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Mapping the Blockchain Technology Research: A Bibliometrics and Visualization Approach

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ABSTRACT

Research on blockchain technology explores the multifaceted aspects of decentralized and distributed ledger systems. Originating with Bitcoin in 2009, the technology has since evolved beyond cryptocurrencies, gaining prominence in diverse sectors such as finance, supply chain, and healthcare. Scholars have investigated the underlying principles, design considerations, scalability challenges, and potential applications of blockchains. This study aims to map blockchain technology research using bibliometrics and a visualization approach. Scholarly publications on blockchain technology were analyzed using quantitative and qualitative indicators from the Web of Science (WoS) database. A total of 5,249 research articles, spanning a decade (2011-2020) were extracted from the WoS database. This analysis has been enriched using various bibliometric tools, including Biblioshiny, VOSviewer, RStudio, and BibExcel. The key findings of this study revealed that the highest annual growth rate of publications occurred in 2018, with 581 records (184.80%). Author Zhang Y published most of the papers (57) with 1,857 citations. China emerged as the most cited country, with 14,779 world citation shares.

Keywords: Bibliometrics, Visualizations, Blockchain Technology, Co-citation Network, Topic Dendrogram.

1. INTRODUCTION

Blockchain technology has emerged as a disruptive innovation with the potential to transform various industries by revolutionizing traditional processes of data storage, security, and transaction management (Swan, 2015). It's decentralized and immutable nature, coupled with cryptographic techniques, ensures transparency, integrity, and trust in digital transactions, thereby eliminating the need for intermediaries and central authorities (Nakamoto, 2008). Since the inception of blockchain with the launch of Bitcoin in 2009, the technology has evolved beyond

cryptocurrencies, expanding into diverse applications such as supply chain management, healthcare, finance, and decentralized finance (De Filippi & Hassan, 2018; Yli-Huumo et al., 2016).

The growing interest and investment in blockchain technology has spurred a substantial body of scholarly research aimed at understanding its underlying principles, exploring its potential applications, and addressing the challenges associated with its adoption and scalability(Zheng et al., 2018). As the field of blockchain research continues to expand, there is a pressing need to systematically analyze and map the existing literature to identify key trends, seminal works, influential authors, and collaborative networks driving innovation in this domain.
Bibliometrics, a quantitative analysis of scholarly publications offers a powerful methodology for mapping and analyzing the landscape of blockchain technology research (Martín-Martín et al., 2018). By examining publication trends, citation patterns, and collaboration networks, bibliometric studies provide valuable insights into the structure, evolution, and research impact within a specific field (Van Eck & Waltman, 2010).

This study incorporates a year-wise assessment of the annual growth rate and average total citations per article, drawing insights from the global landscape of blockchain research outputs are recorded in the Web of Science database. By investigating the interconnections between countries, affiliations, and keywords in blockchain research, this study aims to provide a holistic understanding of the global landscape within this field. In conclusion, the research addresses the trends in blockchain research by summarizing past efforts and leveraging these insights to forecast potential future developments.

2. LITERATURE REVIEW

Blockchain technology has rapidly emerged as a disruptive force with transformative potential across various sectors, including finance, supply chain management, healthcare, and beyond. This literature review aims to provide an overview of the paper "Mapping the Global blockchain technology research: a bibliometrics and visualization approach," which employs bibliometrics and visualization techniques to analyze and map the global landscape of blockchain technology research.

Firdaus et al. (2019) study analyzes over 1000 articles from 2013-2018 on blockchain research, focusing on its use in IoT security and healthcare adoption. The study finds that blockchain is an increasing trend, with the US being the most active country, followed by China, Germany, Switzerland, and Singapore. Collaborations between countries have increased, and blockchain is used in various data research areas. Ghosh et al. (2020) study on cryptography productivity found India contributes 9.88% of global publications. The study ranks proficient organizations, authors, and countries based on publication numbers and citation impact. It also examines the distribution of research fronts in Indian cryptography. The main findings of the (Zhou et al., 2021) study encompass the evolution of blockchain research, profiling influential authors and institutions, examining popular research topics, and investigating collaboration networks among researchers. Additionally, the study identifies emerging research themes and outlines potential future directions in blockchain research.

The study by Ozdagoglu et al. (2020) reveals a significant increase in blockchain research between 2013 and 2018, primarily focusing on technical aspects like consensus mechanisms and security. Key research topics include cryptocurrency, smart contracts, and blockchain applications. The United States and China are the leading countries in blockchain research output. Similar to Kamran et al. (2020) study "Blockchain and Internet of Things: A

bibliometric study" examines the link between blockchain technology and IoT, revealing a surge in research on security, privacy, data management, and blockchain-based architectures, and robust collaboration among researchers.

Gupta & Dhawan (2020) study analyzes blockchain research trends, patterns, and themes. It reveals an increase in publications, with the US leading in research output. The study also identifies top institutions and authors, and examines collaboration patterns among researchers and institutions, providing insights into the collaborative nature of blockchain research. Velmurugan (2019) study identified 23,335 publications by researchers worldwide in the field of neurology. The highest number of publications (3357) was recorded in 2015. Olawumi & Chan (2018) study reveals a significant increase in global sustainability research, primarily in developed countries like North America and Europe. Key areas include environmental, social, and economic sustainability, and the study highlights influential authors, institutions, and journals in this field.

The other experts Olawumi & Chan (2018) study identified different clusters of research hotspots, co-author, co-word, and co-citation in sustainability research. The maximum contributions of sustainability research originated mainly from the United States, China, the United Kingdom, and Canada.

The objective of Guo et al. (2021) study was to provide a comprehensive overview of blockchain research and identify current research trends and emphasis. The analysis was based on data collected from 3826 articles published from 2013 to 2020 in the Web of Science core collection database. The main findings of the study include identifying the development trends and current domains in blockchain research, as well as the most influential and productive authors, institutions, countries, and journals in this field. Same as Niknejad et al. (2021) study examines bibliometric analysis to scrutinize the research trends concerning blockchain technology within the food and agriculture sector. Commonly used terms in the titles and abstracts of the articles include traceability, transaction, Internet of Things (IoT), safety, and food supply chain.

The Lyu et al. (2020) study seeks to chart the knowledge terrain of blockchain research and discern the principal trends, themes, and research trajectories within this domain. The paper unveils several noteworthy discoveries regarding the global landscape of blockchain research. Initially, it pinpoints the most prolific countries and institutions in terms of output in blockchain research. The goal of the study Yang et al. (2022) study report indicates possible directions for further research and offers insightful information about the state of blockchain research today. Further, Nasir et al. (2020) research underscores the significant and conceptual dimensions of blockchain and cryptocurrency literature through bibliometric analysis. It encompasses 1965 relevant documents published between 2015 and 2020, exploring diverse frameworks, technologies, cryptocurrencies, and blockchain applications. Key affiliations include the University of Cagliari, Notreported, and Peking University, while prominent countries contributing to literary research are the USA, China, and India.

Luo et al. (2021) the study presents a detailed bibliometric analysis of blockchain research from 2014 to 2019. Among the authors with a publication volume exceeding 30, Choo Kim-Kwang Raymond, Guizani Mohsen, and Yu Fei Richard stand out as the most productive. In terms of countries, China emerges as the most productive, with a total of 1314 articles published. The Beijing University of Posts and Telecommunications leads in terms of the number of publications, with 96 articles. A Similar Mohapatra et al. (2023) study revealed that China, the United States, and India are the most active nations in Blockchain technology (BCT) research and publishing. In

comparison to China and the United States, India has less international research collaboration. The study also found that BCT is a viable tool for resolving difficulties in the agricultural supply chain, maintaining transparency, and safeguarding information during transactions. Duan & Guo (2021) study indicates that the United States and China emerging as the leading countries in terms of research output.

However, discrepancies between prior studies and the current paper prompted the authors to undertake a comprehensive mapping of global blockchain technology research using a bibliometric and visualization approach. This approach aimed to address gaps in scholarly literature for the years 2019-2020, open access and proprietary information, and the scope of subject sources related to blockchain technology. To accomplish this, the researcher conducted a thorough examination to uncover gaps and trends in the existing literature, contributing to a more nuanced understanding of the current state of blockchain technology research.

3. OBJECTIVES OF THE STUDY

This study aimed to accomplish the following objectives.

(1). What are the trends in publications and citations of blockchain technology research (BTR) from 2010 to 2020?
(2). Who are the most productive contributors (authors, countries, affiliations)?
(3). What are the most relevant sources and subject areas of BT research publications?
(4). what is the factorial analysis of conceptual structure map-method
(5). To identify the most relevant patterns of author keywords and table dendrograms.
(6). To highlight the three-factor plots, author's co-citation network, and the map showing collaborations between countries.

4. METHODOLOGY

This study presents a comprehensive evaluation of blockchain technology research practices documented in the Web of Science database spanning the years 2011 to 2020, providing insights into the evolutionary trends within the field. The methodology involves a thorough examination of blockchain studies, covering topics, publication patterns, and utilization. The scope of this bibliometrics analysis encompasses 5249 studies sourced from the Web of Science database, which includes diverse document types such as Science Citation Index-Expanded (SCI-EXPANDED), Social Sciences Citation Index (SSCI), and Arts and Humanities Citation Index (AHCI). The analysis extends to various types of papers, offering a comprehensive assessment of blockchain research efforts.

This study search string used for data extraction is TS= (“Blockchain” OR “Bitcoin” OR “Cryptocurrency” OR “Ethereum” OR “Hyperledger” OR “Smart contract”). The search output was later restricted to the period 2011-2020. For producing an output of the highest countries in blockchain research, the search string further used the country name (in ‘country tag’). This search has been refined to limit the period from 2011 to 2020. The data was obtained from the date of publication till 27 April 2021. Data filtering has been completed manually to remove unrelated record entries. This analysis has been enriched by the utilization of various bibliometric tools, including Biblioshiny, VOSviewer, RStudio and BibExcel.

5. DATA ANALYSIS AND RESULTS

5.1 Document type information.

Figure 1 illustrates the various document types of information that contributed to blockchain technology research worldwide over the past decade. The predominant form of publication in blockchain research is journal articles, comprising 4276 publications (81.46%). Following journal articles, authors in the global blockchain technology research community commonly opt for the 'Review' publication type, accounting for 299 records (5.69%). Early Access publications are the third most preferred type, with 233 instances (4.43%), followed by Editorial Material with 215 records (4.09%), and Proceedings Papers with 60 publications (1.14%). Other types of publications are less prevalent in comparison.

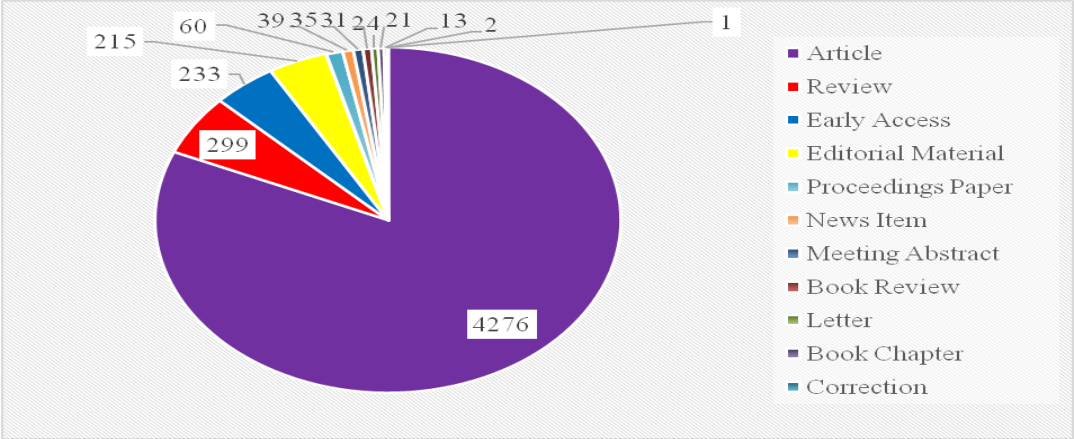

Figure 1: Document type information

5.2 Publications and citation trends

Between 2011 and 2020, global blockchain technology research has yielded a total of 5249 publications globally, with an average annual growth rate of 85.53%. Notably, the annual growth rate peaked at 184.80% in 2018. However, the average total citations per article were 63.18% in 2016, with an average of 12.63% per year. Conversely, in 2020, these figures decreased to 4.35% for average total citations per article and average total citations per year (refer to Table 1).

Table 1: Publications and citation trends.

Year	TP	Annual Growth Rate	Mean TC Per Art	Mean TC Per Year
2011	8	0	48.87	4.88
2012	15	87.5	46.73	5.19
2013	21	40.00	36.85	4.60
2014	32	52.38	26.15	3.73
2015	71	121.87	40.08	6.68
2016	92	29.57	63.18	12.63
2017	204	121.73	46.05	11.51
2018	581	184.80	34.75	11.58
2019	1462	136.48	15.10	7.55
2020	2763	81.00	4.35	4.35

TP= “Total Publications”, TC= “Total Citations”, Formula of Growth= “Final Value-Start Value/Start Value X100”

5. 3 Most Relevant Sources

From 2011 to 2020, a total of 5249 publications on global blockchain technology research were recorded across 1012 sources. Table 2 showcases the top 20 relevant sources for blockchain publications. IEEE Access leads with the highest number of publications at 582, followed by Sensors with 122 publications. Analysing the journal-wise distribution of research documents from Table 2, IEEE Access stands out with 582 research documents, 7461 total citation score, and respective h-index, g-index, and m-index scores of 40, 72, and 6.66, placing it at the top rank among the 20 journals. Sensors follow with 122 research documents, 1225 total citation scores, and h-index, g-index, and m-index scores of 19, 31, and 1.9, respectively, securing the second position. The IEEE Internet of Things Journal holds the third position with 112 records, 2367 total citation score, and respective h-index, g-index, and m-index scores of 24, 46, and 4.8. Lastly, the Computer contributes 35 records, 490 total citation scores, and h-index, g-index, and m-index scores of 8, 22, and 0.88, respectively, placing it at the lowest position.

Figure 2 illustrates a growing trend in blockchain research for Sensors and the IEEE Internet of Things Journal. Additionally, the subsequent section highlights the subject field that prompted investigators to embrace blockchain technology.

Table 2: Most Relevant Sources

S. No.	Sources	TP	TC	h-index	g-index	m-index
1	IEEE Access	582	7461	40	72	6.66
2	Sensors	122	1225	19	31	1.9
3	IEEE Internet of Things Journal	112	2367	24	46	4.8
4	Finance Research Letters	98	3333	29	55	4.83
5	Sustainability	97	631	13	21	2.6
6	Future Generation Computer Systems-The International Journal of Escience	95	2384	24	46	6
7	Applied Sciences-Basel	68	333	11	16	2.75
8	IEEE Transactions on Industrial Informatics	68	1984	24	43	4.8
9	Physica A-Statistical Mechanics and Its Applications	68	1009	18	29	3.6
10	IEEE Network	66	654	14	24	3.5
11	Electronics	61	234	8	12	2
12	Economics Letters	55	3224	25	55	3.57
13	Energies	51	441	11	18	1.22
14	IEEE Transactions on Vehicular Technology	42	466	11	20	2.75
15	Computers & Security	41	377	8	18	2
16	Plos One	40	1054	11	32	1.37
17	Research in International Business and Finance	40	618	14	23	2.8
18	Concurrency and Computation-Practice & Experience	39	73	4	6	0
19	IEEE Transactions on Engineering Management	37	125	6	8	3
20	Computer	35	490	8	22	0.88

TP= “Total Publications”, TC= “Total Citations”

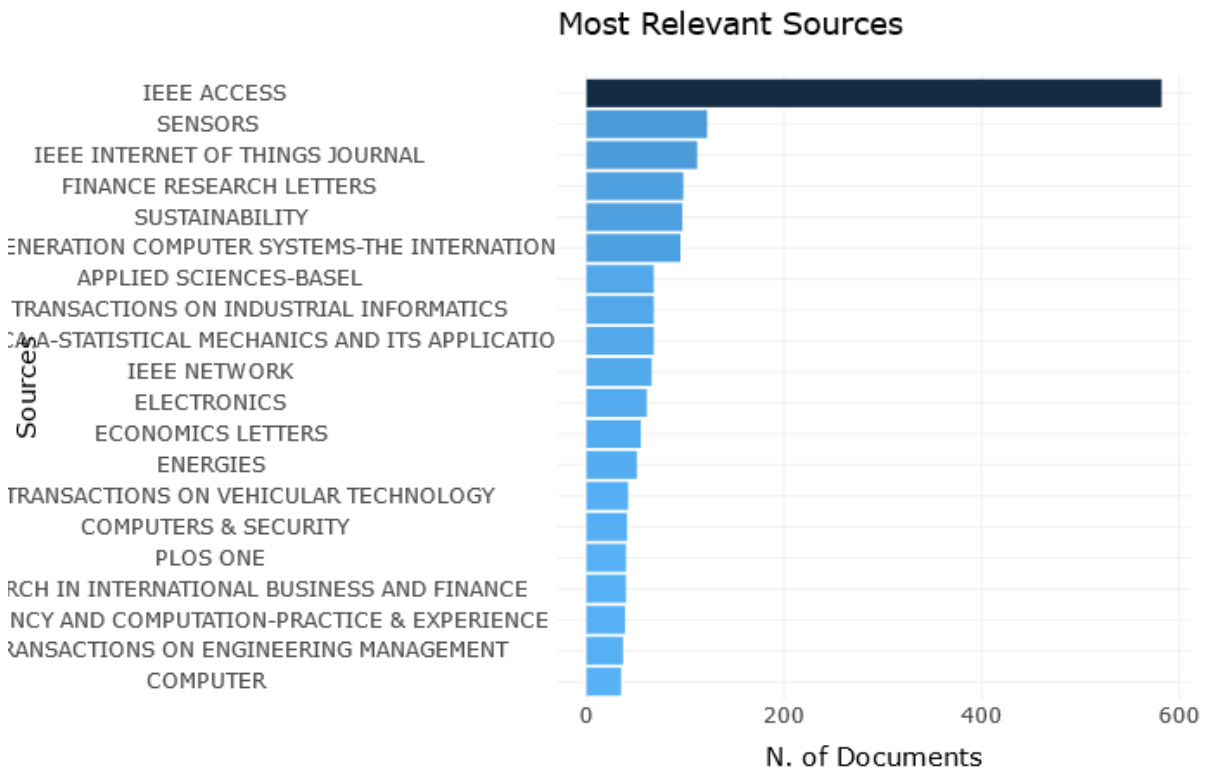

Figure 2: Most Relevant Sources

5.4 Top ten subject areas

Figure 4 reveals the distribution of the top ten subject areas in blockchain technology research output from 2011 to 2020. This analysis aids in identifying the focus and impact of researchers when publishing in their respective subject areas. The data indicates a substantial overlap among most subject areas. Notably, Computer Science leads with the highest number of publications at 1405 (26.78%), followed by Engineering at 987 (18.81%), Telecommunications at 602 (11.47%), and Business & Economics at 531 (10.12%). Other subject areas each contribute less than 2% of the total publications.

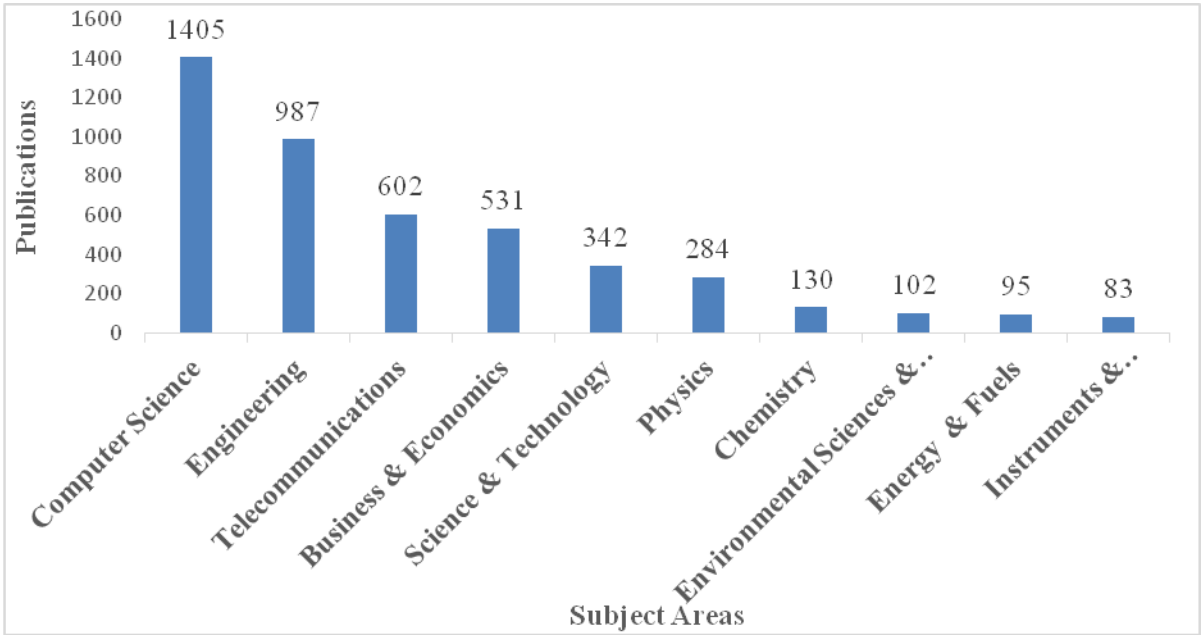

Figure 3: Subject areas of blockchain technology research

5.5 Most prolific authors

Table 4 highlights the top twenty prolific authors who have made significant contributions to blockchain research. In terms of the number of publications, Zhang Y emerges as the most productive author with 57 publications, followed by Choo KKR with 49, Guizani M with 36, and Kumar N with 34 publications. Zhang Y also holds the highest h-index, followed by Bouri E (19), Roubaud D (17), Choo KKR (16), and Gupta R (14). When considering g-index, Zhang Y leads with 43, followed by Bouri E with 33, Choo KKR with 31, Salah K with 30, and Guizani M and Park JH with 26. Additionally, the highest m-index is attributed to Roubaud D (3.4), followed by Choo KKR (3.2), Yu FR, Corbet S, and Salah K (2.75) respectively.

Table 3: Most prolific authors

S.No.	Author	TP	TC	h-index	g-index	m-index
1	Zhang Y	57	1857	19	43	0
2	Choo KKR	49	1037	16	31	3.2
3	Guizani M	36	703	12	26	0
4	Kumar N	34	567	12	23	0
5	Bouri E	33	1659	19	33	0
6	Salah K	32	947	11	30	2.75
7	Yu FR	32	555	12	23	3
8	Du XJ	29	631	10	25	0
9	Park JH	26	729	12	26	2.4
10	Wang J	28	596	12	24	0
11	Roubaud D	24	1603	17	24	3.4
12	Corbet S	23	918	12	23	3
13	Wang Y	23	328	8	18	0
14	Zheng ZB	23	797	10	23	0
15	Gupta R	22	855	14	22	0
16	He DB	22	422	10	20	0
17	Kim S	22	81	4	8	0.667
18	Tanwar S	22	348	12	18	0
19	Lee J	21	288	7	16	1.4
20	Li H	21	375	9	19	2.25

TP= “Total Publications”, TC= “Total Citations”

5.6 Top twenty contributing countries

Table 5 shows the number of research articles on blockchain technology published by top twenty contributing, with their frequencies, SCP, MCP, and MCP-Ratio. China leads with 1374 articles, accounting for 29.95% of the total, with 867 citations and 507 co-authors. The US follows with 564 articles, with 393 self-cited and 171 co-authored. Korea ranks third with 306 articles, with 93 co-authored and a MCP-Ratio of 0.304. The UK has 286 articles, with 126 self-cited and a MCP-Ratio of 0.441. Australia has 178 articles, with 82 self-cited and 96 co-authored. The

remaining countries have varying numbers of articles and corresponding SCP, MCP, and MCP-Ratio values, providing insights into the extent of self-citation and international collaboration in scientific research.

Table 4: Top twenty contributing countries

Country	Articles	Frequency	SCP	MCP	MCP-Ratio
China	1374	0.299542	867	507	0.369
USA	564	0.122956	393	171	0.303
Korea	306	0.06671	213	93	0.304
United Kingdom	286	0.06235	160	126	0.441
Australia	178	0.038805	82	96	0.539
India	151	0.032919	93	58	0.384
Spain	147	0.032047	99	48	0.327
Italy	137	0.029867	87	50	0.365
Germany	132	0.028777	88	44	0.333
Canada	110	0.023981	50	60	0.545
Japan	67	0.014606	49	18	0.269
Brazil	66	0.014388	49	17	0.258
France	62	0.013516	27	35	0.565
U Arab Emirates	61	0.013298	36	25	0.41
Netherlands	52	0.011336	34	18	0.346
Switzerland	51	0.011118	34	17	0.333
Greece	50	0.0109	29	21	0.42
Ireland	48	0.010464	20	28	0.583
Pakistan	47	0.010246	19	28	0.596
Saudi Arabia	43	0.009374	14	29	0.674

SCP= “Single Country Publication”, MCP= “Multiple Country Publications”

5.7 Top twenty cited countries

Table 5 presents the top twenty most cited countries in blockchain technology research, focusing on both total and average article citation values. The table lists total citations in descending order, with China leading, followed by the USA and the United Kingdom. Notably, certain countries received lower total citations but showed higher average article citation values. Lebanon (1394–53.62), Ireland (1986–36.78), and Austria (936–33.43) stand out in this regard, indicating that these three countries have a notable relationship between high-quality research publications in blockchain and their citation impact, despite a lower volume of publications. For the remaining 17 countries, there is a consistent relationship between total citation and average article citation, suggesting a balance between quantity and quality in their research output.

Table 5: Most cited countries

Country	Total Citations	Average Article Citations
China	14779	10.05
USA	12421	18.65
United Kingdom	6787	20.95
Australia	3787	19.32
Korea	3307	10.33
Germany	2646	17.52
Spain	2532	15.73
Ireland	1986	36.78
Italy	1897	12.73
Canada	1819	14.55
India	1510	9.74
France	1489	20.68
Lebanon	1394	53.62
Norway	1090	32.06
UAE	951	15.34
Austria	936	33.43
Netherlands	925	15.42
Pakistan	833	16.02
Japan	801	10.14
Brazil	703	9.76

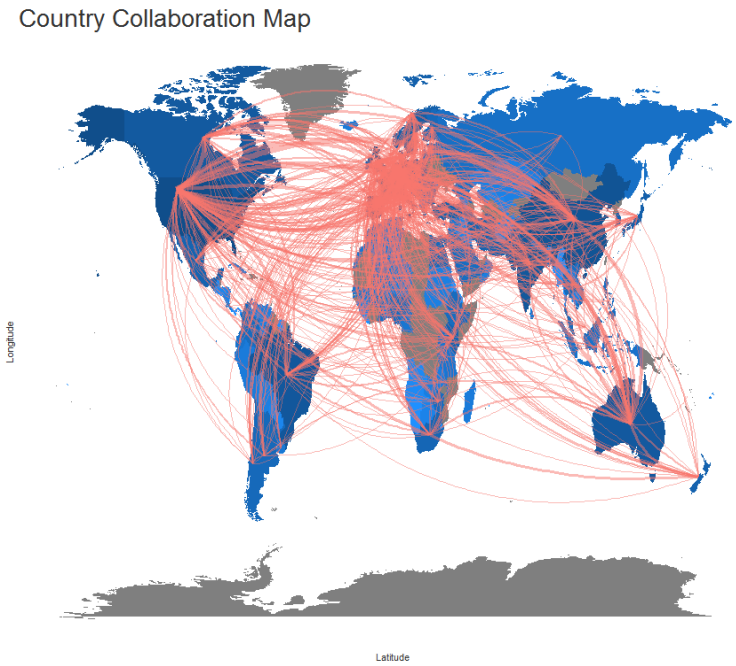

Figure 4: Word map collaboration

5.8 Top 20 most relevant affiliations

Figure 8 depicts the top 20 most relevant affiliations in blockchain technology research publications. China emerges as the dominant country in terms of both paper count and citation count. Beijing University of Posts and Telecommunication leads the list with 118 publications, followed by University of Electronic Science and Technology, China with 101 publications, Xidian University with 100 publications, and King Saud University in Beijing with 80 publications. The University of Texas, San Antonio, and Hong Kong Polytechnic University occupy the 5th and 6th positions, respectively, in blockchain research publications.

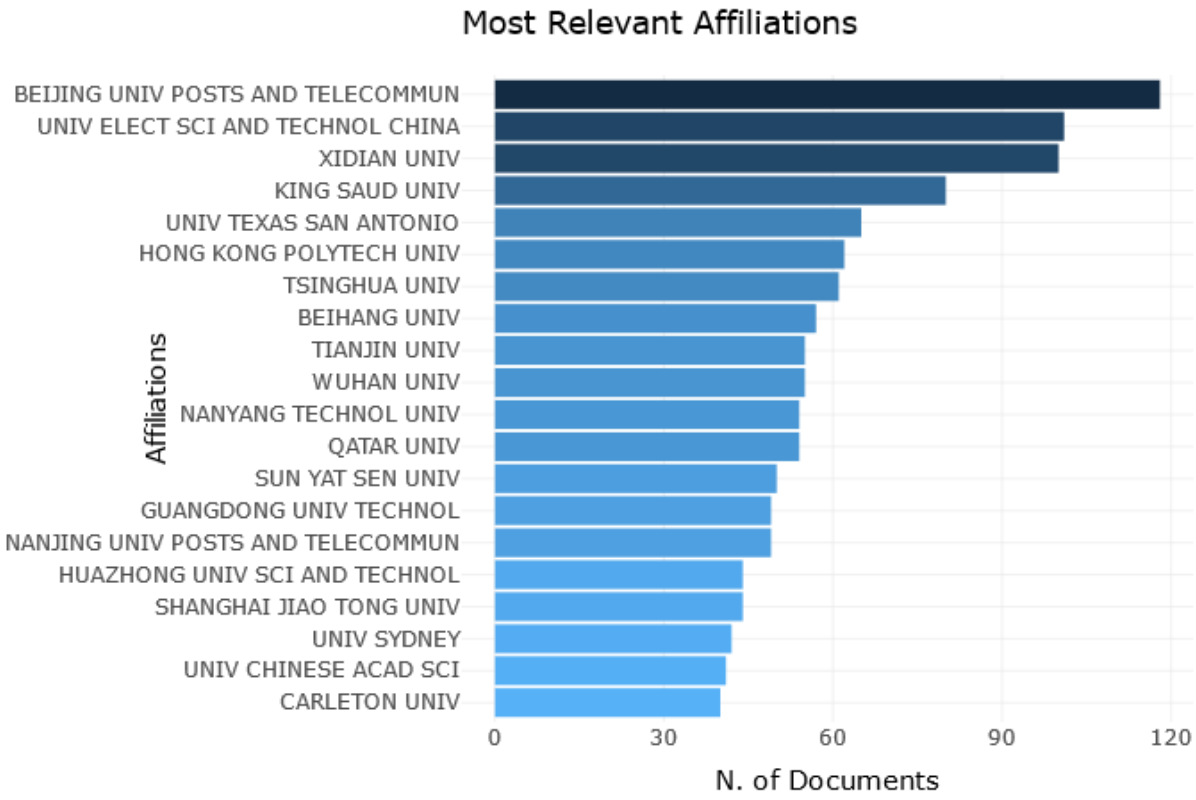

Figure 5: Top 20 most relevant affiliations

5.9 Factorial analysis of conceptual structure map-method

Figure 6 illustrates a conceptual structured map of the literature created using multiple correspondence analysis (MCA). This map is derived from a co-word analysis of the conceptual structure outline, which is based on the co-occurrence of words in research publications. The words analyzed include authors' keywords, keywords plus, and terms extracted from titles and abstracts of articles. Upon depicting the conceptual structure map, two clusters emerge. Cluster 1 (red) contains the most keywords, indicating that researchers have focused more attention on these subject matters for their studies.

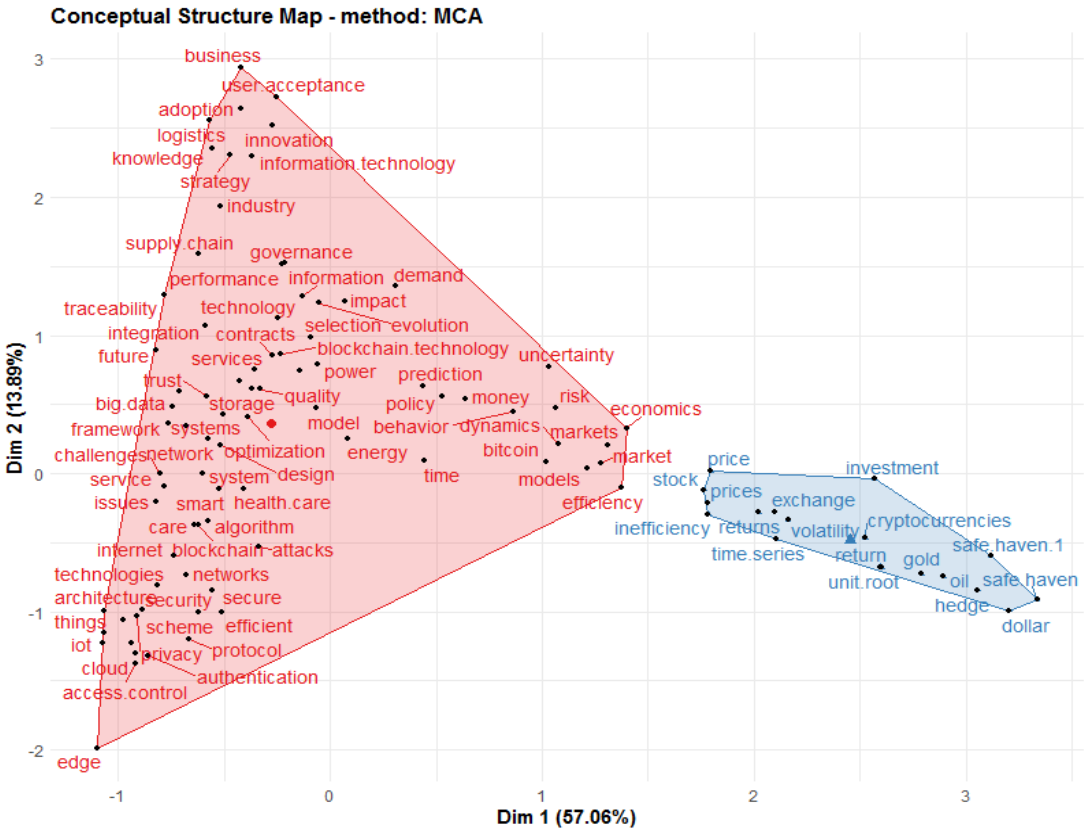

Figure 6: Factorial analysis of conceptual structure map

5.10 Most relevant keywords

Figure 10 examines the prominent keywords utilized by researchers in blockchain technology research. A total of 20 keywords were identified to analyze the growth trends in blockchain research. Table 6 lists these keywords in descending order of frequency of occurrences. Throughout the period from 2011 to 2020, the research focus was centered around keywords such as Blockchain (2516 occurrences, 40%), Bitcoin (700 occurrences, 11%), Cryptocurrency (355 occurrences, 6%), Security (325 occurrences, 5%), Internet of Things (276 occurrences, 4%), Smart Contract (239 occurrences, 4%), Privacy (237 occurrences, 4%), Smart Contracts (218 occurrences, 3%), Cryptocurrencies (190 occurrences, 3%), IoT (157 occurrences, 2%), Ethereum (152 occurrences, 2%), Blockchain Technology (143 occurrences, 2%), Cloud Computing (116 occurrences, 2%), Edge Computing (104 occurrences, 2%), Smart (100 occurrences, 2%), Authentication (95 occurrences, 2%), Contracts (94 occurrences, 1%), Distributed Ledger and Machine Learning (93 occurrences, 1%), and Supply Chain (90 occurrences, 1%). The authors utilized RStudio statistical software to visualize the research hotspots with frequently occurring keywords during the study period.

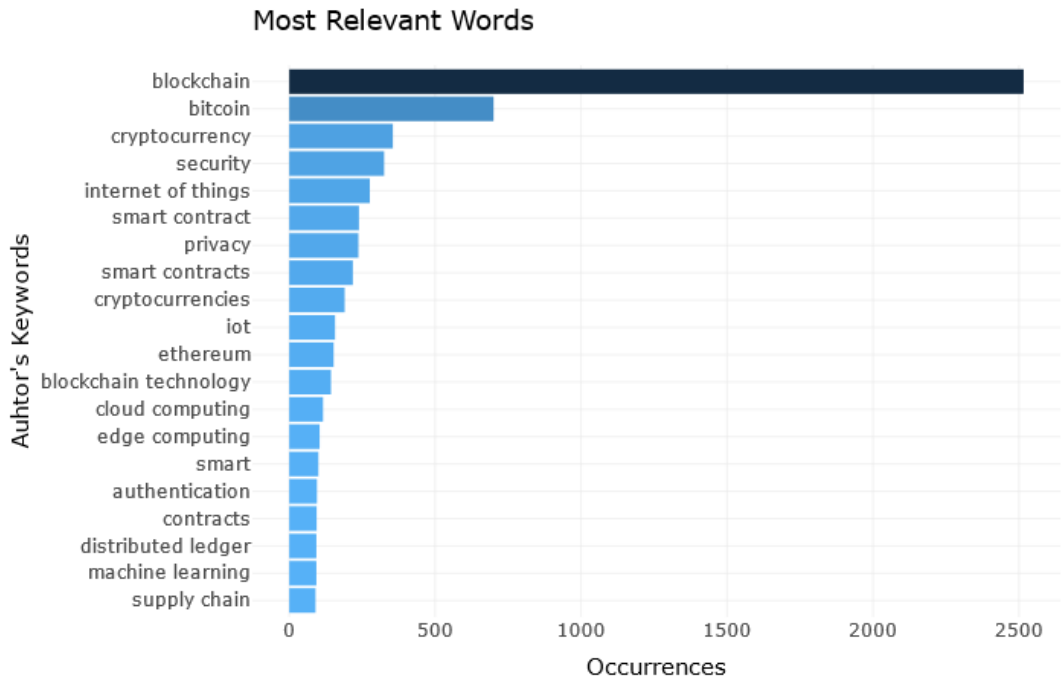

Figure 7: Most relevant keywords

5.11 Topic dendrogram

Figure 8 illustrates the topic dendrogram created from keywords, depicting the hierarchical relationships resulting from hierarchical clustering. This method is optimal for allocating objects to clusters based on the height at which objects are connected in branches. Initially, the researchers highlighted the keywords "contracts," "smart," and "contract" in the dendrogram. The remaining keywords encompass those commonly found in blockchain research articles (Parisa et al., 2021).

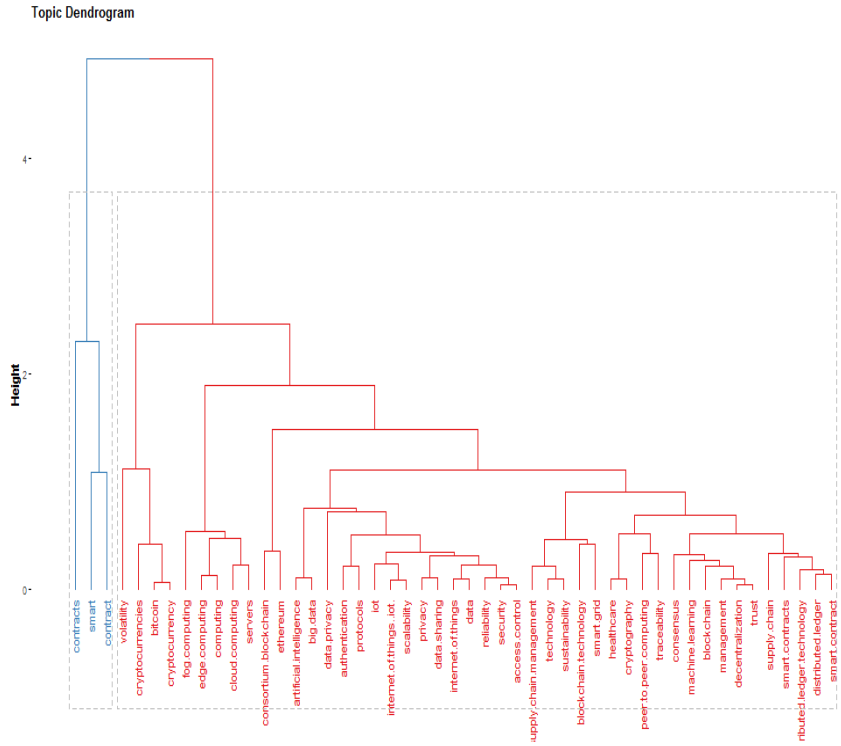

Figure 8: Topic dendrogram

5.12 Three-factor plots (countries, affiliations, and keywords)

Figure 12 illustrates that countries engage in blockchain technology research based on specific domains, often influenced by the availability of domain experts. For instance, China places significant emphasis on blockchain and the Internet of Things. Similarly, the USA concentrates on the Internet of Things, along with smart contracts, and cloud computing. The figure also indicates that certain affiliations specialize in blockchain within specific domains, likely based on their expertise. For instance, the University of Electronic Science and Technology, China, focuses on blockchain and the Internet of Things (IoT). Affiliations such as Beijing University of Post and Telecommunication, Xidian University, Guangdong University of Technology, and Beihang University demonstrate an interest in blockchain research. Regarding IoT, Chinese universities predominantly conduct research in conjunction with blockchain. King Saud University in Saudi Arabia concentrates on the Internet of Things, bitcoin, distributed ledger, and privacy. Similarly, the University of Sydney in Ireland is oriented towards cryptocurrencies, smart technology, and blockchain.

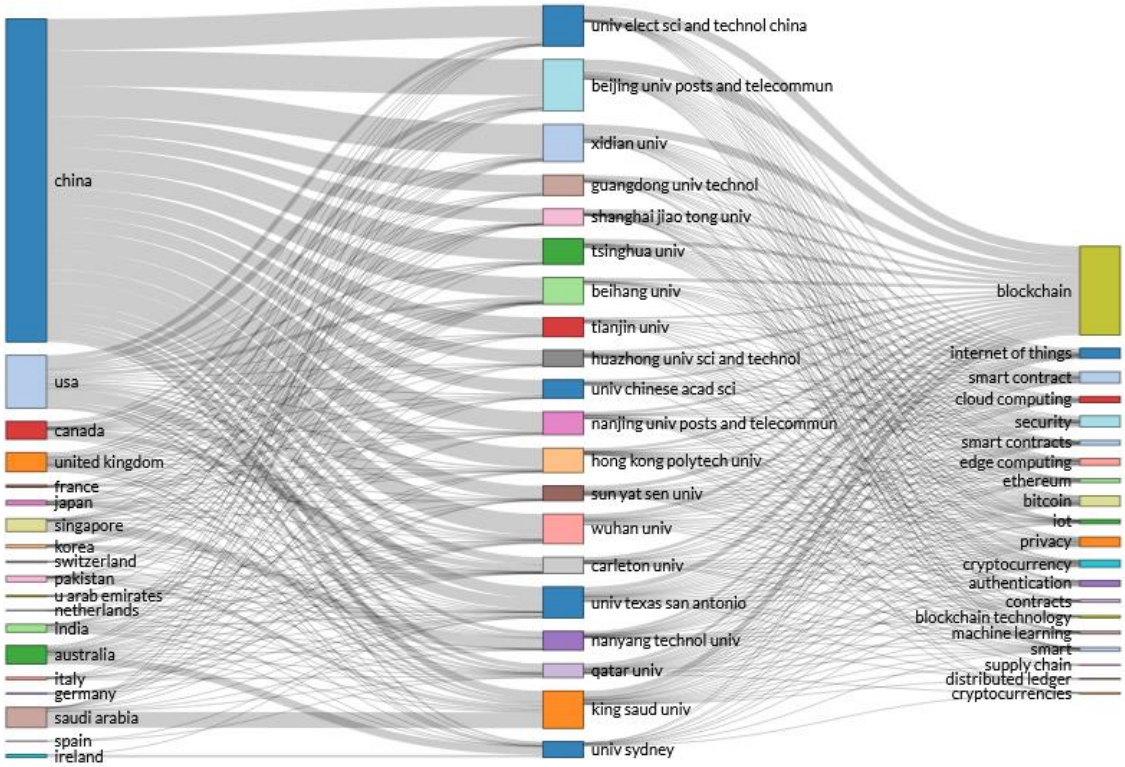

Figure 9: Three-factor plots (countries, affiliations, and keywords)

5.13 Author's co-citations network

The author's co-citation network relationship chart (Figure 13) was generated by selecting the top 50 documents with the highest citation frequency in each year from a dataset of 5249 articles. In this chart, each node represents an author, and the radius of the node corresponds to the citation frequency of all documents authored by that individual. A larger radius indicates a higher citation frequency, suggesting a more concentrated focus on a particular subject domain by the author. The color of the node signifies the author's first citation, with darker red and blue indicating a longer time span since the first citation to the article.

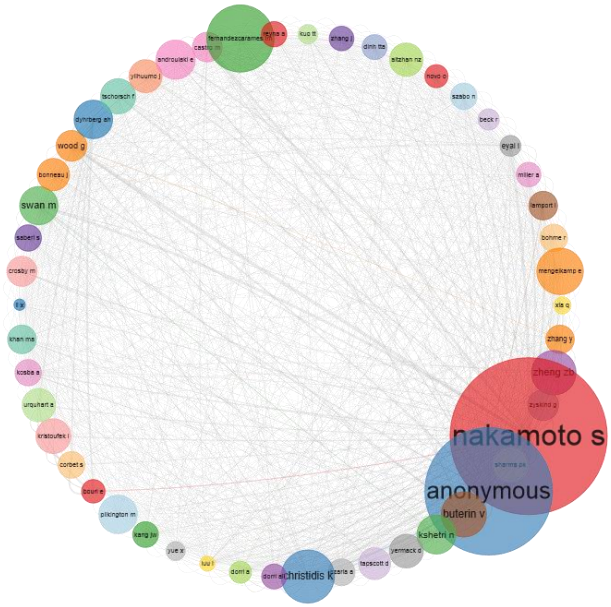

Figure 10: Authors co-citations network

DISCUSSION AND CONCLUSIONS

Blockchain, originating from Bitcoin and cryptocurrency, has garnered significant attention globally. Numerous studies have explored the application of blockchain technology to address the challenges in various fields. Despite this, there is a dearth of scientometric reports that provide diverse analytical perspectives in this domain. Our research focuses on the scientometric analysis of 4276 articles published on blockchain between 2011 and 2020. The average annual growth rate stands at 85.53%, with the highest growth recorded in 2018. Zhang Y is the most prolific author, contributing 57 publications, followed by Choo KKR with 49. China led in published articles, followed by the USA, Korea, the United Kingdom, Australia, and other countries during the study period. This study visualizes and maps global blockchain technology research (5249 records) from 2010 to 2020 using Web of Science data and employing selected quantitative and qualitative indicators. Journal articles constituted the majority (81.41%) of document types. In 2020, 2763 publications were recorded, reflecting the highest growth rate of 85.53%, with a peak in 2018 at 184.80%. IEEE Access has emerged as the most influential source, with 582 publications, 7461 citations, an h-index of 40, a g-index of 72, and an m-index of 6.66. Computer science dominates blockchain research, with 26.78% of publications. Zhang Y, with 57 articles, garners 1857 total citations.

China (1374) and the USA (564) led the number of papers published, while India ranked sixth with 151 publications. Beijing University of Posts and Telecommunication contributed the most (118). The keyword 'blockchain' appears 2516 times (40%). The study includes a topic dendrogram of keywords, a three-field plot among countries, affiliations, keywords, and a co-citation network analysis of blockchain research output.

This study anticipates the continued rise of blockchain technology in the global banking and financial sectors. The increasing number of blockchain researchers in Europe suggests more publications in the future, with active involvement from the surrounding countries. Collaboration in blockchain research is expected among Asian countries, particularly focusing on combining blockchain with the IoT. Additionally, this study highlights the exploration of blockchain beyond digital currency, emphasizing the use of algorithms and consensus mechanisms in research.

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