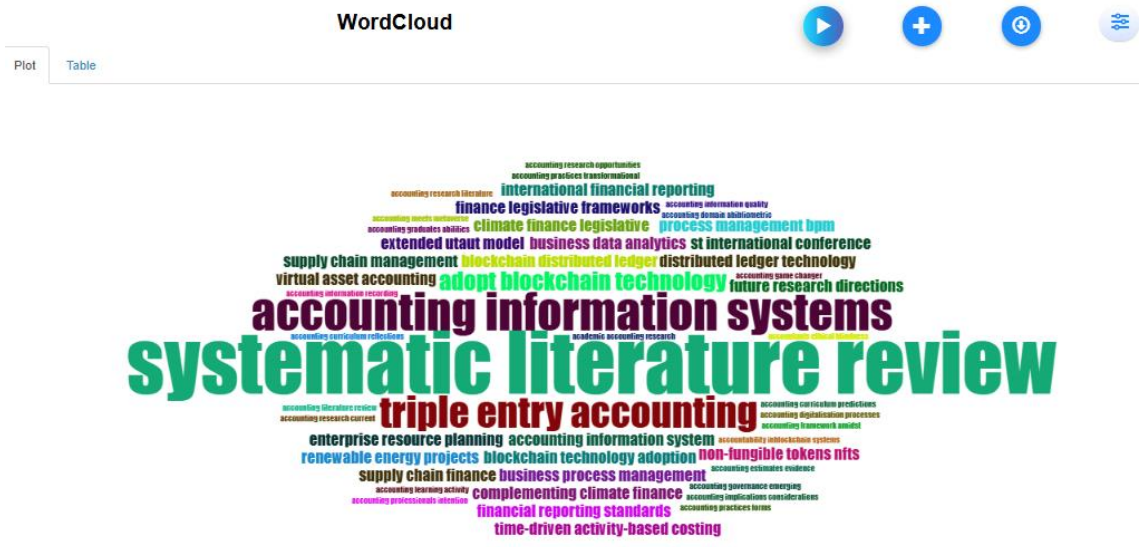

Figure 6.
Word Cloud.

4.8. TREEMAP

Blockchain emerged as the most frequently mentioned term (32 occurrences), closely followed by blockchain (23 occurrences), reflecting the prominence of blockchain technology across various discussions. The term treemap highlights important concepts and technologies in the changing landscape of accounting and business management. The increasing use of blockchain in logistics and the improvement of global supply chain operations are indicated by other terms like supply chains and supply chain management, which appear seven and three times, respectively. The treemap also illustrates the growing significance of accounting and associated domains, including accounting rules, accounting processes, and accounting information systems. These words reflect how the accounting industry is constantly changing, with an emphasis on implementing cutting-edge technology like blockchain to increase security, efficiency, and transparency. Emerging technologies that highlight their role in improving data security, processing power, and decision-making within commercial and financial systems include digital storage, cryptography, and artificial intelligence. Words like distributed accounting, smart contracts, and decentralized finance highlight the growing interest in blockchain's uses outside of traditional accounting, especially in the fields of finance and law. Last but not least, the addition of words pertaining to investments, economic analysis, and sustainable development points to a rising focus on incorporating moral and long-term factors into accounting and company plans. A dynamic transition towards technology-driven accounting procedures that promote sustainability, innovation, and transparency is depicted in the overall treemap.

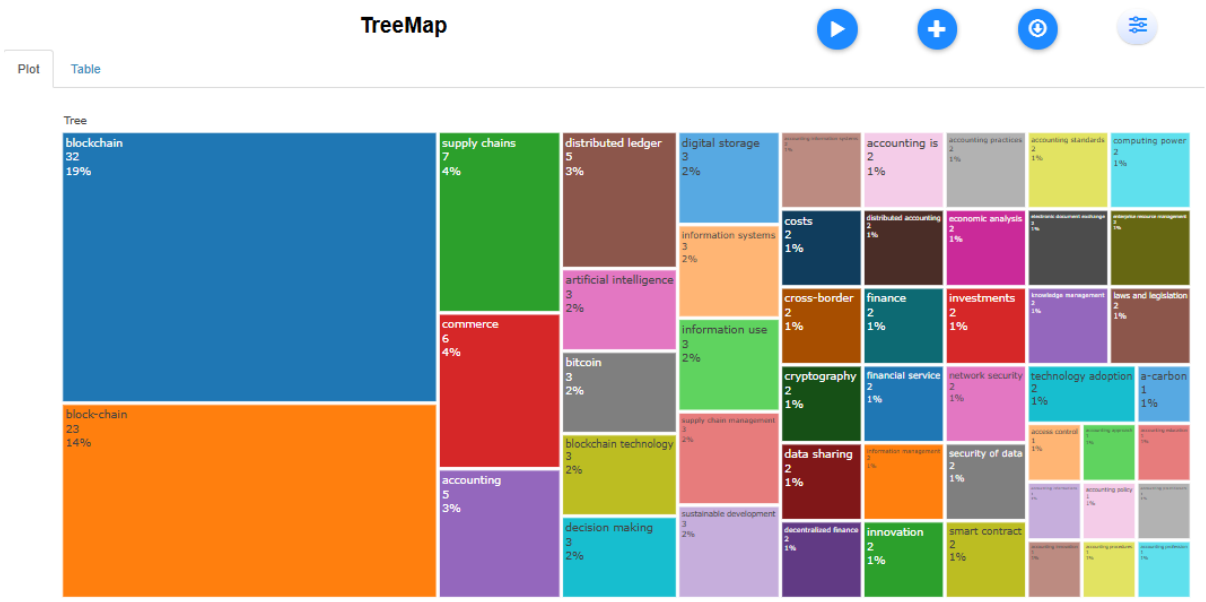

Figure 7.
TreeMap.

4.9. Words' Frequency Over Time

Key terminology associated with blockchain and business technologies has become much more common over time, which is indicative of the concepts' growing applicability and relevance in recent years. The most often used phrases are blockchain and block-chain, which increased rapidly from 1 in 2018 to 32 and 23, respectively, by 2024. This increase demonstrates how blockchain technology is becoming more popular across industries. The number of mentions for supply networks and trade has also gradually increased, rising from one each in 2018 to seven and six by 2024, respectively. This increase points to a rising interest in how blockchain technology might improve global trade and supply chain management. Despite receiving zero mentions in 2018 and 2019, accounting gains popularity starting in 2020 and reaches a frequency of five by 2024. This increase is consistent with the incorporation of blockchain technology into financial management and accounting procedures. The continual expansion of other terminology like bitcoin, distributed ledger, and artificial intelligence reflects their increasing significance in the larger framework of digital finance and commercial decision-making. The steady but moderate presence of decision-making suggests that it will continue to be relevant in the context of cutting-edge technologies like blockchain and artificial intelligence (AI), which support better-informed and more effective business strategies. All things considered, the evidence indicates that blockchain and associated technologies have gradually become more prominent in business and financial discourse due to their potential to completely transform sectors like supply chain management, accounting, and commerce.

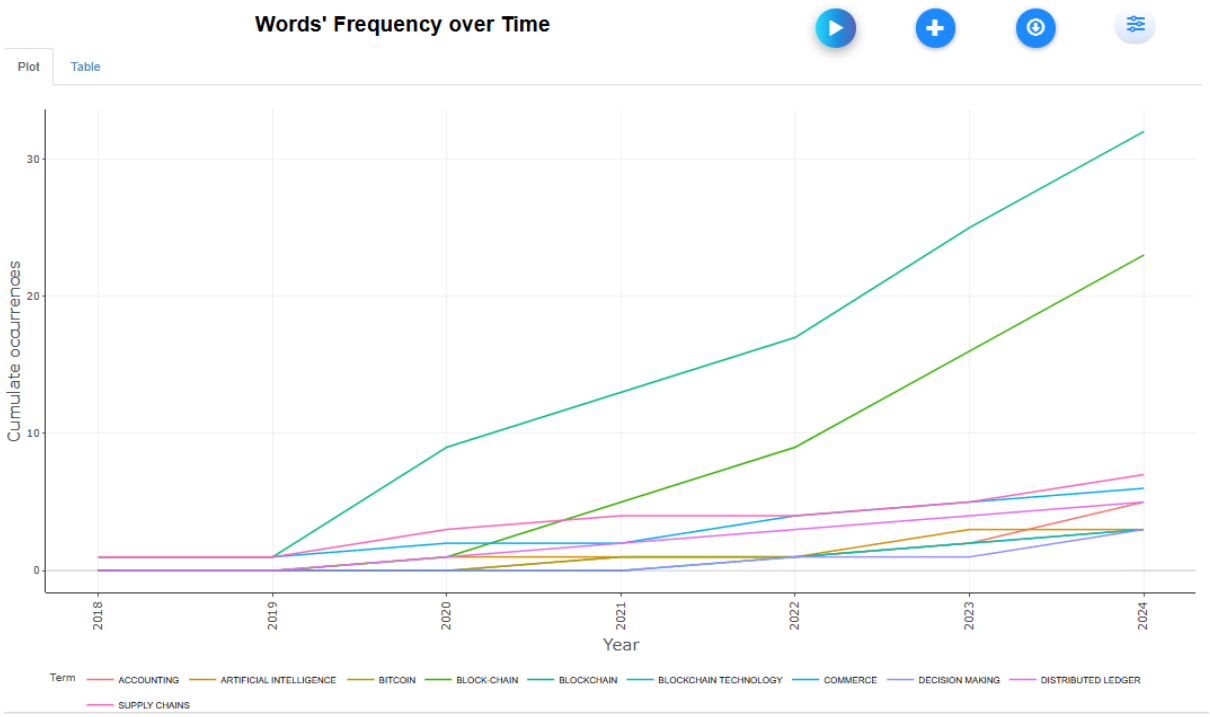

Figure 8.
Words' Frequency over Time.

4.10. Thematic Evolution

Keywords' thematic evolution from 2017–2022 to 2023–2025 shows a change in emphasis within the domains of technology, blockchain, accounting, and finance. For instance, over the 2023–2025 timeframe, terminology like accounting information systems has expanded to encompass more complex subjects like automation and artificial intelligence. This shift demonstrates how automation and artificial intelligence are increasingly changing accounting procedures and technology integration. From a specialized idea in 2017–2022, blockchain technology and its related terms such as distributed ledger technology and smart contracts remain highly relevant. In 2023–2025, the focus shifted to digitalization and emerging technologies. With a noticeable rise in conversations about risk and cryptocurrencies as crucial areas of development, data analytics and cryptocurrencies have also become more well-known in the later time. Similarly, in conversations about digital currency and fraud detection, the idea of triple-entry accounting, which was less common in the past, now frequently comes up alongside blockchain. The growing integration of digital technologies and artificial intelligence in corporate settings is reflected in the growing popularity of the metaverse, cloud computing, and AI in accounting courses and more general technology discourse. Furthermore, in the 2023–2025 timeframe, the convergence of blockchain, finance, and audit is expanding, with audit emerging as a major area of interest due to blockchain's potential to improve accountability and transparency. Thematic evolution, taken as a whole, shows how new technologies like artificial intelligence (AI), blockchain, and digital transformation are pushing traditional industries like supply chain management, accounting, and finance towards more automated, decentralized, and data-driven methods.

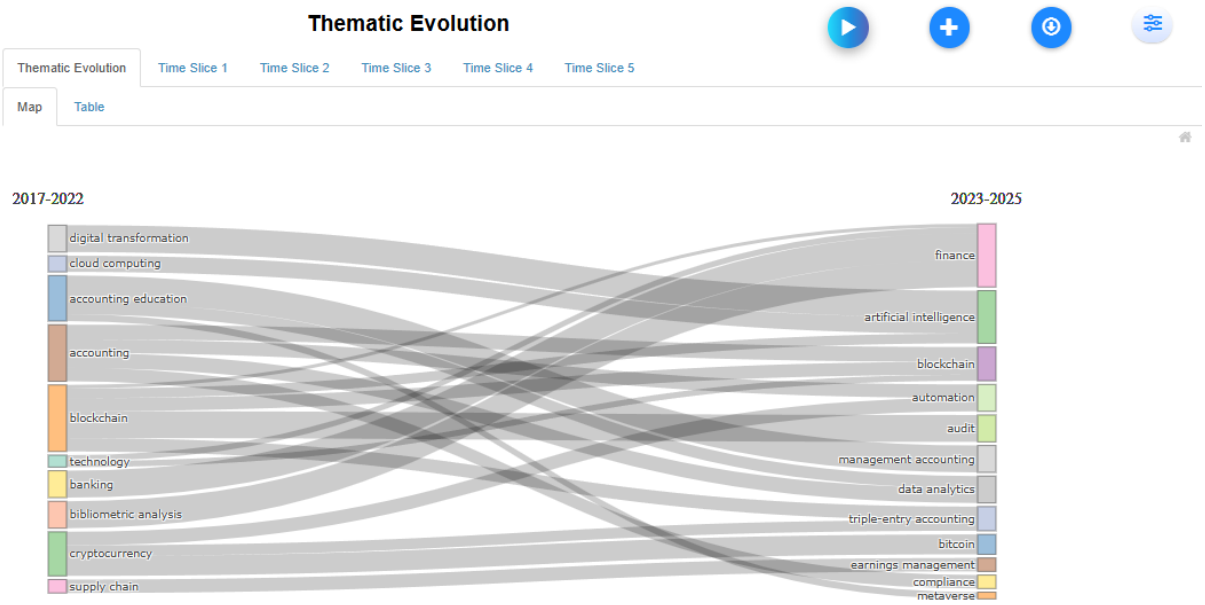

Figure 9.
Thematic Evolution.

5. Discussion

In order to design, build, test, and deploy software systems that satisfy user requirements, are delivered on schedule and under budget, and retain high quality, software development teams adhere to a standardized procedure known as the System Development Life Cycle [28]. The addition of blockchain into the System Development Life Cycle improves security by integrating blockchain technology to enhance security within the System Development Life Cycle. By guaranteeing integrity, version control, and an unchangeable audit trail, blockchain's decentralized, transparent, and immutable features enhance risk mitigation throughout the System Development Life Cycle [29].

The System Development Life Cycle, which includes the phases of planning, analysis, design, implementation, testing, and maintenance, can be linked to the use of blockchain technology in accounting and auditing, according to the investigation's findings. According to research, blockchain is required at the planning stage in order to strengthen a more transparent and trustworthy financial reporting system and enhance the quality and security of accounting information [2-4, 11, 13].

Additionally, the function of blockchain in the development of accounting is examined in greater detail at the analysis stage, especially in relation to satisfying the demands of contemporary organizations by incorporating concerns of sustainability, ethics, and decision-making effectiveness. Through a decentralized framework that facilitates accounting, auditing, supply chain management, and sustainable business strategies, blockchain is intended to guarantee data openness and reliability during the system design phase.

While the testing stage ensures that blockchain performs as intended in enhancing the security, efficiency, and accuracy of financial reporting systems, the implementation stage subsequently applies this technology to accounting and auditing systems. The blockchain system is assessed and modified to meet future business requirements and technological advancements throughout the maintenance phase. Blockchain can enhance the function of accounting and auditing, facilitate more robust data-driven decision-making, and transform the sector towards transparency, efficiency, and long-term sustainability by methodically implementing the System Development Life Cycle stages.

6. Conclusion

Blockchain technology has shown promise in accounting and auditing, particularly in enhancing the security, transparency, and quality of financial data. The technology is growing into a strong basis for a financial reporting system that is more dependable and effective. Its rise is propelling accounting's development in the direction of incorporating new technology focused on ethics and long-term sustainability. Blockchain greatly aids in better company decision-making, supports economic analyses, and fortifies sustainable accounting practices in the context of sustainable development.

Additionally, blockchain has the ability to completely transform the accounting and auditing sector, encompassing auxiliary domains like commerce and supply chain management. This technology's efficiency and transparency open up new ways to tackle the high-tech era's issues while promoting sustainability in contemporary corporate plans. It is advised that a number of significant areas be investigated in subsequent studies. First, research on the use of blockchain in cross-organizational data management, particularly how the technology might enhance interoperability within financial systems. Second, studies on the financial effects of widespread blockchain adoption, especially in the field of accounting and auditing. Third, further research on the legal and technological obstacles that need to be removed for blockchain adoption to be as successful as possible. By taking these actions, blockchain may be fully exploited to develop a more creative, open, and sustainable accounting and auditing sector.

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