A Systematic Review and Bibliometric Analysis of Blockchain Application in Consumer Service

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Abstract

The potential of blockchain to modify and innovate established business structures and frameworks has received widespread attention. As a result, academics and industries are increasingly interested in how this technology might be used in consumer services and operations. Although research into the application of blockchain in consumer services has gained traction, there is a scarcity of comprehensive summaries in the literature. Hence, this bibliometric analysis, combined with a systematic review, aims to convey qualitative and quantitative knowledge on the ever-evolving subject of blockchain application in consumer services in an organized manner. Specifically, this paper analyses: 1) the current publication trends in studies devoted to blockchain-based applications for consumers, 2) the most important publications and themes of research in this field, 3) the evolution of blockchain in customer service over the years, and the most current trends in this field, 4) the advantages and challenges of incorporating blockchain technology into consumer services, 5) gaps in the existing literature that future researchers should investigate. The review includes 727 documents after searching for scholarly publications in two databases (Web of Science and Scopus) and choosing documents based on their relevance to the stated goals.

Keywords: consumer services, bibliometric analysis, blockchain, systematic literature review, industry 4.0, economic change

1. Introduction

Ever since the concept of blockchain was first proposed in 2008, there has been a surge in interest in blockchain technology (Chen, 2018). It is a fast-evolving technology changing the consumers interaction with businesses (Antonio and DiNizo, 2018), and predicted to be a game-changer (Raddatz et al., 2021), having numerous practical applications, and can assist boost, efficiency value, and transparency (Gupta, A., 2018; Howells, 2020). It is thought to be promising, emerging, and innovative and has a significant impact on the society and industry (Chen, 2018, Huh & Kim,

2019, Tijan et al., 2019, Samaniego & Deters 2016, Tsai et al., 2016). A blockchain is made up of cryptocurrency blocks linked together by chains (Nakamoto S., 2008), where each block comprises a cryptographic hash of the previous block, a timestamp, and transaction data, all bound by cryptography (Gupta, A., 2018). It has significantly affected traditional business processes since services and transactions that previously required centralized systems or trusted third parties to authenticate them, can now operate in a decentralized way with the same level of confidence (Casino et al., 2019). Without a third-party organization, blockchain provides privacy, confidentiality, and data security (Hou, J. et al., 2020; Patki. A., & Sople. V.,2020). Blockchain-based transactions are driving interest in the technology, which opens up new research fields, particularly in terms of technological hurdles and constraints (Casino et al., 2019). It is a data storage system that aims to ensure data privacy and transaction integrity (Gupta, A., 2018), and it's also significant for tracking product quality and responding to product safety issues (Fan et al., 2020).

Since consumers' awareness highly influences global economic markets and systems (Mittal, 2015), in the consumer products industry, authenticity and traceability of consumer goods are becoming increasingly important (Schlegel et al., 2018) and are significantly changed by blockchain (Greenspan G., 2021). It's a way for consumer goods companies where they can differentiate themselves from the competitors (Fan et al., 2020). Consumers are interested in where a product comes from and whether it was made in an environmentally friendly manner (Christidis & Devetsikiotis, 2016) and also include concerns like security, transparency, transaction traceability, and control over their data. Companies are constantly researching new solutions to guard against attacks and protect customer data as data breaches and cyber disasters become more prevalent (Raddatz et al., 2021; Treleaven et al., 2017). As a result, blockchain is predicted to kick-start the industrial and commercial revolution while also promoting global economic change (Underwood, 2016, Christidis and Devetsikiotis, 2016, Greenspan G., 2021).

There are several studies on blockchain technology (Brandão et al., 2018), yet the current state of blockchain-enabled applications in consumer services has received little attention. In 2018, it was revealed that blockchain-based consumer solutions exist (Schlegel et al., 2018) but that the present status and systematic assessment are lacking, suggesting the need for more comprehensive and up-to-date research despite the blockchain privacy protections. This paper demonstrates a bibliometric analysis and systematic review of the blockchain, its benefits, and development in consumer services and further investigates critical challenges in their development with the following questions outlining the scope of the study.

RQ1. - What are the recent trends in the publication of blockchain applications for consumer service in terms of time, authors, journals, associated countries, institutions, and type of economy?

RQ2. –What are the most impactful publications and research themes in this field?

RQ3. –What has been the evolution of blockchain in customer service over the years, and what are the most current trends in this field?

RQ4.- What are the advantages and challenges of incorporating blockchain technology into consumer services?

RQ5. – What are the research gaps and topics that need to be addressed in the future?

The remaining part of this paper follows the sequence as: Section 2 discusses the methods of analysis and data retrieval, the findings on worldwide evidence and publication trends are covered in Section 3, Section 4 presents the citation network, the analysis of keywords is covered in Section 5. Section 6 covers the co-citation analysis, while Section 7 details the advantages of incorporating blockchain into consumer service, Section 8 delineates the challenges of Blockchain, Section 9 discusses the future research directions. Finally, the study is concluded in Section 10.

2. Methodology

2.1 Database, Keywords, and Inclusion Criteria

The sample database was created by searching the Scopus database and papers in the Web of Science (WoS) database as it is best suited for bibliometric as it contains publications in top-tier journals (Korom, 2019; Bonilla, C., 2015). The search was undertaken in August 2021, and data for the years 2015 to 2021 were analyzed. Table 1 lists the search options and their descriptions. Table 2 shows the summary of extent reviews in the blockchain application in consumer service domain since 2015 to 2021. A technique that could provide a higher level of accuracy in determining the sample database was utilized. PRISMA principles established by Moher, Liberati, Tetzla, and Altman (Moher et al., 2009) were followed. According to their findings, four phases are involved in identifying and extracting data for a bibliometric review using the PRISMA approach. The initial stage of the PRISMA is to identify articles that are relevant to blockchain and customers.

Due to the large number of studies published, the WoS and Scopus databases for articles with "blockchain" and "consumers" in the keywords, title, or abstract were used. The exact search revealed that 1355 journal articles used these keywords. Documents written in English were examined, and as a result, 29 articles were deleted. Among the selected publications, we detected and removed 279 duplicates. The remaining articles were then studied to see if they were related to the objective of the paper by reading their titles and abstracts. 156 publications were subsequently removed from the study based on their titles because they were from different disciplines of study. All authors of this paper personally examined each abstract in the second round of screening to see if the search results fit the standards. In the third screening phase, the complete text of each surviving article was downloaded and reviewed to determine its eligibility. Finally, bibliometric studies were performed on 727 publications. The stages of the study choosing different process explained above are detailed in figure 1. A systematic and bibliometric evaluation of the literature was conducted to find solutions to the research questions. The extracted 727

journal publications were converted in a file format for further analysis using the software "R" and "Vosviewer".

Table 1: Search options and databases

Database	**Options for searching**
Scopus	Search in: Article Title, Abstract, Keywords
	Document type: Article
	Source type: Journal
	Subject area: Business, management and accounting; social sciences; environmental science; economics and finance.
	Data range: 2015-2021
	Language: English
Web of Science (WoS)	Search in: Topic
	Document type: Article
	Citations databases: all
	Data range:2015-2021
	Language: English

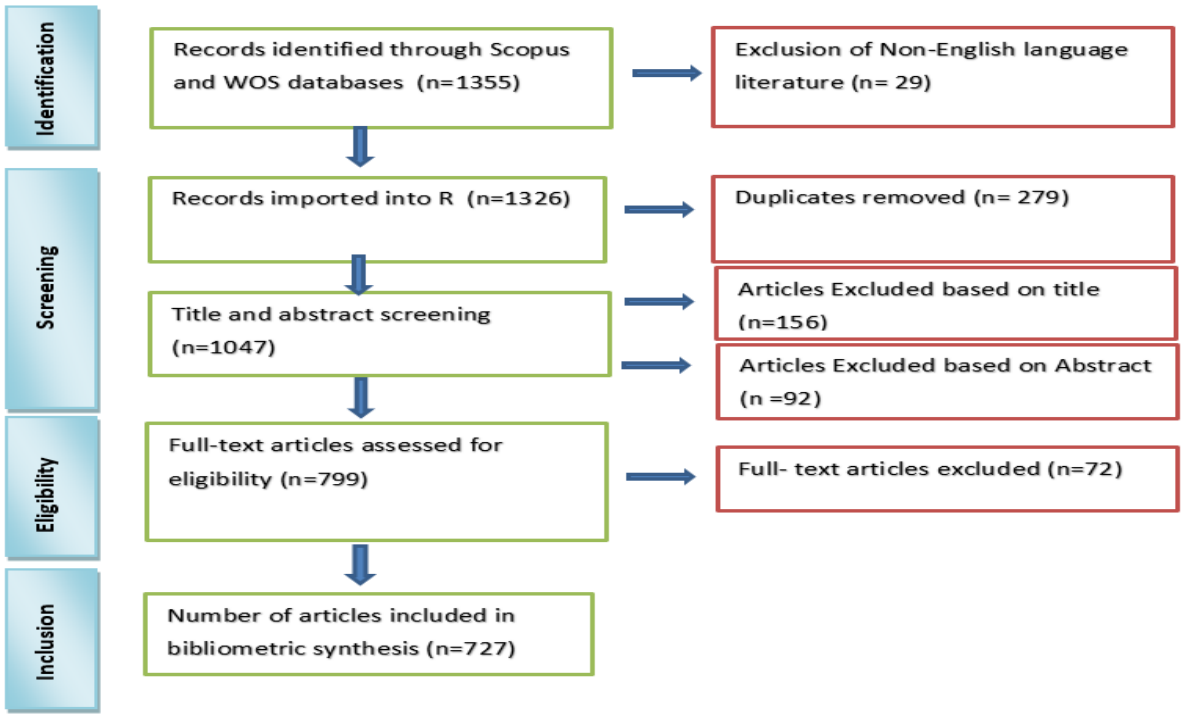

Figure 1. The PRISMA flow diagram showing the data retrieval process

Table 2: Summary of extent reviews in the blockchain application in consumer service domain (2015 – 2021)

Author(s)	**Scope of review**	**Type of Study**
Boukis, A (2019)	Implications of blockchain technology adoption for brands and consumers	Review + Conceptual
Raddatz N., et al. (2021)	Factors and attributes which influence consumers' intention to switch to blockchain-based applications.	Review
Schlegel M. et al. (2018)	Overview of how the blockchain affects consumers	Review
Lin X, et al. (2021)	Intentions' influenced factors of blockchain food traceability system for Chinese consumers	Empirical
El-Dosuky M & Eladl G (2021)	Business model to deal with warranties of products bought by clients	Review + Cnceptual
Fan Z, et al. (2020)	The optimal pricing strategies of the supply chain considering the traceability awareness of consumers	Review
Gatteschi V. et al (2019)	Blockchain based applications for consumer electronics	Review

Lu C. et al (2020)	Evaluation of consumers intentions to adopt blockchain based personal health records	Empirical
Fell M, et al (2019)	Evaluation of consumer demand for blockchain enabled peer to peer electricity trading	Empirical
Mazzu M, et al (2021)	Measuring the effect of Blockchain extrinsic cues on consumers perceived flavor and healthiness	Empirical
Pérez-Sánchez M, et al (2021)	Evaluation of consumer loyalty through the use of modern and efficient Blockchain technology.	Empirical
Nam S, (2018)	Analyzing the relationship with socio-economic characteristics of the consumer for blockchain	Empirical
Salah K, et al (2019)	Blockchain-based System for Online Consumer Reviews	Review
Bulbul S and Nce G (2018)	Design of a blockchain-based customer loyalty program	Review +conceptual
Longo F, et al (2020)	Estimating the impact of blockchain adoption in the food processing industry and supply chain	systematic literature review
Gurtu A and Johny J (2019)	Evaluation of potential of blockchain technology in supply chain management	systematic literature review

2.2 **Analysis Method**

Researchers can use bibliometric tools to help them perform more systematic literature review by narrowing the search to the most important publications and by objectively mapping the study field (Glanzel, W. 2005; Zupic, I., & Ater, T., 2015; Paul & Benito, 2018; Rosado-Serrano et al., 2018; Gilal et al., 2019). The bibliometric technique is used to find the most frequently cited authors, research documents, and most cited contributions from the countries and institutions in question (Paul and Bhukya, 2021; Randhawa et al., 2016; Knoll & Matthes, 2017; Paul & Mas, 2019). Systematic literature reviews are utilized to compile a summary of the literature, limit bias, and identify potential research needs (Paul & Benito, 2018; Satinsky, E.N., 2021; Kumar et al., 2019; Dabić et al., 2020). In this research, a combination of systematic literature review and bibliometric is followed as a quantitative technique to characterize, assess, and track published studies to achieve knowledge of the published work in the emerging field of blockchain in consumer services. The research begins with a summary of primary bibliometric data and progresses to a thorough examination of two topics. The first is performance analysis, which uses bibliographical indexes built from citation data and author-related data to analyze numerous criteria (author, affiliations, nations, and so on) (Narin & Hamilton 1996; Broadus, 1987; Singh, S. et al., 2020). Second, it goes over science mapping analysis (SMA), which collects data using network mapping to map research disciplines' social and cognitive structures (Fagerberg et al., 2018; Landstrom et

al.,2012). Additionally, co-citation for clustering, content analysis, and keyword analysis are also used (Xu et al., 2018). We used the "biblioshiny" function of the "Bibliomertix" package in R studio. It's ideal for mapping scientific studies at a time when empirical research is a constant focus and is producing significant quantities of newer research streams (Aria and Cuccurullo 2017).

3. Findings

Section 3.1 to 3.5 gives a review of the current publication trends in blockchain application for consumer service in terms of time, authors, journals, institutions, and associated countries, and type of economy, hence outline the answer to research question 1.

3.1 International Evidence of Blockchain Application in Consumer Service

The term 'blockchain technology' has been in use in the IT-sphere since 2008. The first application it made was for bitcoin (Pilkington M, 2016), and because of the rise of bitcoin, it has become famous for use in various industries (Jaoude & Saade, 2019; Chang et al., 2020). The concept of a decentralized ecosystem and a digital ledger can be implemented in various additional applications in many industries, making blockchain research even more intriguing (Yli-Huumo J et al., 2016). There is substantial proof that blockchain is a spectacular, innovative technology that will transform the way people transact. Thanks to its capacity to ensure trust among unknown players, ensure the immutability of records, and eliminate the need for mediators (Makridakis and Christodoulou, 2019). Today, more than 50 major blockchain firms have a primary mission to disrupt traditional sectors by utilizing blockchain technology[1]. Global investment in blockchain solutions is expected to reach $15.9 billion by 2023 (Makridakis and Christodoulou, 2019); the banking industry will dominate worldwide blockchain spending, accounting for around 30% of overall investment, followed by healthcare, insurance, fintech, and food according to the IDC Report, 2019[2]. Service organizations actively implement or test emerging technologies to revolutionize how they do business, but client participation has become a vital element of the service creation process (Boukis, A. 2020). Governments may considerably benefit from blockchain in most of the operations and services they give to their residents, lowering charges and increasing quality (Christodoulou, P. et al., 2018). Estonia is one such example, where early implementation of the technology has demonstrated promising results. Approximately 99 percent of government services are available online 24 hours a day, seven days a week, and the transition to digital technologies has saved almost 1400 years of time resources (Makridakis and Christodoulou, 2019).

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[1] Martin, R. (2021). 50+ Blockchain Startups Transforming the Digital World - Ignite Ltd. Retrieved 9 November 2021, from https://igniteoutsourcing.com/blockchain/top-blockchain-startups-to-watch/

[2]International Data Corporation. New IDC Spending Guide Sees Strong Growth in Blockchain Solutions Leading to $15.9 Billion markets in 2023. 2019. Available online: https://www.idc.com/getdoc.jsp?containerId=prUS45429719

3.2 **Trend of Publication in Time**

The number of studies has increased over time, as seen in figure 2. The first study in the review was published in 2015. There were few studies on the subject before 2017, but after that, there was a dramatic growth in the number of studies, which peaked in 2020. This trend indicates that blockchain application in consumer service research is becoming more popular. The core qualities of blockchain are that it provides anonymity, confidentiality, and data integrity without a third-party organization's involvement in the transactions. The driving interest in the technology also opens up new research fields and accompanying technological hurdles and constraints (Yli-huumo et al., 2016). The number of articles published has increased from one article in 2015 to 231 in 2020. Since 2018, the number of publications has steadily increased. The annual percentage growth rate is 139.98. demonstrates that researchers are interested in learning more about the use-cases and potential effects of blockchain technology on consumers.

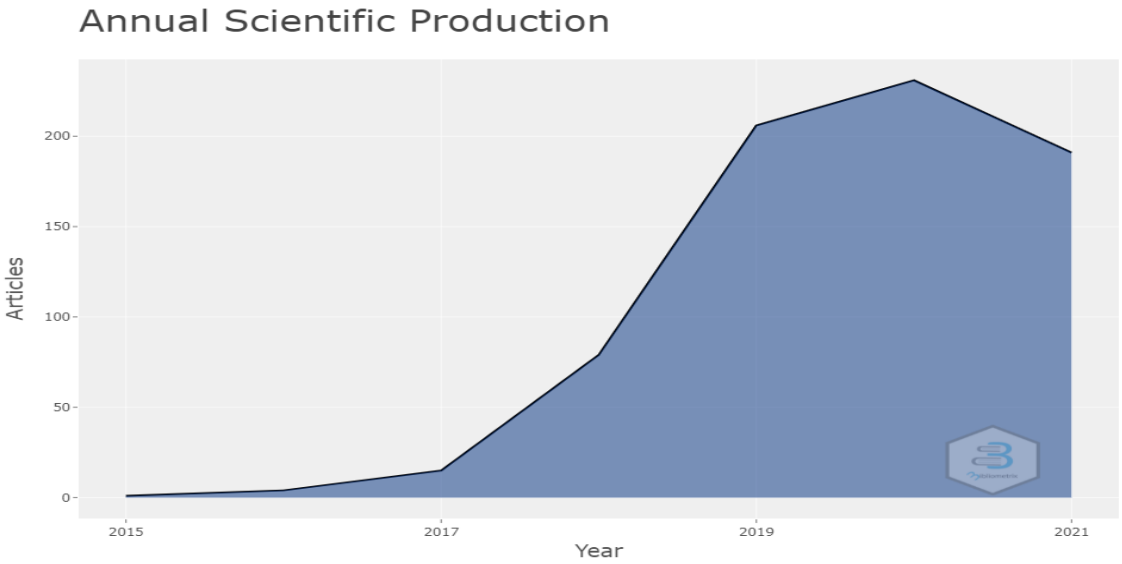

Figure 2. Annual publication trend from 2015-2021. *Source: Authors' elaboration using Biblioshiny*

3.3 Publication Outlets

The 727 papers examined were published in 453 different journals. Table 3 shows a list of some of the most well-known journals that publish articles on blockchain applications in consumer services. The top 15 journals published 155 papers, accounting for 21.32 percent of the total. IEEE consumer electronics magazine is the most productive platform, publishing 22 articles, followed by the lecture notes in computer science, the study's 727 papers were published in a variety of journals. There are a lot of technological journals.

Figure 3 presents that the subject of blockchain in consumer services is linked well not only to computer science but also to subjects like mathematics, social science, environmental science, engineering, and energy. This indicates that the subject is multidisciplinary, but there is a paucity of research in other subjects, particularly physics and economics. There are very few papers on blockchain applications in the field of physics and astronomy.

Table 3: Leading journals publishing on blockchain applications in consumer services

Journal Name	**Publisher**	**Total Production**
IEEE consumer electronics magazine	IEEE Xplore	22
Lecture notes in computer science (including subseries lecture notes in artificial intelligence and lecture notes in notes in artificial intelligence and lecture notes in bioinformatics)	Springer	21
Advances in intelligent systems and computing	Springer	15
IEEE access	Institute of electrical and electronics engineers	15
ACM international conference proceeding series	ACM	14
Lecture notes in networks and systems	Springer	12
Sustainability (Switzerland)	MDPI	10
Communications in computer and information science	Springer Verlag	8
E3S web of conferences	EDP Sciences	6
IOP conference series: earth and environmental science	IOP Publishing	6
Proceedings of the annual hawaii international conference on system sciences	IEEE	6
EAI/springer innovations in communication and computing	Springer Nature Switzerland AG	5
Energies	MDPI	5
International journal of production research	Taylor and Francis Ltd.	5
Studies in computational intelligence	Springer Verlag	5

Source: Authors' elaboration using Biblioshiny

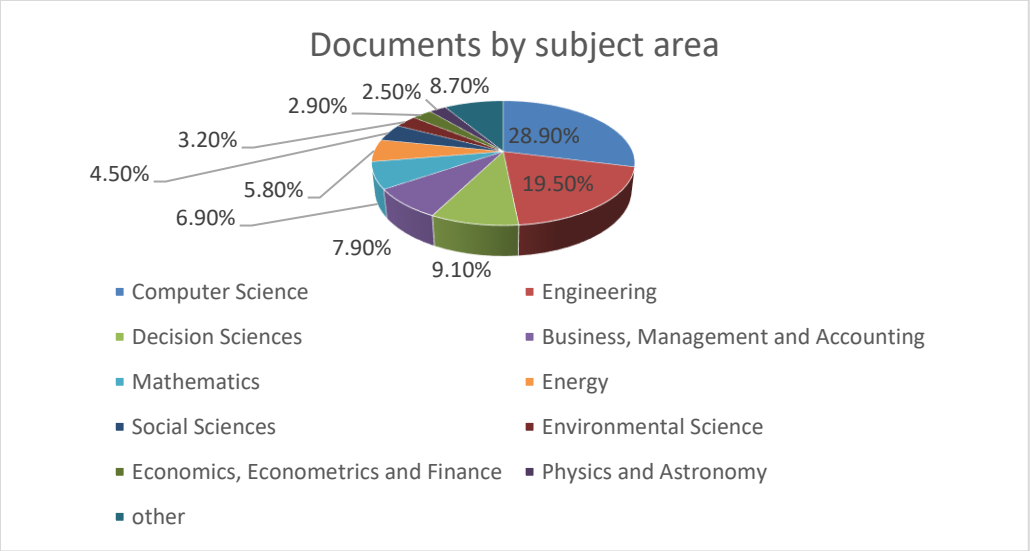

Figure 3. Top disciplines of blockchain in consumer services research in 727 papers

3.4 Productive Authors and their Associated Institutions and Countries

Based on our data, 2117 authors, associated with 991 institutions spread across 66 nations, have published papers on blockchain applications in consumer services. The top contributors are listed in table 4 based on the number of publications and shows the top 15 most known authors who have been publishing papers on blockchain application in consumer services research between 2015–2021. The top 4 most relevant authors in the list are Javaid N (n = 7), Liu X (n = 6), Na N (n = 6), and Zhang X (n = 6). Choi T and Kumar N have received the highest number of citations- 205 and 113, respectively, followed by Zhang X (69) and Javaid N (48). This sample includes a considerable corpus of research on blockchain application in consumer services, as these 15 authors have written 60 publications and got 630 citations between them.

Table 4 also presents the most productive universities from 2015-2021 in terms of quantity and quality of publications. The most active institutions working on Blockchain are Hongkong polytechnic university (n=9), Beijing University of Posts and telecommunications (n=8), North Eastern University (n=7), followed by IBM research (n=6), University of Cagliari (n=6), University of Guelph (n=6), and the University of Lyon (n=6). The table also lists the top countries where the authors have written on blockchain applications in consumer services. China (119 articles), India (87 articles), and the USA (85 articles) lead in publications in this domain.

The future of blockchain technology in China did not appear bright when the Chinese government effectively banned cryptocurrencies in 2017. However, President Xi Jinping fundamentally changed the game in 2019. The Blockchain Service Network, China's own "internet for blockchain," was established more than a year later. Several public and private organizations have used blockchain in a variety of applications, including travel, remittances, and cross-border settlements (Haldane, 2021).

In the areas of cross-border payments, trade finance, bill discounting, loyalty, supply chain financing, and digital identification, many Indian companies have experimented with blockchain technology. (Deloitte, 2021). The table demonstrates that many areas have yet to engage in blockchain research. Blockchain research is still in its early stages in countries like Indonesia, Malaysia, Spain, Brazil, Greece, and Bangladesh.

Table 4: Top authors, associated affiliations, and countries publishing on blockchain in consumer services

Authors	TP	TC	Affiliations	TP	Country	TP	TC
Javaid N	7	48	The Hong Kong polytechnic university	9	China	119	615
Liu X	6	8	Beijing university of posts and telecommunications	8	India	87	90
Na N	6	4	Northeastern university	7	USA	85	1017
Zhang X	6	69	Notreported	7	South Korea	45	153
Choi T	5	205	IBM research	6	UK	35	265
Kumar N	5	113	University of Cagliari	6	Germany	34	615
Lee J	5	14	University of Guelph	6	Italy	34	70
Li J	5	4	University of Lyon	6	Australia	21	354
Liu Y	5	2	Bina Nusantara University	5	France	17	76
Singh S	5	36	Comsats University Islamabad	5	Canada	15	138
Wang J	5	127	National university of defense technology college of computers	5	Pakistan	14	17
Zhang Y	5	40	Ryerson university	5	Saudi Arabia	14	60
Chen H	4	110	Tsinghua University	5	Japan	13	0
Chen J	4	66	University at Buffalo	5	Portugal	12	18
Chen X	4	14	University of British Columbia	5	Indonesia	11	16

***TC- total citations, TP- total publications. *Source: Authors' elaboration using Biblioshiny*

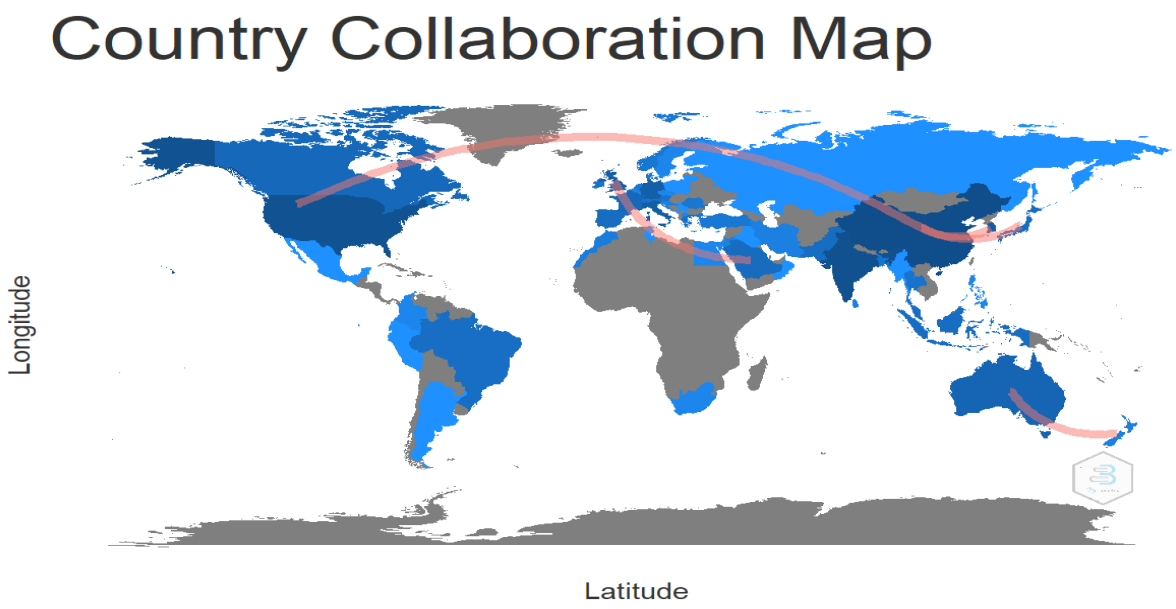

Figure 4. Country collaboration map. Source: Authors' elaboration using Biblioshiny

The global collaborations are depicted in figure 4. On the map, the blue color represents the country's research collaboration. The pink band that connects the states also shows the level of collaboration amongst the authors. It's fascinating to see how the countries with the most blockchain publications have collaborated in this way. Countries like Australia and New- Zealand, China and Japan, China and Korea, China and USA, UK and Saudi Arabia are collaborating with each other. Most significant collaborations are amongst countries that are often extremely far apart, and as a result, they were not able to develop the theme, but the collaboration can possibly lead to market collaboration and policy exchange.

3.5 Sample Statistics

The literature for this study was divided into two groups based on the country's economy in which it was conducted: developed and under developing. Figure 5 reveals that 51 % of the 727 studies were undertaken in developed countries, whereas 49 % were conducted in developing countries. The number of studies on blockchain application in consumer services is almost equal in both developed and developing countries because developing countries like India, China, and others are discovering a growing number of uses for blockchain technology, such as the decentralized ledger technology that promises a safe, peer-to-peer mechanism for authenticating information (Knowledge@Wharton, 2021). However, in comparison to developed nations, significantly more work on the subject is needed in developing countries to improve legislative proposals on blockchain.

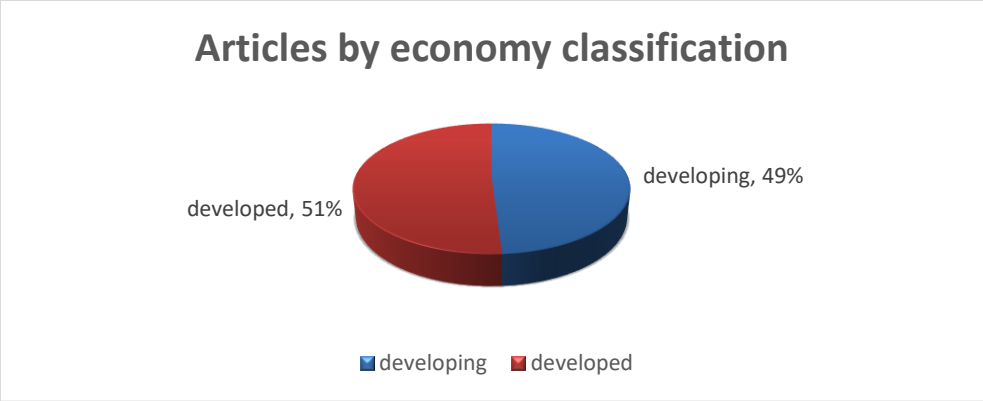

Figure 5. Sample statistics of 727 articles based on the country's economy

4. Citation Network Analysis

The best way to map the impact of a research paper is to use citation analysis (Tsay, 2009). When an article is widely cited, it is thought to have a greater impact on a particular topic than less cited studies (Merigo et al., 2016). This section deals with providing answers to research question 2. Table 5 lists the ten most globally cited papers on blockchain. Local citations are not available as these papers are not cited locally. According to the global citations, (Nakamoto S., 2008) top the list with 60 citations, followed by(Christidis & Devetsikiotis, 2016) with 32 citations and (Toyoda, K. et al., 2017) with 15 citations.

(Nakamoto, S., 2008) paper is highly cited as Nakamoto invented the electronic cash that is fully peer-to-peer and would allow internet remittances to be transmitted directly from one party to another without passing through a banking institution and using a peer-to-peer network. It provides a solution to the double-spending dilemma. Satoshi Nakamoto, the eponymous creator of Bitcoin, created the Genesis Block in 2009, kicking off the current cryptocurrency bubble. The second highly cited paper is that of (Christidis & Devetsikiotis, 2016) demonstrates how a blockchain-IoT combination: (1) supports the sharing of resources and services, resulting in the formation of a marketplace of services across devices; and (2) allows us to automate various existing, time-consuming activities in a cryptographically verifiable manner. Despite the fact that our research is focused on consumers services, these two studies are essential for any study of blockchain, whether or not it is focusing on consumers.

There are two studies that conducted a review of the literature among the top 10 most cited ones are Toyoda, K. et al., 2017 and Saberi, S., et al., 2019. (Toyoda, K. et al., 2017) present a novel product ownership management system (POMS) for RFID-attached products that can be used in the post-supply chain to combat counterfeiting. Even if the RFID tag information is authentic, a consumer can reject to buy counterfeits if the seller does not give their ownership information after using Bitcoin's blockchain concept. (Saberi, S. et al., 2019) studied the potential use of blockchain technology and smart contracts to supply chain management in terms of consumers, global and local government, and community. According to (Aung & Chung, 2014), customers want more real-time information about the items they buy and eat, and this will be one of the food industry's

competitive advantages. Since the food sector is evolving to become more customer-centric hence, this paper provides detailed information on food supply chain traceability in terms of food safety and quality. The study shows that if consumer demand, market forces, and government regulations all come together to create a new degree of supply chain visibility, food traceability from "farm to fork" will become a reality.

Table 5: The 10 most cited papers in blockchain

R	Authors	Title	Journal	year	TC
1	Nakamoto,S.,2008	Bitcoin: a peer-to-peer electronic cash system	White paper	2008	60
2	Christidis & Devetsikiotis, 2016	Blockchains and smart contracts for the internet of things	IEEE access, 4, pp. 2292-2303	2016	32
3	Toyoda, K., et al., 2017	Blockchain-based product ownership management system (poms) for anti-counterfeits in the post supply chain	IEEE access, 5, pp. 17465-17477	2017	15
4	Saberi, S., et al., 2019	Blockchain technology and its relationships to sustainable supply chain management	International journal of production research, 57 (7), pp. 2117-2135	2019	14
5	Aung, & Chang, 2014	Traceability in a food supply chain: safety and quality perspectives	Food control, 39, pp. 172-184	2014	12
6	Nakamoto, S., 2008	Bitcoin: a peer-to-peer electronic cash system	https://bitcoin.org/bitcoin.pdf	2008	11
7	Wood, G., 2014	Ethereum: a secure decentralised generalised transaction ledger	Ethereum project yellow paper, 151, pp. 1-32	2014	11
8	Abeyratne & Monfared, 2016	Blockchain ready manufacturing supply chain using distributed ledger	International journal of research in engineering and technology, 5 (9), pp. 1-10	2016	10
9	Iansiti & Lakhani, 2017	The truth about blockchain	Harvard business review, 95 (1), pp. 118-127	2017	9
10	Mengelkamp, J., et al., 2018	Designing microgrid energy markets: a case study: the brooklyn microgrid	Applied energy, 210, pp. 870-880	2018	9

*** r = rank; ref = number of references; TC = Total citations *Source: Authors' elaboration using Biblioshiny*

5. Keyword Analysis

Using the Biblioshiny, the most common themes were investigated using keyword analysis in blockchain applications in consumer services. In 727 papers, a total of 50 keywords were found. Table 6 lists the most often used keywords in blockchain applications in consumer services research from 2015 to 2021. With 485 instances, "blockchain" is the most commonly used keyword, indicating that this word is employed as a termed concept in the publications. The other three most commonly used keywords are “commerce” (n=101), “supply chain” (n=92), and "internet of things” (n=80). A significant result from the analysis is that the majority of the terms derive from consumer services applications where blockchain technology is applied, such as supply chain, food supply, electric power transmission networks, sales, and so on.

Table 6 : Top keywords of blockchain application in consumer

Services based on the occurrence

Keyword	Occurrences
blockchain	485
commerce	101
supply chains	92
internet of things	80
power markets	62
digital storage	54
supply chain management	44
electric power transmission networks	42
peer to peer networks	41
food supply	37
sales	35
smart power grids	33
ethereum	29
information management	29
privacy by design	29

Source: Authors’ elaboration using Biblioshiny

Figure 6 depicts that blockchain is more widely linked with the term “commerce," “supply chain” and “internet of things." Blockchain is also linked to food supply (Caro et al., 2018; Aung &

Chang, 2014), as is seen in Figure 5. One of the most promising technology developments in the fight against food fraud is blockchain. It digitizes secure transactions or "blocks" at every step of the supply chain, making them viewable by anyone with access to the blockchain ledger, removing the need for middlemen (Lindley et al., 2021).

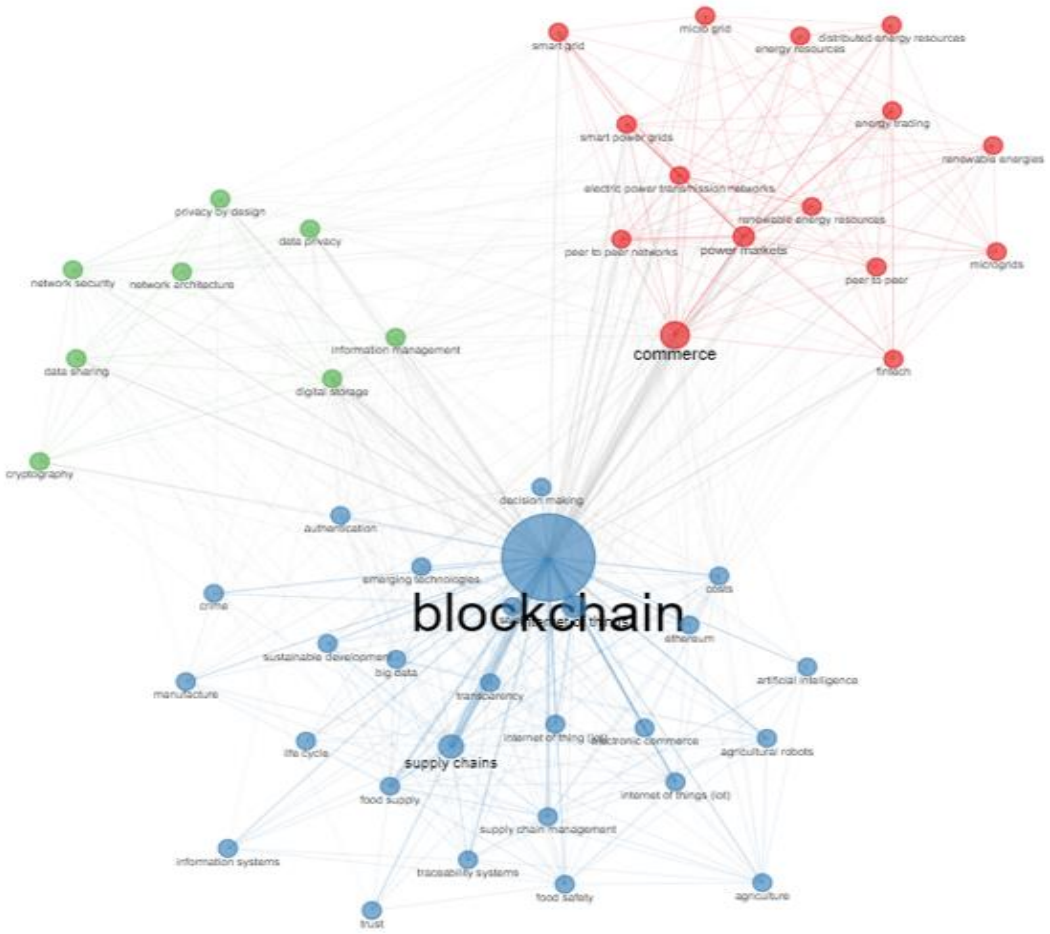

Figure 6. Network of keyword co-occurrence on blockchain

Source: Authors' elaboration using Biblioshiny

The words used in journals dealing with blockchain and consumers are shown in word growth (figure 7). The words that appear frequently are shown by a curve that develops each year with the annual occurrence value. In the data-gathering study on the theme of blockchain w.r.t. consumers, these results represent the average number of occurrences of these phrases every year. The figure illustrates the words that have frequently appeared from 2015 to 2021. They have also fluctuated every year, with 'blockchain' and 'supply chain' being the most prevalent words in 2021.

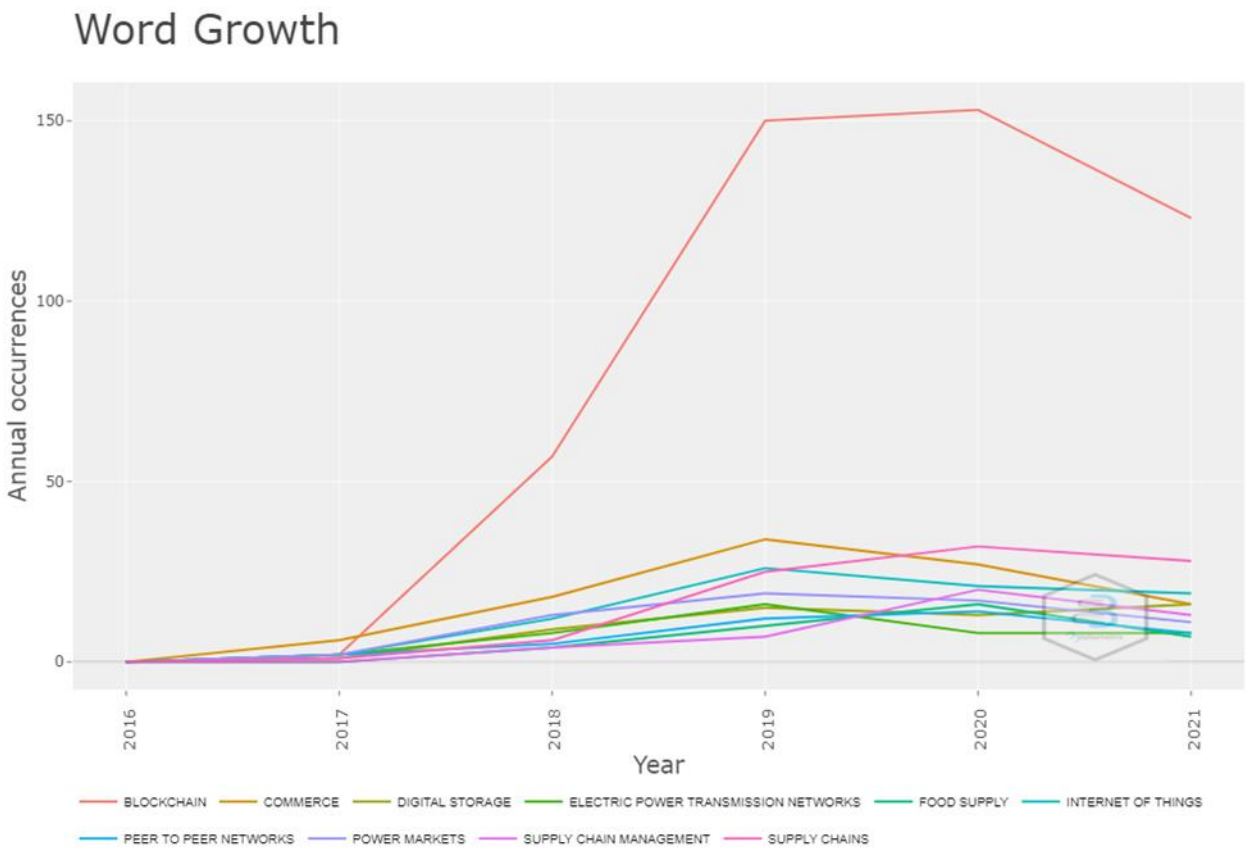

Figure 7. Word growth. source: Authors' elaboration using Biblioshiny

5.1 Thematic Map

In terms of conceptual structure, bibliometric employ a thematic map to define the topic's conceptual structure, and hence section 5 and 6 detail the answer to research question 3. A thematic map is an easy-to-understand plot, and themes can be analyzed based on where they fall in the quadrant. Figure 8 shows four alternative typologies of themes that can be visualized via thematic mapping. The "Keywords plus" field is used in the thematic map. The motor themes are depicted in the upper-right quadrant of the map. They have a high centrality and density. Because there is no theme depicted in the upper right corner, it suggests that there is no developed field. The upper-left quadrant reveals high-density themes but unimportant external links, indicating that they are of modest value for the field (low centrality). In most situations, the unit of analysis is trust, but humans and articles are intimately intertwined since the notion of blockchain provides a simple and secure means for consumers to create a trust or nearly any form of transaction.

Commerce, power markets, and electric power transmission networks are also the areas that are in the niche themes. As consumers seek a better and more sustainable energy source than ever before, blockchain can be used to promote social welfare and provide renewable energy to consumers (Zhu S et al., 2020). Finally, the basic and transversal themes are displayed in the lower-right quadrant. These themes cover a wide range of subjects that cut across the field's several research

areas. In this area, the predominant themes are blockchain, supply chain, supply chain management, internet of things, digital storage and information management.

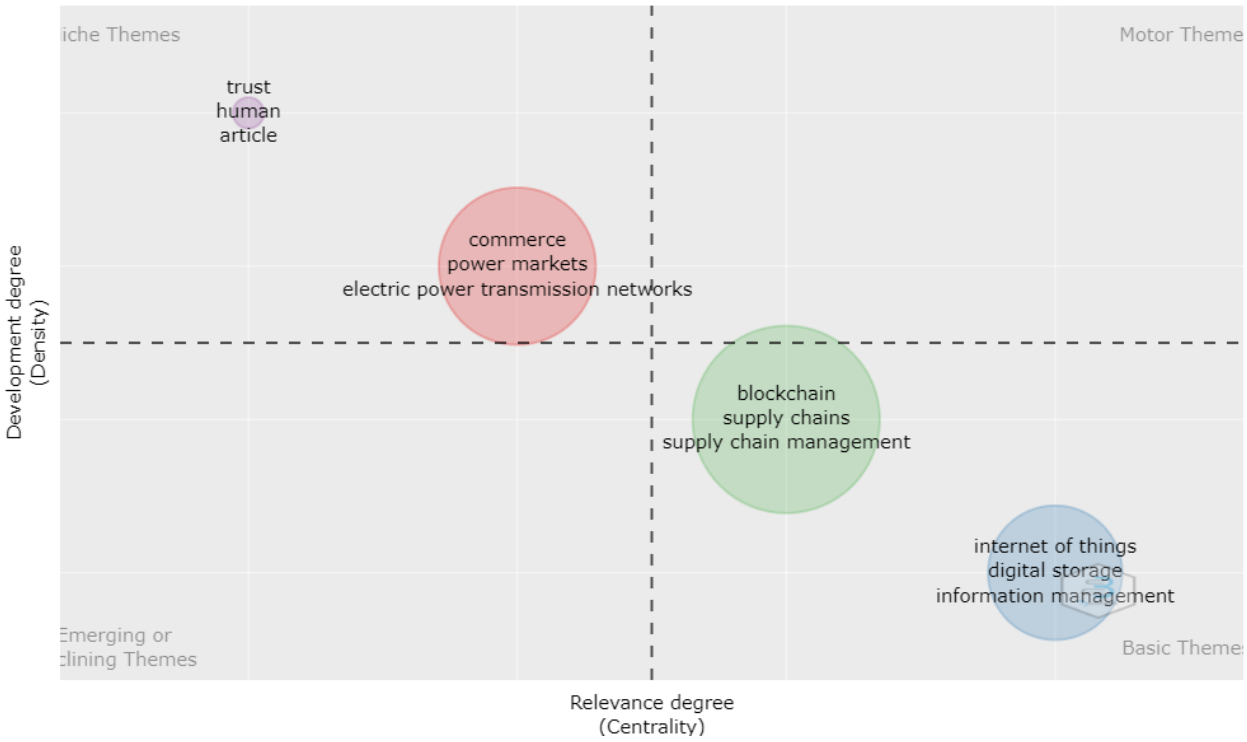

Figure 8. Thematic map. Source: Authors' elaboration using Biblioshiny

Blockchain technology is addressing several global supply chain management concerns as a distributed digital ledger platform that guarantees security, transparency, and traceability (Saberi S. et al., 2018). The evolution of the theme is depicted in figure 9. The size of each node in the figure corresponds to the number of keywords incorporated in the theme. The direction of evolution of the research theme is represented by the flow between nodes. Although the study's main focus is on blockchain and its potential consumer implications, the data reveals a number of sub-themes that have emerged from 2015 to 2017, as shown in the figure. There are nine different themes listed, each with a different size depending on how frequently they are utilized. "Blockchain" was the most popular subject of research, followed by "Ethereum" and "data privacy."

Various popular topics of publication from 2018 to 2019 are displayed in the second half of the middle section; some of the themes that have emerged during this time are evolutions of previously used content-related themes. For example, the subject 'Commerce' evolved as a form of revolution from the theme. For example, research using the keywords 'commerce,' 'internet of things,' and 'blockchain' reveals that study utilizing these keywords in the themes is a continuation of prior research. The theme is most commonly used in the researches of business or corporate sector areas. The third or right part displays the most recently used themes from 2020 to 2021. There are four topics listed, two of which are evolutions of prior era' themes, namely "blockchain" and "internet

of things," which is an extension of several themes as indicated by the colored grooves.

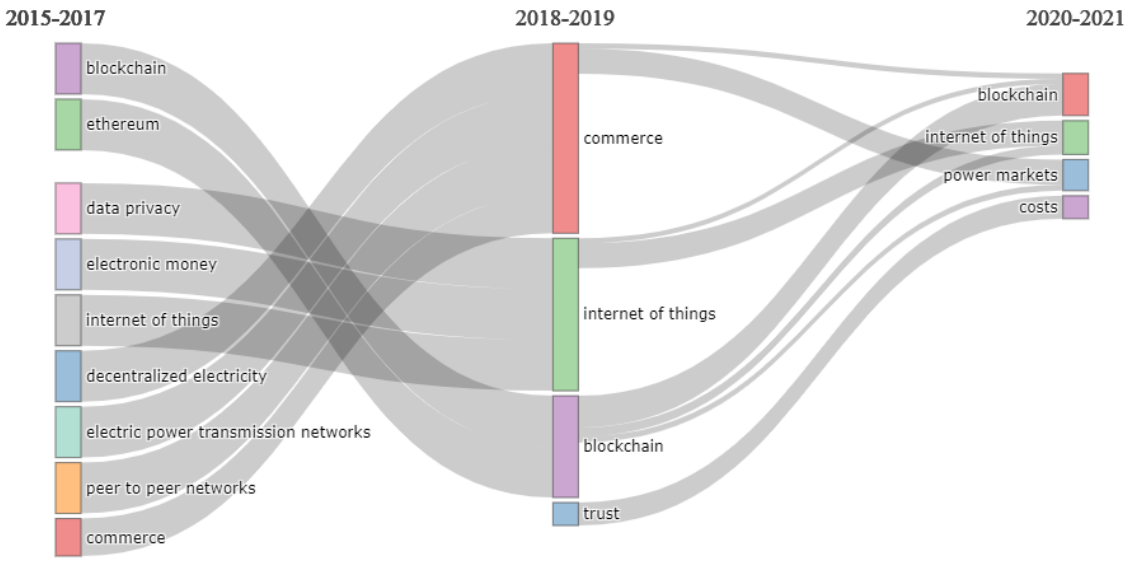

Figure 9. Keyword analysis of blockchain literature. Source: Authors' elaboration using biblioshiny

5.2 Trend Topics over the Years

Figure 10 represents several trends in the subjects that were researched w.r.t. blockchain and connected to consumers over time, and the trend of the subject can highlight those diverse challenges that have become a focus of researchers in blockchain technology. The evolution of the topic over time with the division per year is too depicted. It shows which topics have been researched for a long time and which ones have been recently added to the research list. The graph shows how the trend topics have changed over time. The prevalent theme in 2017-2018 was blockchain; in 2018-2019, the theme, smart contracts, smart power grids, electricity trading, new business models, intelligent buildings, Ecosystem were added; in 2019-2020, the popular themes, business models, supply chains, internet of things, digital storage, commerce, power markets, electric power transmission networks, Ethereum were used, and in 2020-2021, the popular themes were privacy by design, cryptography, information dissemination, supply chain management were researched.

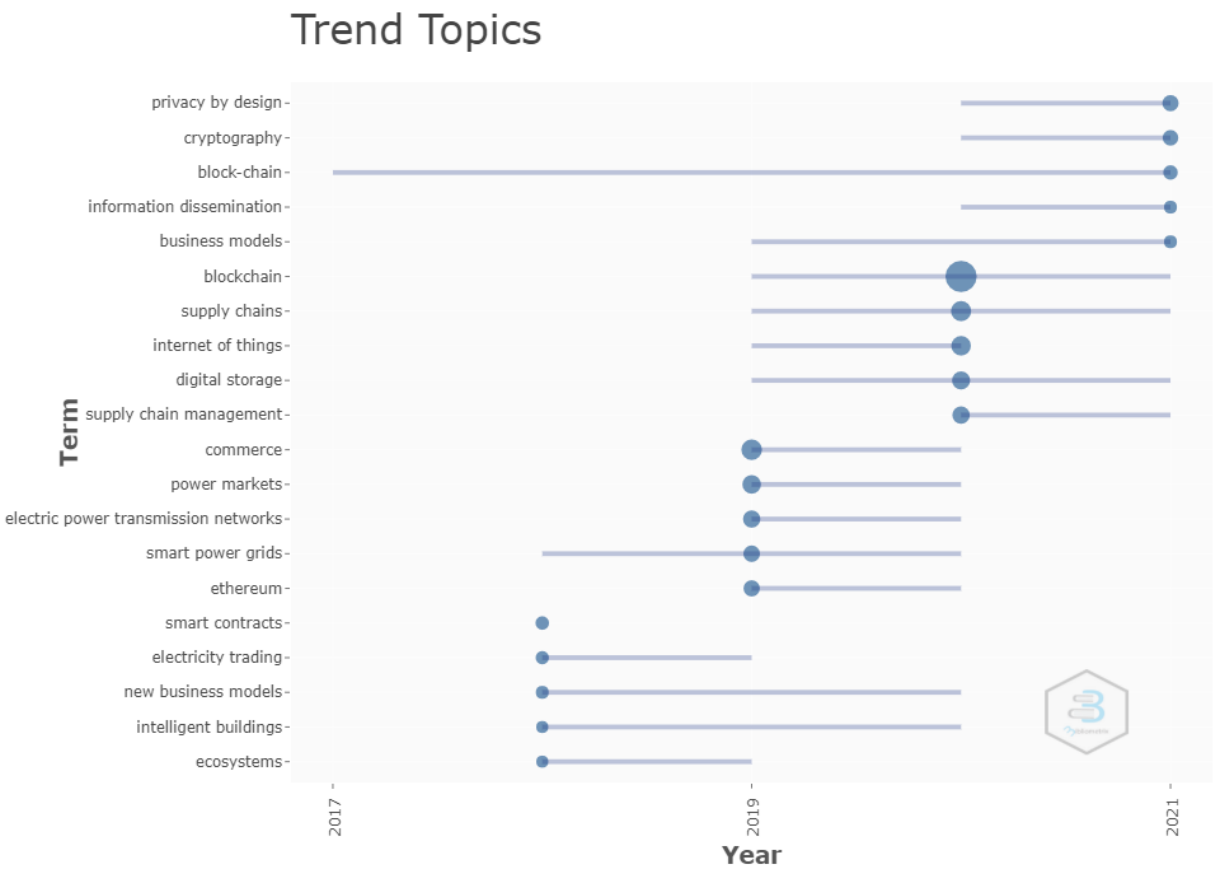

Figure 10. Trend topics. Source: Authors' elaboration using Biblioshiny

6. Co-Citation Analysis

Many authors, including Cawkell (1976), Glanzel & Czerwon (1996) and Small (1973) describe co-citation as a measure of subject similarity. It is defined by Small (1973) as "the number of times two or more papers are cited simultaneously." Co-citation networks are illustrated and analyzed considering the cited references/authors by publications in consumer-related blockchain research.

The first co-citation figure examined the document co-citation network on blockchain studies. Small (1973) believes that the most frequently cited publications in a subject indicate the most important concepts, methods, or experiments. As a result of this study, we determined which documents in blockchain studies in consumer services describe the intellectual structure. The reference co-citation network by publications is shown in figure 11. A node represents a reference, and the node's size indicates the total number of citations used to cite the reference. A co-citation relationship is represented by a link between two nodes, and the thicker the link, the more citations the reference has. Clustering the objects is done using the location of the nodes and the colors, and there are four clusters from the perspective of four colors. In the 727 papers analyzed, there were a total of 21834 cited articles, of which 10 met the threshold of a minimum of 10 citations per article. The red cluster depicted the impactful articles on blockchain and was the most cited cluster

(116 citations). This cluster is most important in terms of link strength. In this cluster, documents have the most incredible connection.

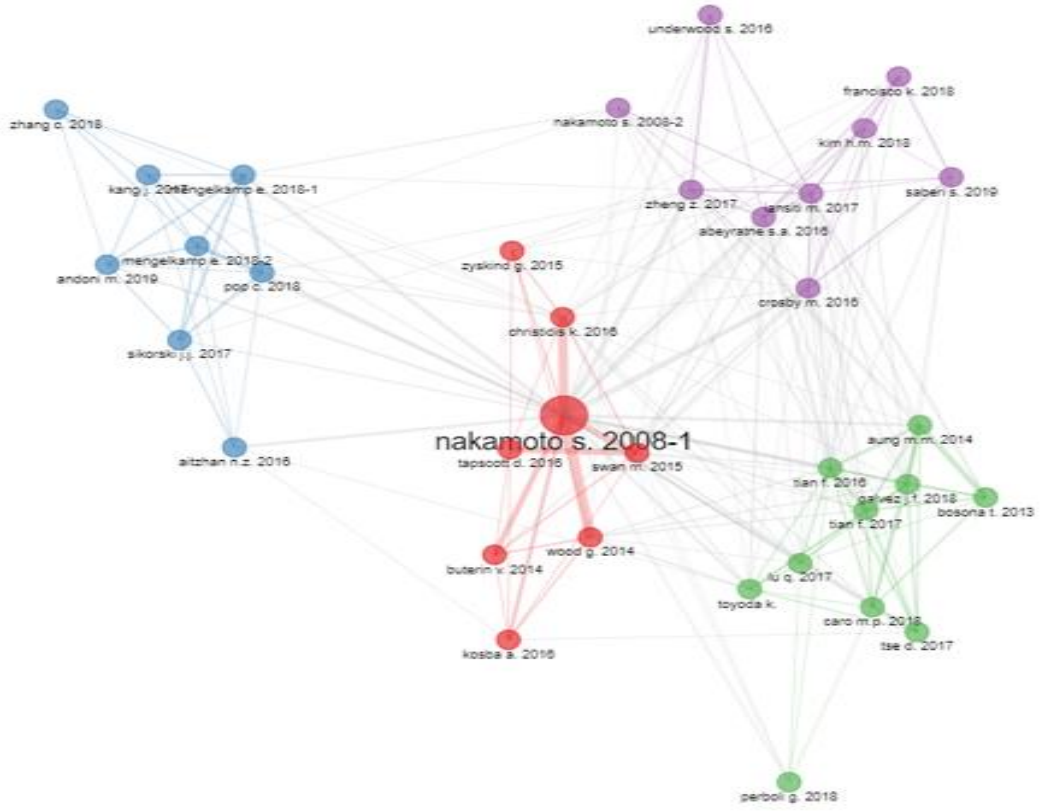

Figure 11. The reference co-citation network by publications in the journal. Source: Authors' elaboration using Biblioshiny

Figure 12 shows the author's co-citation networks by publications in the journal. The nodes represent the cited authors by publications in the journal, where the node's size is related to the number of citations a given author has. The strength of author relationships is shown by the thickness of straight lines linking nodes. To be more specific, the larger the node, the broader the author, and the darker the color, the more citations the author has. As a result, several of the larger nodes in the figure represent the top-cited authors in blockchain publications in terms of consumers. In the 727 documents examined, there were a total of 10737 cited authors. The top 10 most cited authors and their total citations are Wang (267), Nakamoto (216), Zhang (203), Liu (150), Chen (128), Kim (119), Tian (114), Zhang (114), Lin (85), Lee (83).

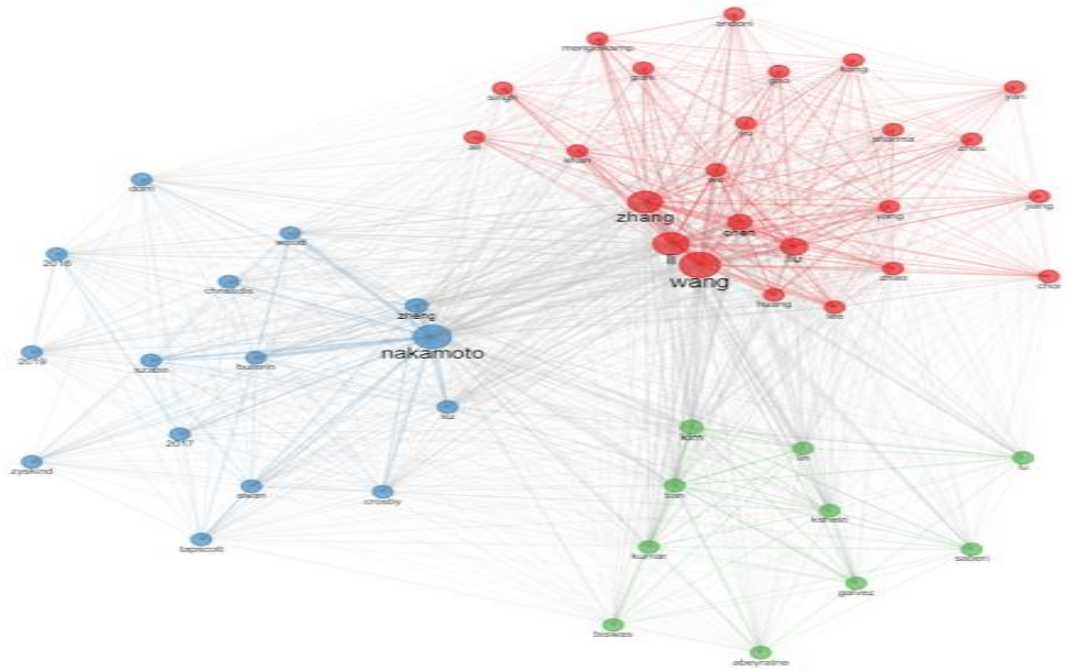

Figure 12. author co-citation networks of publications. Source: Authors' elaboration using Biblioshiny

6.1 Thematic Categorization: Clustering

The nodes in a network diagram can be divided into different groups. The items in the same cluster share a similar problem and are distinct from those in other clusters. The clustering aids in evaluating the theme analysis of co-citation networks.

6.2 Content Analysis

The content analysis of 727 papers was divided into three clusters, followed by the co-citation analysis. After a thorough inspection of each cluster, a common theme was discovered. Table 7 shows the top ten publications in each cluster based on the number of co-citations.

Table 7: Top articles in each cluster

Cluster 1	**Cluster 2**	**Cluster 3**
Saberi S., et al., 2018	Shahid A, et al., 2020	Wang J, et al., 2017
Behnke K. and Janssen M., 2020	Liu K. et al., 2014	Dehghani M, et al., 2021
Bumblauskas D., et al., 2020	Grecuccio J, et al., 2020	Alcarria R, et al., 2018
Smith C and Kumar A., 2018	Ma J, et al., 2020	Afzal M, et al., 2020
Yadav V., et al., 2020	Gopalakrishnan P and Behdad S, 2019	Zhu S, et al., 2020
Rogerson M and Parry G., 2020	Ahamed N, 2020	Fell M, et al., 2019
Allen D. et al., 2019	Majdalawieh M, 2021	Diestelmeier I, 2019

Cartier I . et al., 2018	Botelho A, et al., 2020	Wilkinson S, et al., 2020
Van H R, 2020	Cakic S, et al., 2021	Pumbhrey K, et al., 2020
Modgil S. and Sonwaney V, 2019	Nguyen D and Ali M, 2019	Yahaya A, et al., 2020

Source: Vosviewer

6.2.1 Cluster 1: Blockchain Technology and its Application in Supply Chain Management

Cluster 1 is the largest of the three clusters, containing 46 documents. The focal point of this cluster is the association of blockchain with supply chain management, particularly concerning tracking and traceability. In a world where marketplaces are becoming more global, varied, and complicated, and customers expect high quality, supply chain traceability has become essential (Behnke K. and Janssen M., 2020). As a distributed digital ledger platform that assures security, transparency, and traceability, blockchain technology is showing promise in alleviating some global supply chain management issues. (Saberi S. et al., 2018). The application of blockchain technology in supply chain networks was discussed by (Saberi S. et al., 2018). The emergence of blockchain-based supply chain management, which allows for the construction of secure, shared, autonomous digital contracts (smart contracts), decentralized ledgers, trustworthy and secure networks, are discussed. It facilitates peer-to-peer transactions by minimizing the role of intermediaries in the network. (Behnke K. and Janssen M., 2020) Demonstrate that blockchain is a great innovation since it allows supply chain partners that compete with one other to share more data. However, before BCT may be used, some boundary criteria must be met. Hence, they identified that the diversity of boundary conditions suggests that organizational adjustments are required before BCT can be employed successfully in supply chains.

6.2.2 Cluster 2: Blockchain Technology and its Application in the Food Supply Chain

Cluster 2 comprises 31 documents. The documents in this cluster examine how blockchain ensures trust, delivery mechanism, and traceability in the food supply chain. In this cluster, the studies discussed the blockchain's potential for collecting and monitoring product lifecycle data ranging from manufacturing, wholesaling, and shipping to standards, company reputation, and certification. (Majdalawieh M, 2021) presented a blockchain and IoT-based framework to govern and monitor the functioning of the processed poultry food supply chain, hence improving the quality and safety of food products provided to end-consumers. (Cakic S et al., 2021) described a project to digitally change the wine supply chain, with a focus on product traceability. According to the study, blockchain is utilized to maintain all status updates for each wine bottle, ensuring transparency for all parties. (Ahamed N, 2020) described a new blockchain strategy for improving the management paradigm for the food supply chain.

The authors offered some unique tags from the producer to reach the consumer. The benefits of a particular label are that it allows everyone from the producer to the consumer to learn more about the product and ensure that it is manufactured safely. (Grecuccio J, et al., 2020) highlights how

combining two growing and disruptive technologies, such as Internet-of-Things devices and BC-based infrastructure for decentralized applications, may benefit many industries. In the Industry 4.0 domain, the critical application scenario for which the integration was designed is food-chain traceability. The developed system has been depicted in a use case for monitoring the temperature of fish items in a warehouse and during the delivery process.

6.2.3 Cluster 3: Blockchain Technology and its Application in Energy Trading

Cluster 3 comprises 31 documents. Articles in cluster 3 show that blockchain can increase social welfare and offer consumers renewable energy as consumers demand a better, cleaner, and more sustainable energy source than ever before (Zhu S et al., 2020). However, at the moment, electricity trading is associated with a lack of customer control and power (Pumbhrey K et al., 2020). The authors looked into a blockchain-based LEM in which prosumers and consumers in a small-town traded energy without a middleman (Yahaya A et al., 2020). This technique also enables end-users to move their load to off-peak hours and use the LEM's low-cost electricity. The proposed approach demonstrates how HEM and the demurrage mechanism can reduce energy usage and costs. (Afzal M, et al., 2020) described a distributed demand-side management system for many households in a community microgrid, complete with an internet of things smart meter and renewable energy sources, and the study shows that the energy consumption game is designed to reduce the cost of electricity in individual homes as well as the overall cost of energy consumption in the community. (Zhu S et al., 2020) demonstrates that blockchain technology may encourage sustainable energy use and build a circular economy by providing a decentralized trade mechanism.

7. Advantages of Incorporating Blockchain Technology into Consumer Services

Today, innovators in different areas are recognizing the benefits of blockchain technology. Many industries are exploring methods to incorporate blockchain into their infrastructures, from health to banking. Because of its decentralized and trustless nature, blockchain can open up new doors and assist businesses by improving transparency, security, and traceability. Following are the advantages of blockchain technology for consumer service to answers the fourth research question:

7.1 Immutable Data Record

The data on the blockchain is tamper-proof, which means that no one can change it without the knowledge of others (Christidis & Devetsikiotis, 2016). It is cryptographically linked and encrypted, making it easy to identify alterations to the ledger[3]. For example, a Global Swiss Digital

[3] Research report (2021), Harnessing the Blockchain Revolution | Blockchain | CompTIA. (2021). Retrieved 9 November 2021, from https://www.comptia.org/content/research/harnessing-the-blockchain-revolution-comptia-s-practical-guide-for-the-public-sector

Health firm provides customers with a safe platform to store and manage their health information where clients can choose to make their data available for medical research in exchange for monetary remuneration (Mettler, M., 2016). Another advantage of this technology is data quality in the KYC system where every change to the data is tracked and monitored in real-time (Parra-Moyano, J. et al., 2019) in comparison to the current KYC process which fails to meet the needs of financial institutions as it is tedious, long, repetitive and is inconvenient to the customers.

7.2 Decreased Transaction Cost

Blockchain technologies helps the consumers to make payments more quickly and correctly as well as saving money on transaction fees[4]. Because of this technology, market participants can now have direct access to dematerialized assets and stored data (Iskandar 2017). Due to near-real-time transaction processing, blockchain in cross-border transfers can help consumers acquire the best exchange rates from foreign-exchange marketplaces (Gupta, A., 2018).

7.3 Better Security

Blockchain technology is seen to improve the security of massive data (Puthal et al., 2018; Kshetri, 2017). In comparison to other platforms, blockchain technology employs better security as the consensus mechanism used for all transactions is recorded (Garg, P., 2021; Kadka. R.,2020). In recent years, the number of cyber incidents has increased considerably where businesses gather personal information from their consumers and then store it, which is a significant aspect in facilitating the leakage of personal information in a cyber-attack (Investopedia, 2021)[5]. Blockchain-based databases, such as those that underpin cryptocurrencies, are data vaults that allow customers to be identified and financial transactions to be completed without revealing personal information (Nirmalee, R. et al., 2021).

7.4 Greater Transparency

In a fast-paced economy, transparency can be a double-edged sword (Shahid, A., et al., 2020). For today's consumers, comprehensive brand openness, trust, and ethics are essential (Boukis A. 2020). Businesses can utilize blockchain to concentrate on establishing a supply chain that includes both suppliers and vendors where tracing objects is challenging, leading to difficulties like counterfeiting, theft, and product loss (Chang, S. E., et al., 2019; Pilkington, 2015). Thanks to blockchain, the supply chain is more visible than ever before allowing all participants, particularly

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[4] Consultancy.uk, the benefits and use cases for blockchain technology in banking. (2021). Retrieved 9 November 2021, from https://www.consultancy.uk/news/12801/the-benefits-and-use-cases-for-blockchain-technology-in-banking

[5]Investopedia. 2021. 6 Ways Cybercrime Impacts Business. [online] Available at: <https://www.investopedia.com/financial-edge/0112/3-ways-cyber-crime-impacts-business.aspx> [Accessed 9 November 2021].

consumers, to trace goods and ensure that they are not being substituted or misused (Fan, ZP, 2020).

7.5 Improved Traceability

Blockchain includes a robust information traceability feature when it comes to monitoring product quality and responding to food product safety issues (Fan, ZP, 2020). According to the World Health Organization (WHO) [6], 42 lac people die each year due to food contamination, which impacts one out of every ten people on the planet and 1.25 lac children under the age of five die every year from foodborne illness[7]. The capacity to track food goods throughout their entire lifecycle, from their origin to every point of contact on their way to the consumer, improves credibility, efficiency, and safety (Caro, M. P., 2018, Tse, D., et al., 2017). Blockchain carries the possibility of transformative change where with the scan of a QR code, consumers would be able to track their food from "farm to fork" (Lin et al., 2021).

7.6 Increased Efficiency

The final industrial benefit provided by blockchain is increased efficiency and speed. Consumer goods industries, for example, must retain higher levels of efficiency and provide consumers with extra value (Rejeb et al., 2020). Blockchain automates time-consuming processes to increase efficiency and removes human errors by automation (George, R.V., et al., 2019). By providing reliable data and information and enhancing supply chain inventory and operations visibility, blockchain technology can increase inbound efficiency and optimize planning decisions (Perboli, G. et al., 2018).

8. Challenges of Blockchain Technology into Consumer Services

Blockchain technology is a relatively new innovation that is gaining traction in a variety of fields (Shae and Tsai, 2017) with various opportunities (Fernández-Caramés, T.M. and Fraga-Lamas, P, 2018) and benefits (Alhadhrami, Z. et al., 2017). Although blockchain technology can alter the way businesses engage with their customers (Boukis, A., 2020), however, it comes with its own set of drawbacks that need to be tackled carefully. In this section, we'll look at few of the significant challenges that answer the last subpart of the fourth research question.

8.1 Privacy and Security of Data

Since consumers use digital technology, the data they generate provides businesses with both an opportunity to boost customer engagement and a responsibility to protect consumer data (Anant et

[6]WHO.int. 2021. Food safety. [online] Available at: <https://www.who.int/news-room/fact-sheets/detail/food-safety> [Accessed 19 September 2021].

[7]Bahuguna, K., 2015, Children under five account for 30 per cent of deaths due to food borne diseases globally: WHO https://www.downtoearth.org.in/news/food/children-under-five-account-for-30-per-cent-of-deaths-due-to-food-borne-diseases-globally-who-51994

al., 2021). Data privacy and security are the most crucial issue (Kuo et al., 2017). Using a third party to complete a transaction is no longer necessary to implement blockchain-based applications (Alhadhrami, Z. et al., 2017). Since it enables the whole community to validate the records in a blockchain system instead of a sole third-party service provider, the data becomes vulnerable to potential security and privacy threats (Zheng, Z, 2017). Data privacy will be affected because the data is accessible to all nodes transmitted by a single node (Ahram, T. et al., 2017). When high-security techniques are applied to data, it creates barriers in transmitting data from one block to another, leaving recipients with restricted or missing information (Margheri, A. et al., 2017).

8.2 Storage Capacity Management

As blockchain technology has grown in popularity and spread its wings across numerous domains, storage issues have become apparent (Zhang et al., 2020). Consumer services process a vast volume of data (Schlegel et al., 2018), as a result, all data will be accessible to all nodes in the chain, necessitating a vast storage capacity in a blockchain scenario (Pirtle and Ehrenfeld, 2018). Blockchain applications are transaction-based, the databases utilized to support this technology have a proclivity to develop (Bennett, B., 2017) and the speed with which they can be searched and accessed decreases, making them unsuitable for transactions (McKinlay, J., 2016).

8.3 Interoperability Issues

The capacity to see, share, and access information in blockchain networks without an intermediary or any authority is termed as blockchain interoperability (Jabbar et al., 2021) which is another challenge that blockchain faces (kuo et al., 2017). As more companies use blockchain, many of them are going to create their systems with unique features which do not connect with one another, and there's no uniform standard in place to allow them to do so. Because of the lack of interoperability, widespread adoption may be difficult for businesses and consumers (Biswas and Muthukkumarasamy, 2017). This challenge makes it difficult to share data effectively (Boulos et al., 2018).

8.4 Social Challenges

Blockchain is still in its infancy (Chang et al., 2020) and faces societal challenges such as cultural shifts. (Ølnes and Jansen, 2017). Although consumer services are gradually heading toward digitization (Schlegel et al., 2018), there is still a long way to go before fully embracing this technology, which has yet to be clinically proven. The technologies and rules offered are somewhat untrustworthy due to their low adoption rate in consumer services. (McKinlay, J., 2016).

8.5 Standardization Challenges

Blockchain technology is still in its initial phases of development (Chang et al., 2020); as a result, it will undoubtedly confront standardization issues as it moves closer to being implemented in consumer services. International standardization authorities would be required to provide several well-authenticated and approved standards (Margheri, A. et al., 2017). These predefined standards could be helpful in determining the nature, size, and format of data transmitted in blockchain

applications in consumer service (Laborde, 2021). These standards will not only evaluate the shared data but will also function as safety precautions.

Considering all these hurdles and dangers, it is premature to conclude that the technology will provide practical and universal solutions to all consumer service issues (Alhadhrami, Z. et al., 2017).

9. Future Research Directions

Blockchain is becoming a popular topic of discussion and consideration amongst financial regulators and policymakers. The existing research has probed into the manifestation of blockchain technology in consumer service, its applications across the world, the challenges and benefits of such technology. This study also adds to blockchain research by unraveling the evolving literature according to numerous themes and trends, thereby presenting the status of scholarly work from its inception to the present. However, we find specific gaps in the study of blockchain application in consumer service and propose some future research questions. Currently, the number of consumers using blockchain solutions is not many as well as there are associated human, technical, and institutional challenges. Blockchain technology needs to overcome these issues before it can achieve wide consumer adaptation. We discovered that there are numerous existing blockchain applications that are just ready to be used by consumers. However, how many of these applications will continue to function in the future is uncertain.

Awareness of consumers is highly influencing global economic markets and systems. As a result, if more studies are done on blockchain application in consumer services, consumers will have more information about the prospective technology's application and its uses. In this area, there have been less studies undertaken. Studies have shown blockchain creating value through its numerous benefits with a focus on greater productivity and growth. Studies reveal that blockchain technology positively influences consumer service (Schlegel et al., 2018). However, Blockchain as innovative technology is desirable in countries with a more rigid regulatory structure (Albayati et al., 2020).

In this regard the researchers can answer the following research questions:

- What are the perceived benefits of putting blockchain technology into practice for consumers?
- How does the blockchain affect consumers in developed and developing countries?
- What are the significant obstacles customers face in embracing blockchain, and how can we overcome these obstacles and pitfalls?

10. Conclusion

Blockchain technology is a disruptive innovation that has significant implications for the growth of countries' economic positions and can help them become more competitive and stable economies.This study has investigated the concept of incorporating blockchain technology in consumer services with a broad taxonomy of blockchain-enabled applications in various industries

such as healthcare, supply chain, IoT, business, data management, and privacy based on bibliometric analysis and systematic review in terms of trends, key themes, and emerging research areas. Blockchain applications are likely to enter other industries/domains like financial services, infrastructure, travel & mobility, healthcare, retail & consumer package goods, public sector, agriculture & mining, communication, & information services, entertainment, education, etc. than those mentioned in our survey as blockchain technology matures. Blockchain research in consumer services is primarily found in emerging nations such as China and India. China is the country with the most publications, followed by India and the United States. Many developing countries, such as India, have begun to feature in the top 50 most essential countries list. 51 percent of the 727 studies were undertaken in developed countries, whereas 49 percent were conducted in developing countries. During the year 2017–20, the number of publications increased dramatically, showing a growing interest in blockchain studies, specifically in consumer services. The studies show that research on blockchain in consumer service has been done on supply chain, food supply chain for food traceability, and other scientific domains like energy and power supply.

The most productive authors contributing to the field with the highest number of publications are Javaid N, Liu X, Na N, and Zhang X. In contrast, the leading authors with the highest number of citations are Wang (267), Nakamoto (216), Zhang (203), Liu (150). The leading journals publishing on blockchain applications in consumer services are IEEE consumer electronics magazine, lecture notes in computer science, advances in intelligent systems and computing, IEEE access, ACM international conference proceeding series, lecture notes in networks and systems, sustainability (Switzerland). The top institutions are The Hong Kong Polytechnic University, Beijing University of Posts and Telecommunications, Northeastern University, and Notreported. According to the findings, the most influential studies are (Nakamoto, S., 2008) top the list with 60 citations, followed by(Christidis & Devetsikiotis, 2016) with 32 citations and (Toyoda, K. et al., 2017) with 15 citations.

The study discovered that in comparison to other fields, a lot of research had been done on blockchain in the supply chain, food supply chain for food traceability, and the energy sector for consumer service. Wang (267), Nakamoto (216), Zhang (203), Liu (150) have received a maximum number of citations in this field. The benefits of blockchain technology in consumer services is discussed, which serves as a wake-up call for regulators and policymakers to develop regulations that welcome blockchain technology in other areas of consumer service, for example, travel & mobility, healthcare, retail & consumer packaged goods, public sector, agriculture & mining, communication, & information services, entertainment, etc. The research work indicates that the benefits of blockchain are consistent across all populations, from developing to developed.

The study shows that blockchain has a lot of potential in terms of application in consumer service. However, there are many obstacles and difficulties to overcome such as Security of Data, storage issues, Interoperability Issues, acceptability issues, and standardization.

The study has suggested some future research directions. in addition, other databases, such as PubMed, ERIC, and JSTOR, may be useful in future research. We also urge that researchers use surveys and case studies to empirically validate the research topics addressed in this study. It is believed that as the researches on this concept evolves, comparable dynamics of knowledge generation will emerge, assisting in the ongoing development of this field.

Conflict of interest

There is no conflict of interest

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