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Bibliometric Characteristics of Cryptocurrency through Citation Network Analysis

Reganti Lavanya
VIT Business School
Vellore Institute of Technology (Deemed to be University) – Vellore.
Vellore, Tamilnadu-632014, India.
email: reganti.lavanya2020@vitstudent.ac.in
https://orcid.org/0000-0003-1389-6849

Rajesh Mamilla
VIT Business School
Vellore Institute of Technology (Deemed to be University) – Vellore.
Vellore, Tamilnadu-632014, India.
Corresponding Author email: rajesh.mamilla@vit.ac.in
https://orcid.org/0000-0003-3497-2468

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Abstract

Purpose: This research aims to investigate the bibliometric characteristics of existing studies published in Scopus-indexed journals to comprehend the most recent movements in Cryptocurrency publishing, the primary themes in cryptocurrency, and factors impacting them, and analyze the Citation network of the cryptocurrency based on the previously published Scopus indexed journals.

Cryptocurrencies have emerged as a new asset class, and individuals and organizations often face investment decisions related to cryptocurrencies. Decision science techniques, such as risk analysis, portfolio optimization, and behavioral economics, can be applied to assess the risks and potential returns associated with cryptocurrency investments. These techniques help investors make informed decisions based on risk tolerance, financial goals, and market conditions.

Design/Methodology: Both citation network analysis and author co-citation analysis are used in our analysis based on Cryptocurrency articles written in 2019 from 2013 to 2022 with top titles including Current Issues in Auditing and International Review of Financial Analysis to find both keywords and track Bitcoin-related cited works. The research also uses VOS Viewer and R in the analysis to visualize both data networks and spread

Findings: In our analysis, we find that Cryptocurrency, Cryptocurrency, Blockchain, and Distributed Ledger Technology were the most commonly-used terms, studying Cryptocurrency in emerging nations is difficult due to significant social disparities and poor reading levels, Guglielmo Maria Caporale is the most cited author in this area with three works and 147 Citations up to the moment of our study, the most Cryptocurrency-focused institution is the Sumy State institution in Ukraine, which has produced two papers up to the moment of our study, and India gets the most publications in the area, followed by the United States, China, the United Kingdom, Russia, and so on, and the United Arab Emirates comes in last place regarding cryptocurrency-related publications. Our study claims no consensus on defining cryptocurrency, leading authors to use varying terms, words such as cryptocurrency, blockchain, cryptocurrency, and distributed ledger technology are often used equally, and cryptocurrency research has had a significant uptick over the past decade and is increasing at an impressive rate.

Practical Implications: The research findings have several practical implications for cryptocurrency, specifically regarding Bitcoin patterns that benefit researchers, policymakers, and stakeholders. For instance, researchers can utilize the study's information to explore new areas and understand the evolving landscape of cryptocurrency research. Policymakers can leverage the insights to develop effective policies and initiatives, enhancing regulation, risk assessment, and consumer protection in cryptocurrency ecosystems. The research contributes to a broader understanding of cryptocurrency's dynamics, societal impact, and implications for finance, economy, and society. This knowledge aids informed decision-making for individuals, businesses, and organizations involved with cryptocurrency.

Originality: Cryptocurrency citation network analysis has been used in this study. It explains why some writers are cited extensively around the globe while others are cited so rarely locally. Indications are that the worldwide citation is much greater. However, the number of local to

worldwide citations is low and could be improved by prioritizing better local citations. Therefore, the study concludes that scholarly interest in cryptocurrency is new and has excellent potential for future research.

Keywords**:** Bibliometric analysis, Cryptocurrency, Blockchain, Electronic money, Internet of things.

JEL classifications: G23, N20

1. Introduction

Cryptocurrencies have emerged as a new asset class, and individuals and organizations often face investment decisions related to cryptocurrencies. Decision science techniques, such as risk analysis, portfolio optimization, and behavioral economics, can be applied to assess the risks and potential returns associated with cryptocurrency investments. These techniques help investors make informed decisions based on risk tolerance, financial goals, and market conditions (Veerasingam & Teoh, 2022).

Cryptocurrencies have become a more popular financial instrument and have gotten the attention of investors throughout the globe. Mr. Satoshi Nakamoto made Cryptocurrency the world, a peer-to-peer automated operation structure that uses cryptocurrencies instead of paper and plastic money, in 2008 (Jalal et al., 2021). The fundamental goal of cryptocurrency stands to censor the distributor, the Financial Institution, and the Central or Regional Authority, and the ease of free availability. Some believe cryptocurrencies could be more secure due to the lack of regional supervision. On the other hand, the blockchain mechanism used by cryptocurrencies makes transactions traceable. Near-to-the-ground operation fees, peer-to-peer operation networks, and less control made cryptocurrencies popular among users. The speedy expansion has led to higher volume trading. Frisby (2014), cryptocurrency gives the impression of having the properties of currency but with added benefits. The market can circulate because of its portability, liquidity, durability, lower transaction costs, and divisibility.

The cryptocurrency market capitalization enlarged to $79.7 billion from $10.1 billion from October 2016 to October 2017. This 680 percent growth gave investors annual returns that no other investment could match. Alternative cryptocurrencies to Cryptocurrency are called 'Altcoins' (alternative coins). There are two types of altcoins: (i) Altcoins that follow blockchain protocols using slight variations in the existing code and (ii) Self-regulating font protocols with the help of distributed ledger technology. Litecoin is one of the most popular cryptocurrencies in the first category. Ethereum and Ripple are the next, even though Alternative coins all belong to the cryptocurrency industry with their unique qualities.

Sum utilizes the cryptocurrency networks, while others employ centralized, decentralized, pseudo-anonymity, or truly anonymous PoS or PoW processes. Ripple, Cryptocurrency cash, Ethereum, Cryptocurrency, NEO, Litecoin, Monero, IOTA, DASH, Cardano, and Planetary are among the top ten decentralized cryptocurrencies. Most of the coins are pseudo-anonymous and utilize smart contracts for security purposes. This market has resentful the interest of politicians and academics worldwide. Cryptocurrencies job 24 hours a day, seven days a workweek, making algorithmic trading more exciting and posing new obstacles to successfully handling a continuous influx of massive data.

Due to the increase of cryptocurrencies, numerous recognized financial practices face an experiential threat. The "middle man," which possibly will be an economic organization, is effectively eliminated by cryptocurrencies' peer-to-peer system. For instance, transactions can be made without a bank account or credit card in cryptocurrencies. The purpose of a cryptocurrency "wallet" is identical to that of a bank treasury. Realizing that almost two billion people lack a bank account, the Internet and smartphones can change financial inclusion (Global Index, 2017; World Bank, 2017).

But the expertise drives far outside giving unbanked people access to banking services. Adults who are unbanked or otherwise excluded from financial institutions may access essential financial services via cryptocurrency (Ozili, 2022). It has the potential to provide low-cost, secure, and nearly instantaneous transactions, enabling billions of people to participate in online commerce by paying for products and services and receiving payments external to the established funding and credit card structure.

Dealings involving cryptocurrencies may make instantaneous micropayments possible. According to Grinberg (2011). Cryptocurrency is expected to be the next revolutionary payment option for micropayments, which are seldom lucrative when credit card costs are added to such tiny notional amounts. Using a credit card to pay is intended for a one-cent transfer of creation or facility, as cyberspace is not how credit cards are designed to be used. In addition to enabling firms to develop actual pay-per-use usage of their goods, such as videos, audio, cell phone amenity, and functions, in addition on, cryptocurrency systems promise to make micropayments seamless.

New technology is always associated with risk. The primary issue of the developing Cryptocurrency market is the secrecy of some transactions that bad players might use to behavior unlawful professional or not as good as, pose a more significant danger to the world and its foundations. The credibility of these cryptocurrencies is that their anonymity is unbreakable, but the truth is that a considerable proportion of deals are traceable Dupuis and Gleason (2020). Quantifying the hazards is more complex than doing so for the advantages, such as reduced transaction costs, safety, and the assurance of speedy processing.

An open-source, peer-to-peer virtual grid that upholds the directions the situation remains set up with, a cryptocurrency might be compared to a Decentralized Autonomous Organization (DAO). DAOs enable people to coordinate and self-govern themselves online. Although no mention is made as to the minimum size of the group, the term "organization" is generally understood to refer to an entity comprising multiple people acting towards a common goal rather than a legally registered organization. Hassan and De Filippi (2021). The stability of the networks takes the place of the requirement to trust the honesty of human members in this DAO because the money supply is determined by algorithmic instruction. As per Facebook's "Libra" money pre-emission market popularity exhibits, the technological development of cryptocurrency presents a task to well-established Central banks and fiscal policy. This is something that central banks are aware of, and several banks have started their nationwide cryptocurrency operations. All innovative expertise entails dangers; uncertainty we do not necessitate danger, and the invention is limited. Unlike many marketplaces, cryptocurrencies provide a wealth of freely accessible data prime for empirical research.

Various pieces of literature have studied cryptocurrencies in multiple fields. The following works of literature are the evidence that depicts the importance of cryptocurrency. Ajaz and Kumar (2018) investigate the crypto-currency market herding phenomenon. Herding is tested in both high and moderate market volatility scenarios. Herding suggests excess and enthusiasm in volatile markets. Market instability does not affect herding. Herding is driven by market action rather than instability. Jaiswal et al. (2022) stated that the financial uncertainty brought on by blockchain technology has sparked several works of literature. Academics and bankers alike want this technology despite its drawbacks. From 2014 to 2022, financial blockchain

bibliometrics and network analysis using 3312 Dimensions database components filled this void in understanding. The potential of blockchain writing is analyzed regarding the author and national approval, common patterns, and monetary uses using a visual projection created by the VOS viewer. China and the United States lead financial blockchain studies. For three years, media attention on the blockchain in the financial sector only increased. India ranks third in the world in terms of documentation, but it falls short when it comes to citations and networking. Pho et al. (2021) researched, considering daily Chinese stock diversity statistics from 2010-2020, contrasting cryptocurrency with gold. In this research, the Value-at-Risk and anticipated deficit of cryptocurrency and non-cryptocurrency assets are modeled using a copula-based return distribution function (or gold). Using stochastic dominance, they compared three distinct forms of portfolio return and concluded that investing in gold is safer than cryptocurrency. Because there is a potential for loss but also potential for gain with cryptocurrency. According to the researchers, compared to cryptocurrency, gold is more valuable. If these numbers hold, cautious Chinese buyers would be better off purchasing bullion than cryptocurrency. Individuals who are comfortable with uncertainty are likely to be drawn to cryptocurrency. Shiba et al. (2022), researched Using daily uncertainty associated with transmissible illnesses; the heterogeneous autoregressive realized variance model predicts the realized volatility of nine foreign currency futures and the Cryptocurrency futures series. Volatility in Forex and Cryptocurrency Futures can be indicated for any time frame using the uncertainty index linked to contagious illnesses. The uncertainty of infectious diseases has repercussions for portfolio managers and investors.

In their research, Ye et al. (2023) stated that climate change has ruled international discourse-many attribute environmental destruction to using cryptocurrencies, fossil fuels, farmland, and industry for decades. NARDL investigates topics including ecological finance, cryptocurrency, and environmental inequalities. US data from 2011-2020. The blockchain and unequal biodiesel.

Consequently, there is an asymmetry and incoherence between blockchain technology and global green funding. The study recommends that states and conservation groups use less energy and better technology to reduce carbon pollution. Lastly, the complex impact of blockchain and green spending on US carbon pollution. Sayim and Quang My’s (2022) analysis shows that the yields and fluctuations of cryptocurrencies are affected by investors' illogical and reasonable behavior in the United States. As this study demonstrates, the benefits of cryptocurrencies are bolstered by an unanticipated increase in the logic of individual investors in the United States. Thus, rationality can increase cryptocurrency profits. Furthermore, rational US investors are favorably correlated with cryptocurrency fluctuations. Finally, the findings demonstrate that cryptocurrency price fluctuation is reduced when sensible buyers use and evaluate economic effects on asset values.

A bibliometric analysis of cryptocurrency literature reveals rising scholarly attention to the topic. Many recent articles have emphasized the importance of learning about cryptocurrencies and their implications for the global economy, technology, and culture. Kshetri (2018). conducted a bibliometric study that revealed a meteoric rise in cryptocurrency research papers, indicating a growing academic interest. Several studies have found that cryptocurrency could impact business and the banking system. A strong correlation between cryptocurrency and equity values was found by Gandal et al. (2018). This suggests that some scholars in the field of finance

are considering the implications of cryptocurrency for the market. The blockchain system that supports cryptocurrencies is an innovative step forward in technological terms. There has been a lot of research into the crypto world, focusing on the security, scale, and possibility of an invention that the cryptocurrency space offers. Computer science, engineering, and technology academics may be interested in cryptocurrency due to its unique technological features Bonsón and Bednárová (2019). Security, anonymity, and legislation are all social and societal factors that have been examined as potential influences on the adoption and use of cryptocurrency. Researchers in sociology, anthropology, and cultural studies may therefore be curious about the societal impact of cryptocurrency Reijers and Coeckelbergh (2018). Bibliometric evidence suggests that cryptocurrency is gaining traction among academics. The implications of cryptocurrency on finance, technology, and culture and the possibilities for the new study drive this interest. Knowledge of Cryptocurrency studies could help academics stay contemporary, which would be helpful in their research, instruction, and practice.

The current study utilizes Scopus as a more extensive database. This research provides a framework for understanding the conceptual framework of cryptocurrency research as it relates to various areas. This study will provide an in-depth depiction of where cryptocurrency research stands. Furthermore, highlighting areas where more study is needed will clear the way for new research. Consequently, the findings of this study can inform future research strategies in cryptocurrency by providing a greater understanding of new patterns in this domain.

Although there has been a lot of work in the scholarly world on cryptocurrency in recent years, the findings have been all over the place and have not been pinned down. Therefore, the main variables in cryptocurrency and the fundamental shifts in this critical research topic over time need to be illuminated. Consequently, the present research is driven by a desire to understand better the theoretical foundations upon which the rapidly growing field of cryptocurrency research rests. To that end, this research aims to contribute to the area by shedding new light on the established standards of Cryptocurrency study and opening new avenues for potential investigation.

According to Jain (2021), the following are the top seven qualities to consider when analyzing cryptocurrency.

1. Security

The ideal digital money will be built with safety as its primary design principle. This means that in addition to two-factor verification and complicated passwords, it will have additional security measures against hacking.

2. Stability

Sometimes it may seem paradoxical to aim for steadiness in the cryptocurrency market. After all, widespread use by consumers, merchants, and governments is necessary before cryptocurrency can be considered secure.

But this does not mean reliable digital assets like Ether and Cryptocurrency do not exist. XRP and BTC have seen an increase in transaction volume over time, typical of cryptocurrencies. This is how the perfect cryptocurrency eventually finds its footing. Investing in cryptocurrency that follows this paradigm is a good strategy.

3. Scalability

To gauge a cryptocurrency's liquidity, we look at how many transactions can be confirmed or processed in a given time. In the world of blockchains, there are numerous fast and reliable methods for settling transactions.

4. Supply

The primary disadvantage of regular or paper money is that it can be easily created in any amount. Some experts have warned of an imminent credit disaster due to the widespread availability of quick currency released to bolster economies during Covid-19 lockdowns.

Cryptocurrencies, however, solve this funding problem without needing physical currency. There is a cap on the total number of tokens produced for a given currency. Cryptocurrency, for example, has a fixed supply of 21 million coins.

For a cryptocurrency to be seen as beneficial, it must take measures to guarantee a constant supply of coins.

5. Decentralisation

The whole purpose of cryptocurrencies is to decentralize power away from centralized institutions like banks and governments and give it to individual users instead. Although attempts to identify Satoshi Nakamoto, one of Cryptocurrency's defining features is that no one knows who created it. However, to influence their worth, some coins work to weaken the blockchain's autonomous nature.

6. Demand

The coin is attracting interest from the media and may grow in prominence as word-of-mouth spreads, and it is made available on platforms like WazirX. The more people are aware of cryptocurrencies, the more valuable they will be, and the sooner they will be invested.

7. Use case

One of the most fundamental aspects of cryptocurrencies is their use to trade one form of currency for another, be it for services or goods. However, few individuals give this any thought at all when making a cryptocurrency purchase.

It is debatable whether or not Cryptocurrency can become a safe-haven money due to its low dependence on centralized exchanges and its ability to spread investment portfolios. When the epidemic first started, COVID-19 was responsible. However, after October 2020, Cryptocurrency's value skyrocketed. In March 2021, it was increased to $60,000. Compared with other financial assets, this finding may indicate that cryptocurrency has received a bullish indication from the COVID-19 epidemic.

2. Literature Review

Table 1 describes the comprehensive literature on cryptocurrency during the study period.

Table 1. Cryptocurrency: a summary of comprehensive reviews from (2013-2022)

Author and year	Title	Findings
Barratt et al. (2013)	Internet content regulation, public drug websites, and the growth in hidden Internet services	This research indicated that drug-related websites, which the filter would most likely prohibit, helped to reduce harm. People might get more thorough and relevant information from these sites than they could from other sources. Underground Internet services like Satin Street have evolved unaffected by Net censorship. The helplessness of any authority to oversee the Tor internet site and the digital currency Cryptocurrency presents an exclusive contest to remedy prescription regimes.
Karlstrom (2014)	Do libertarians dream of electric coins? The material embeddedness of Cryptocurrency	This research investigated the implications of Cryptocurrency's continued spread. If the currency succeeds, it will impact many economic institutions, including the prospect of taxing invisible funds, the overall debt economy and lending rates, and international money management.
Cheung et al. (2015)	Crypto-currency bubbles: an application of the Phillips–Shi–Yu (2013) methodology on Mt. Gox cryptocurrency prices	The authors of this study discovered that they conducted an econometric inquiry into the existence of cryptocurrency market bubbles using a newly established method that is resilient in detective work foams – Phillips et al. (2013a). As a result, we discovered several short-lived bubbles between 2010 and 2014; most notably, we found three massive foams in the concluding portion during the study period 2011–2013, each eternal between days 66 and 106, with the past as well as the enormous actuality the one "broke the camel's back."
Kraft (2016)	Difficulty control for blockchain-based consensus systems	They offer a strategy in this paper that performs far better at assuring consistent block times average over extended periods.

Kuo et al. (2017)	Blockchain distributed ledger technologies for biomedical and healthcare applications	This study aims to adopt blockchain technology to the biomedical and healthcare areas, including its benefits, drawbacks, and most recent uses.
Miraz and Ali (2018)	Applications of blockchain technology beyond cryptocurrency	This study aims to examine Blockchain technology's deployment for increased safety, recognize obstacles, and provide resolutions for Blockchain-aided security systems.
Caporale et al. (2018)	Persistence in the cryptocurrency market	The results reveal that the marketplace has determination (an optimistic connection between historical and upcoming values) and that the grade of persistence differs with a period.
Liu et al. (2019)	A Survey on Blockchain: A Game Theoretical Perspective	This study attempts to bridge the gap between a high amount of research on blockchain systems that use game theory as an analytical tool and a thorough survey of game-theoretical methodologies used in blockchain-related challenges. In this survey, researchers examine the game models offered to address significant challenges in the blockchain network. Security challenges include egotistical taking out, widespread occurrence, rejection of service attacks, mining management issues, such as computing authority distribution, recompense distribution, and puddle collection, as well as blockchain financial and liveliness exchange difficulties all addressed. They also discussed the benefits and drawbacks of the various game-theoretical models and solutions.
Caporale and Plastun (2019).	The day of the week affects the cryptocurrency market	This investigation uses a combination of arithmetical approaches and an exchange replication tactic to investigate the daytime of the work week's influence on the cryptocurrency marketplace. Unfortunately, most cryptocurrencies do not show this peculiarity.
Lizcano et al. (2020)	Blockchain-based approach to creating a model of trust in open and ubiquitous higher education	This study used a prototype to validate the created model, and the results were more than satisfactory.

Umar and Gubareva (2020).	A time-frequency analysis of the impact of the Covid-19 induced panic on the volatility of currency and cryptocurrency markets	The key findings indicate that cross-currency hedge techniques that might succeed in everyday marketplace situations are more likely to be unsuccessful in times of global catastrophes, such as the Covid-19 outbreak. They do, though, highlight key variations in currency market behavior that could be utilized to create efficient cross-currency hedges that can survive adverse effects.
Gurrib et al. (2022)	Energy cryptocurrencies and leading US energy stock prices: are Fibonacci retracements profitable?	According to the data, Fibonacci retracement covers liveliness stock price fluctuations better than cryptos. Furthermore, most price breaches occurred more frequently during price falls than during price gains, indicating that the Fibonacci device misses worth activities throughout bed and downtrends. Similarly, when the price breaches were studied three days before the present break, there were fewer successive retracement breaks. Finally, adding the price cross method to Fibonacci did not progress the outcomes and resulted in fewer or no transactions for near citizens. The findings show that, despite considerable declines in oil values, investors (traders) can instrument lucrative approaches when employing practical examination pointers, such as the Fibonacci retracement tool, with or without technical analysis indicators.
Koroma et al. (2022)	Assessing citizens' behavior towards blockchain cryptocurrency adoption in the Mano River Union States: Mediation, moderation role of trust and ethical issues	According to the analysis results, the study model explained R2 = 43 percent of the variance in citizen conduct and R2 = 45 percent of the variance in faith in cryptocurrencies. Additionally, the results demonstrate a favorable association between technological add-ons and resident behavior.

Source(s): Developed by the author

Tabulated in Table 1 above are the most frequently cited studies from systematic reviews from (2013-2022). The years 2013-2022 were chosen as the study's time frame. The tables contain three primary columns, i.e., author and year, the title of the article, and the findings. The primary topics covered in the academic articles are the ramifications of cryptocurrencies like Cryptocurrency and digital currencies like Ethereum. According to Karlstrom (2014), for instance, the currency's success may have consequences for taxation shadow money, the loan economy, interest rates, and global monetary policy. Kuo et al. (2017) conducted their study to

bring blockchain technology and its benefits, obstacles, and cutting-edge uses to the healthcare and biological sectors. Game models suggested to address key cryptocurrency network challenges have been investigated by researchers like Liu et al. (2019). The impact of COVID-19 on digital money is discussed in articles published in 2020.

2.1 Research gap and aim of the study

Table 1 demonstrates that many writers have studied cryptocurrency from different nations but have not evaluated global publishing patterns or focused on the most important variables affecting cryptocurrency acceptance.

This research aims to use citation network analysis to outline the conceptual structure supporting research on cryptocurrencies released between 2013 and 2022. In addition, we hope to learn which aspects of cryptocurrency studies are most crucial and which are most likely to be superseded shortly. Furthermore, it demonstrates the way forward for Cryptocurrency research and highlights the most frequently cited papers by consistent authors in high-quality journals at top universities globally. Scopus is used to accomplish these ends of the study.

The significant aim of this research is to characterize the present state of Cryptocurrency research based on the systematic literature review, with the following questions provided as a guide to the scope of the study**:**

Q1: To find out the most recent movements in Cryptocurrency publishing?

Q2: What are the primary themes in cryptocurrency, and what factors impact them?

Q3: How to analyze the Citation network of the cryptocurrency based on the previously published Scopus-indexed journals?

3. Research Methodology

In this study, the Scopus database is used. Scopus, Elsevier's bibliographic database, launched in November 2004. Scopus gives the broadest possible perspective on global research in science, technology, medicine, the social sciences, arts, and humanities. There are about 34,346 peer-reviewed journals on the top-level topics of biological sciences, social sciences, physical sciences, and health care. At the same time, Scopus includes almost 36,377 titles (22,794 active titles and 13,583 inactive titles) from approximately 11,678 publishers. In addition, it provides book series, academic journals, and industry publications.

Furthermore, Scopus annually evaluates the quality of all journals included in the database using four different quantitative measures: h-Index, CiteScore, SJR (SCImago Journal Rank), and SNIP (Science Normalized Impact Per Year) (Source Normalized Impact per Paper). In addition, Scopus searches include Lexis-Nexis searches with fewer options to help researchers find patents. Finally, Scopus's many functionalities make bibliometric research simpler. For example, journal name, document kind, publication year, authors' names and institutions, citation counts, and h-index metrics for papers are all useful operational functions Sweileh (2018).

Keywords were obtained from published cryptocurrency literature like Jalal et al. (2021). The search strategy was limited to documents published in academic journals but was not restricted to any language. While searching for the papers in the Scopus database, keywords like "Cryptocurrency", "Bitcoin" (Jalal et al., 2021; Nasir et al., 2021)," "blockchain technology (Nasir et al. 2021; Guo & Donev, 2020)," and "Distributing ledger technology (Messié et al., 2021; Guo & Donev, 2020)" were used to find the documents.

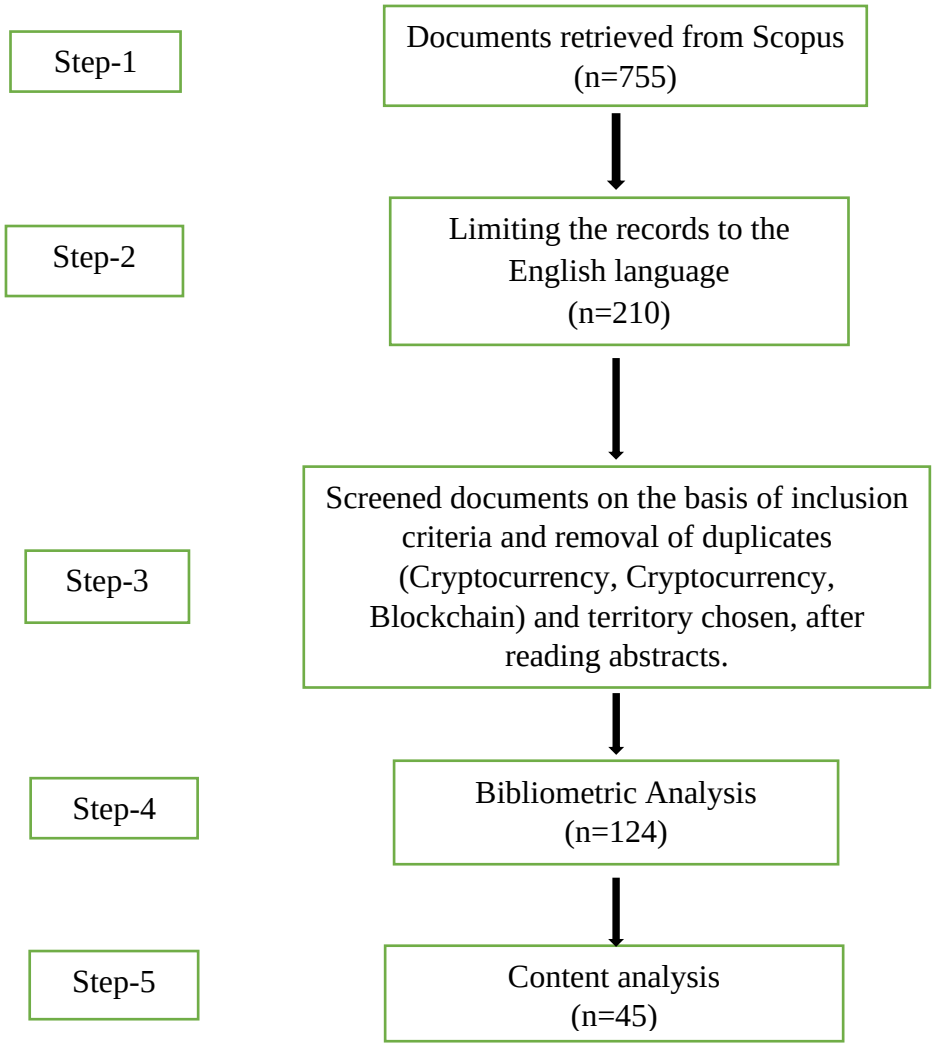
The study period considered for this study was between 2013 to 2022. It was determined based on the assumption that cryptocurrency attracted much public attention during that period. Colicev (2022). has stated that anonymous, encrypted electronic money has been around for a long time, but Cryptocurrency, the first decentralized cryptocurrency, was not made until 2009. In the following years, Name coin, Litecoin, and Peercoin came along, and cryptocurrency started to gain steam. By the end of 2013, there were more than 50 different types of digital currency. By the end of 2014, this number had grown by about ten times to more than 500. There are more than 20,000 cryptocurrencies in use right now.

A systematic review is critical in developing the evidence base (Tranfield et al., 2003). systematic review publication is a structured review that focuses on commonly used procedures, theories, and concepts. The framework-based and bibliometric study aims to create a model or framework. Bibliometrics is the most extensively used method for tracing a research field's knowledge of anatomy, and it is used to assess research subjects in this study. Bibliometric is open-source software for thorough scientific mapping analysis written in the R programming language. It can be upgraded continuously and integrated with other statistical R packages (Aria & Cuccurullo, 2017). It was first introduced by Pritchard and is used to analyze academic literature that has been published both quantitatively and qualitatively, as well as to chart the evolution of a research field over time (Pritchard, 1969). Aria from the University of Naples Federico created the Java program Biblioshiny, which combines the usability of web apps with the functionality of the bibliometric package (Aria & Cuccurullo, 2017). Systematic literature reviews are used to summarise the contents of the literature, identify future research needs and limit bias. To learn more about the domain, a bibliometric study is performed.

The most common bibliometric approaches are used to show commonalities between the cited publications and authors for this co-citation and bibliographic coupling research. In addition, the current study employs techniques such as Citation network analysis and publishing patterns. For clustering, keyword analysis and co-citation are also used. The research is carried out using VOS Viewer and R Software.

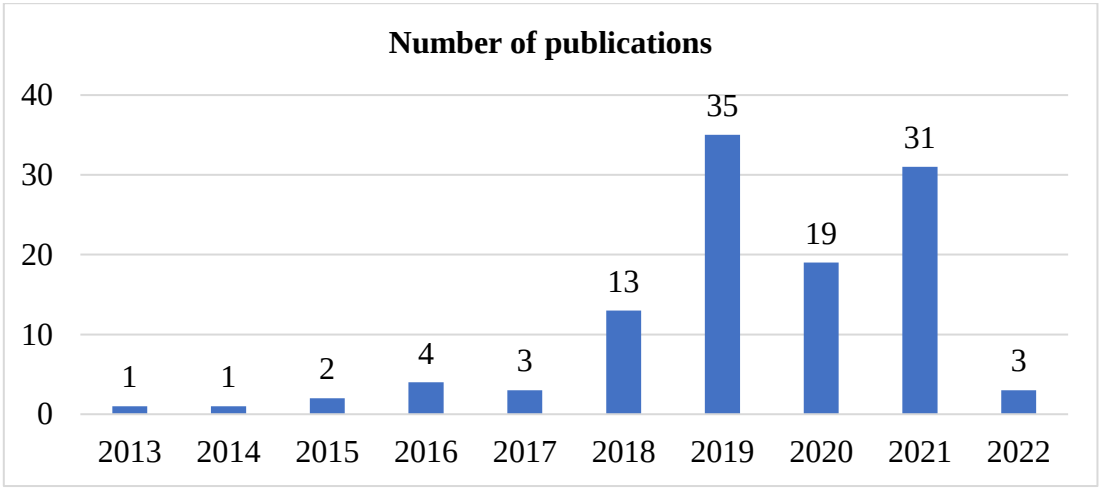
In VOS Viewer, the distance between things can be utilized to explain the relatedness of items. The "visualization of similarity" advises that the distance between things be narrowed (VOS). The VOS Viewer was used to feed 124 articles for bibliographic coupling and co-citation analysis, as well as citation, co-citation, and keyword analysis. For content analysis, 45 articles were chosen. Figure 1 presents the data inclusion and exclusion criteria in detail.

4. Analysis and Interpretation



Source(s): Developed by the author

Figure 1. Data retrieval process of cryptocurrency from 2013 to 2022



Source(s): Developed by the author based on the Bibliographic Data from SCOPUS

Figure 2. Publication of trend studies on cryptocurrencies from 2013 to 2022

Figure 2 shows the evolution of Cryptocurrency-related publications in the Scopus database from 2013 to 2022. The most significant number of papers related to cryptocurrency was published in 2019.

4.1 Publication outlets on cryptocurrency from 2013 to 2022

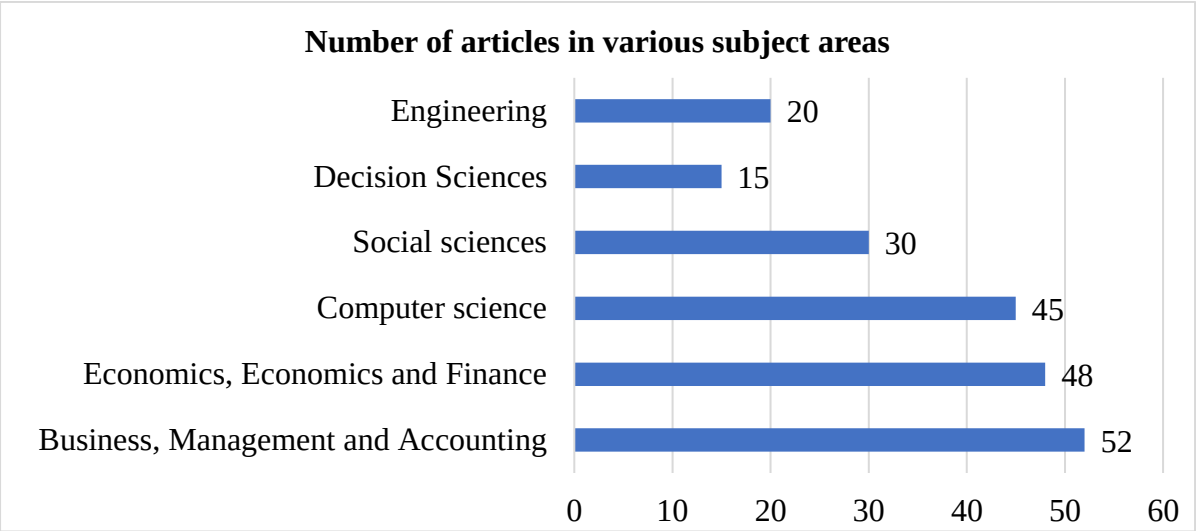
Table 2 lists the most well-known periodicals that were published on cryptocurrency. The top journals published 45 of the total publications examined. For example, the leading journal, Current Issues in Auditing and International Review of Financial Analysis published four articles. Cryptocurrency is a hot topic in the marketplace, so it deserves to be covered in these publications. Furthermore, the Scopus database contains an Academic Journal Guide for many of these publications.

Table 2. Leading Journals on Cryptocurrency from 2013 to 2022

Journal Name	Publisher	AJG rank	TP
International Journal of Finance and Economics	Wiley-black well	3	1
China Economic journal	Taylor & Francis	1	1
Applied Economics	Taylor & Francis	2	1
Current issues in Auditing	American Accounting Association	2	2
Econometrics	M D P I	1	1
Empirica	Springer Nature	1	1
Electronic Markets	Springer Nature	2	1
International Review of Financial Analysis	Elsevier	3	2
Geo Forum	Elsevier	2	1
Journal Of Banking Regulation	Springer Nature	2	1
Journal of International Financial Markets, Institutions, and Money	Elsevier	3	1
Journal of Evolutionary Economics	Springer Nature	2	1
Journal of Behavioral and Experimental Finance	Elsevier	1	1
Journal of Financial Econometrics	Oxford university press	3	1
Journal of Industrial and Business Economics	Springer Nature	1	1
Journal of Forecasting	Wiley-black well	2	1
Journal of Behavioral and Experimental Finance	Elsevier	1	1
Journal of International Financial Markets, Institutions, and Money	Elsevier	3	1
Journal of Evolutionary Economics	Springer Nature	2	1

Source(s): Analysis of Bibliometric Data from SCOPUS using VOS viewer, R software

Notes: TP = Total publications; AJG = Academic Journal Guide rating provided by the Chartered Association of Business Schools, 4* = original research journals with highest impact factor,4 = original research with second highest impact factor,3 = original research journals publishing but not necessarily with a high impact factor, 2 = standard research journals publishing with acceptable, 1 = standard research journals publishing with satisfactory.



Source(s): Developed by the author based on the Bibliographic Data from SCOPUS

Figure 3. Papers covering the most important aspects of cryptocurrency from 2013 to 2022

Figure 3 depicts the intricate relationship of cryptocurrency with other academic disciplines such as economics, finance, business management and accounting, computer science, engineering, decision sciences, and the social sciences. The implication is that the subject is interdisciplinary. Interestingly, few studies have been done in other areas, especially business, management, and bookkeeping. Numerous studies have been conducted on cryptocurrency, all centered on money. Cryptocurrency's potential impact on society's smooth functioning is unclear, which may account for the lack of study in the choice sciences. Due to vast social disparities and low reading levels, cryptocurrency study in underdeveloped nations is complex.

4.2 Authors of note, as well as the organizations and nations with which they are related

According to the selected data, 332 authors belonging to 261 organizations from 56 countries have published papers on cryptocurrency so far. According to their total number of publications, the top contributors are listed in Table 3. Guglielmo Maria Caporale is prolific with three publications (Caporale et al., 2018; Caporale & Plastun, 2019; Caporale & Plastun, 2020), followed by Alex Plastun with two publications (Caporale & Plastun, 2019; Caporale & Plastun, 2020). These two writers are well-known in the area and have written numerous articles about cryptocurrency.

Table 3. Top Authors based on publications and citations of cryptocurrencies from 2013 to 2022

Top Authors	Total publications	Total Citations
Caporale G.M.	3	147
Plastun A	2	143
Hardly W. K	2	14
Trimborn S	2	14
Kassim S	2	4
Ajouz M	2	4
Abdullah A	2	4
Hiramoto N	2	2
Tsuchiya Y	2	2
Gur rib I	2	1

Source(s): Analysis of Bibliometric Data from SCOPUS using VOS viewer, R software

4.3 Top organizations based on publications and citations from 2013 to 2022

Table 4 shows that Sumy State University in Ukraine is the most active Cryptocurrency-focused institution, with two publications. Department of Accounting and Finance ranked second on the list. Finally, although only one paper was published, the Department of Health Services Research, had the most citations during the study period.

Table 4. Top Organisations published studies on cryptocurrency with citations

Top organizations	Total publications	Total Citations
Sumy state university, Ukraine	2	143
Department of Accounting and Finance	1	152
Department of Finance and Banking	1	152
Brunel University London, the United Kingdom	1	98
CESifo and Dew, Berlin, Germany	1	98
University of Navarra, Spain	1	98
Department of interdisciplinary studies	1	67
Division of health services research	1	427
Institute of Mathematics	1	158
Use the health department of Biomedicine	1	425

Source(s): Analysis of Bibliometric Data from SCOPUS using VOS viewer, R software

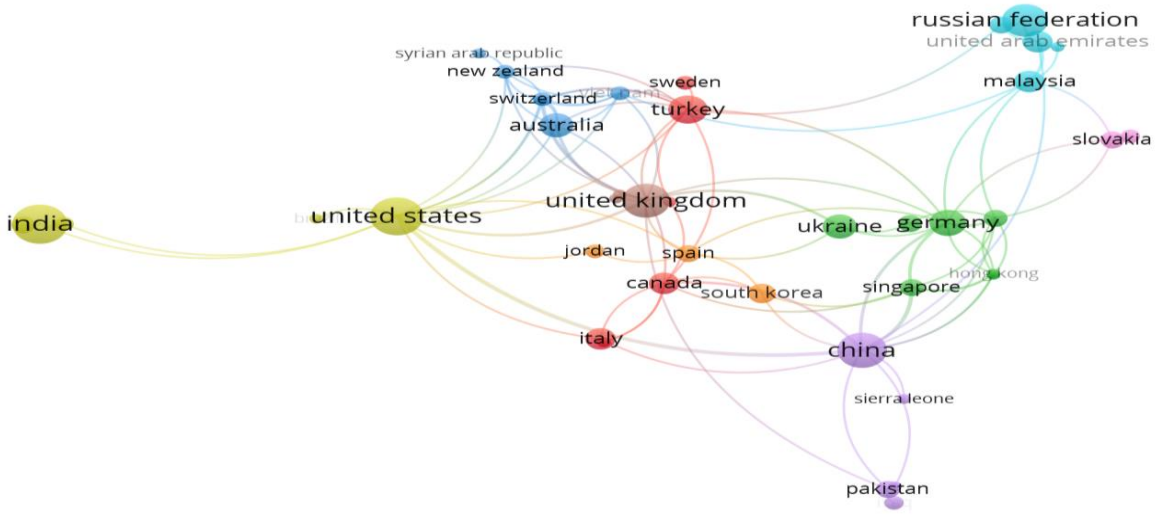
4.4 Top nations based on publications and citations of cryptocurrency from 2013 to 2022

Table. 5 lists the top nations that published research papers on cryptocurrency during the study period. India, with 16 research papers, stood first, followed by the United States (15), China (13), the United Kingdom (12), and the Russian Federation (12 articles) are the top four countries in terms of cryptocurrency.

Table 5. Country-wise publications and citations on cryptocurrency from 2013 to 2022

Nations	Total publications	Citations
India	16	77
United States	15	586
China	13	152
United Kingdom	12	280
Russian Federation	11	62
Turkey	8	20
Germany	7	127
Australia	6	203
Ukraine	6	151
United Arab Emirates	5	48

Source(s): Analysis of Bibliometric Data from SCOPUS using VOS viewer, R software



Source(s): Analysis of Bibliometric Data from SCOPUS using VOS viewer, R software

Figure 4. Country-wise publications and citations on cryptocurrency from 2013 to 2022

4.5 Citation network analysis on cryptocurrency

The citation count of a text determines how many citations it has received over time. Documents with a higher citation frequency are considered more influential and productive than those with a lower one. Therefore, citation analysis is the most effective method for determining a research paper's impact. For example, the essential articles about cryptocurrency were determined by analyzing the 124 articles with the help of citation network analysis through VOS Viewer and R Software.

Between 2013 and 2022, the top 10 articles about cryptocurrency that were most frequently mentioned locally and globally are shown in Table 6. Global citations are related to the number of times an article has been citation d in other works across all databases, fields, and research topics—for example, CAPORALE.GM, 2019, FINAN RES LETT, ranks first with 98 citations. Six categories are represented in Table 6: the most-cited cryptocurrency authors, their local citation counts, the relationship between their local and global citation counts, and the standardized local and global citation counts. For instance, while the top cryptocurrency author has received 1026 mentions worldwide, only 14 have come from within their own country.

In addition, the fraction of a work's total citations from the author's home country can be gleaned by looking at the disparity between the author's local and worldwide citations. For example, Tsuchiya (2021) has the highest notable ratio proportion of any author, at 50, with 2 citations (1 local and one international). Following this is Hotz-Behofsits (2018) at 7.14%, with a total of 14 citations across the world and just 1 in the local area. Next is Alshamsi (2019), which has a 5% ratio, one local citation count, and 20 GC.

More pieces worldwide have been mentioned than from any one country. (Numerically and proportionately). If the work of emerging academics mentioned in the local literature gets the scholarly attention it merits, cryptocurrency may experience a dramatic change.

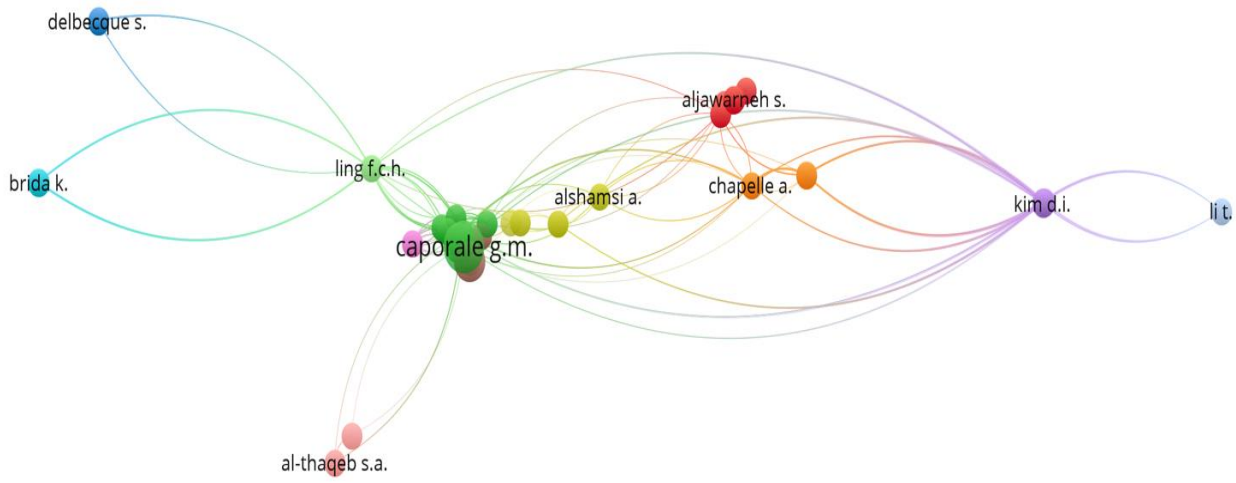
Table 6. Topmost publications based on the number of citations received locally as well as globally from 2013 to 2022

Author	Local Citations	Global Citations	LC/GC Ratio (%)	Normalized Local Citations	Normalized Global Citations
Caporale Gm, 2018, Res Int Bus Financ	3	98	3.06	9.75	4.06
Cheung Aw-K, 2015, Appl Econ	3	152	1.97	2	1.99
Tsuchiya Y, 2021, For Sci Int: Dig Investigation	1	2	50	31	1.77
Umar Z, (2020). J Behav Exp Finance	1	43	2.33	31	4.81
Caporale.Gm, 2019, Finan Res Lett	1	45	2.22	11.67	5.94

Alshamsi A, (2019). Int J Hum Comput Stud	1	20	5	11.67	2.64
Hotz-Behofsits C, 2018, J Forecast	1	14	7.14	3.25	0.58
Kuo T-T, 2017, J Am Med Informatics Assoc	1	427	0.23	1.5	2.86
Kraft D, 2016, Peer-To-Peer Netw Appl	1	158	0.63	4	3.51
Karlstrã˜m H, 2014, Distinktion	1	67	1.49	1	1

Source(s): Analysis of Bibliometric Data from SCOPUS using VOS viewer, R software

CAPORALE GM, 2018, RES INT BUS FINANC, ranks top in local citations with three. The most well-known studies paving the way for more research on cryptocurrency are Caporale Gm, 2018, Res Int Bus Financ, Cheung Aw-K, 2015, Appl Econ. The network's most prominent well-connected nodes containing a lot of Local Citations are depicted in Figure 5. A study with many local citations is considered a significant work in the Cryptocurrency literature review.



Source(s): Analysis of Bibliometric Data from SCOPUS using VOS viewer, R software

Figure 5. Citation network on Cryptocurrency

The top ten publications were compared based on the number of citations. Out of that, only one out of ten highly cited papers (Caporale G.M) was found in the above figure.

4.6 Keywords analysis of cryptocurrency from 2013 to 2022

The study keywords represent the topics of the study papers. The most prominent themes in cryptocurrency were explored using the software VOS Viewer and keyword analysis. Table 7 displays the highest number of phrases used in Cryptocurrency investigation from 2013 to 2022. The keyword "Blockchain" is the most frequently used, with 47 appearances, showing that it

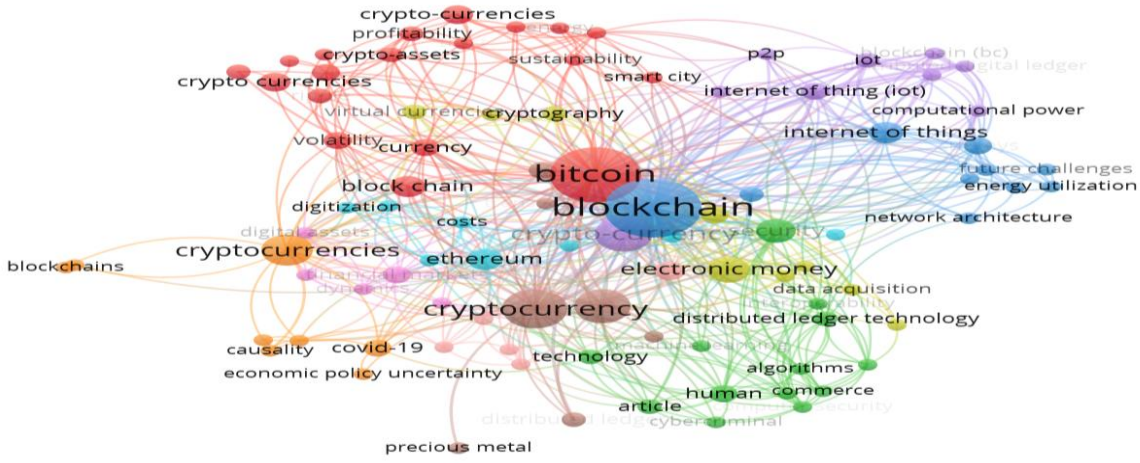
is used as a related idea in the literature, followed by "Bitcoin" (41 instances) and "Cryptocurrency" (21 occurrences).

Table 7. Top Keywords of Cryptocurrency based on the occurrences from 2013 to 2022

Keyword	Occurrences
Blockchain	47
Bitcoin	41
Cryptocurrency	21
Crypto-currency	17
Cryptocurrency	16
Cryptocurrencies	13
Electronic money	9
Security	8
Internet of things	6

Source(s): Analysis of Bibliometric Data from SCOPUS using VOS viewer, R software

Table 7 shows that the research found no agreement on how to describe cryptocurrency and that this absence of agreement compels authors to use the terms regardless of their precise meaning. The finance community frequently uses the words Cryptocurrency, Blockchain, Bitcoin, and Distributed Ledger Technology equally. Figure 6 shows how Cryptocurrency, Blockchain, Bitcoin, and Electronic money are commonly associated with cryptocurrency. It demonstrates the ties between Cryptocurrency and the Blockchain and how cryptocurrencies function.



Source(s): Analysis of Bibliometric Data from SCOPUS using VOS viewer, R software

Figure 6. Network of keyword co-occurrences in cryptocurrency from 2013 to 2022

Cryptocurrency is risky to people's savings and a hassle to use. Given Cryptocurrency's complexity, this study aims to provide the most comprehensive assessment of the ever-changing cryptocurrency subgenres through methods like bibliometric analysis. This research is helpful for lawmakers, financial market authorities, and academics who want to learn more about cryptocurrency. Over the past decade, there has been a massive increase in the quantity and quality of coin studies.

5. Discussion

Cryptocurrency, the first cryptocurrency or decentralized digital money, used blockchain technology to track transactions. Since then, many new coins have been introduced, each with different features and uses Swan (2015). Cryptocurrency may enhance security, financial equality, and transaction speed, all while disrupting the status quo of traditional banking organizations Yermack (2015). This literature study can help find and evaluate these advantages. Conversely, Cryptocurrency has several disadvantages, such as price fluctuation, legislative limitations, and security worries Kshetri (2018). Issues like these can be identified and evaluated by doing bibliometric analysis with the help of literature studies. Since cryptocurrency acceptance and utilization are just starting, such an analysis can shed light on factors that matter (Böhme et al. 2015). These implications may be answered and evaluated by conducting a bibliometric analysis and systematic literature review on cryptocurrency.

Bibliometric findings are helpful for researchers and scholars. First, they can help researchers find untouched areas and new research topics. Gandal et al. (2018) advocate expanding the scope of blockchain studies beyond the financial sector. Böhme et al. (2015) suggested that more research is needed to understand the potential pitfalls of cryptocurrency legislation. Second, academics and scholars can use bibliometric findings to stay current Alnajem et al. (2021). Scholars can identify seminal works, writers, and theoretical frameworks by analyzing publication citation trends. Scholars now have a foundation upon which to expand and improve the region. Third, Bibliometrics has the potential to impact cryptocurrency legislation. The dangers associated with unlawful behavior can be mitigated if authorities and law enforcement agencies control marketplaces and payment providers, as Böhme et al. (2015) suggest. Supply chain management and governance are two examples of non-financial blockchain uses that argues the need for government attention to mitigate adverse social and economic outcomes Gandal et al. (2018). Fourth, cryptocurrency scholars and students can better identify emerging patterns and holes in their understanding using bibliometric analysis. The results have implications for Cryptocurrency theory, practice, and regulation.

The bibliographic analysis is being used increasingly in the study of the cryptocurrency environment. Some of the most innovative tools for analyzing bibliometric data are being developed in this area. With the help of a co-citation analysis tool, researchers can examine how frequently two or more papers cite one another. Key areas and emerging patterns in the study of cryptocurrencies have been found using co-citation analysis. Using co-citation analysis, Huang (2015) determined which Cryptocurrency papers were the most influential and discovered they were primarily concerned with technological problems. A collection's most common terms and sentences can be identified using keyword analysis. Rising patterns and subjects in the study of cryptocurrency have been found through keyword analysis. Using keyword analysis, Kim et al. (2021) identified blockchain technology and cryptocurrencies as the most frequently appearing concepts in the cryptocurrency literature. The bibliographic coupling method considers the intersection of citation d citations to establish the relationships between works. Using bibliographic coupling, researchers could chart the flow of ideas in the cryptocurrency research community and identify pockets of overlap.

Using bibliographic coupling, Wang et al. (2019) determined the seminal works in the cryptocurrency literature and created a mental picture of its conceptual architecture. Research can help you determine your area's most influential and productive authors. Cryptocurrency studies have used authorship analysis to track critical players and uncover common patterns. Using authorship analysis, it is determined which Cryptocurrency writers produced the most content overall. Numerous innovative bibliometric strategies have been implemented in the research of cryptocurrencies. Some instances are authorship analysis, bibliography coupling, and keyword analysis. Researchers have found that using these methods has helped them better comprehend the conceptual framework of the cryptocurrency literature and its development over time.

6. Conclusion

Cryptocurrencies have emerged as a new asset class, and individuals and organizations often face investment decisions related to cryptocurrencies. Decision science techniques, such as risk analysis, portfolio optimization, and behavioral economics, can be applied to assess the risks and potential returns associated with cryptocurrency investments. These techniques help investors make informed decisions based on risk tolerance, financial goals, and market conditions.

Primarily, this research adds to the existing body of crypto-related literature by conducting thorough Citation network studies using Scopus as a comprehensive database, thereby, shedding new light on the conceptual structure of cryptocurrency research. While this study does provide a detailed snapshot of the current state of Cryptocurrency research, it also paves the way for future studies by illuminating the holes in the field and suggesting directions for future investigation. Researchers, lawmakers, and academic practitioners can all benefit from this study's analysis of the patterns surrounding new coins.

Blockchain technology tracked deals for cryptocurrencies, the first cryptocurrency. This research review can identify and assess these benefits. Cryptocurrency's drawbacks include price volatility, legal restrictions, and security concerns. Literature studies and bibliometric research can identify and evaluate such issues. Since cryptocurrency adoption and use are just beginning, such a study can illuminate essential aspects. Studies show that technology adoption increases with trust and usefulness. Cryptocurrency could disrupt money, finance, and foreign trade. A cryptocurrency bibliometric study and thorough literature review can address these consequences.

The results of bibliometric studies can significantly affect cryptocurrency regulation by leading academics to previously unexplored areas and new research subjects, broadening the purview of blockchain studies, keeping them up-to-date, and revealing essential works, authors, and theoretical frameworks. Researchers also suggested that more research is needed to understand the potential pitfalls of cryptocurrency legislation. Supply chain management and governance are two examples of non-financial blockchain uses that argue for government attention to mitigate adverse social and economic outcomes. Scholars and pupils of cryptocurrencies can benefit from bibliometric research in several ways, including identifying new trends and filling in knowledge gaps.

The study made use of a bibliometric analysis of cryptocurrency literature. From the Scopus database, 210 papers were culled that dealt with cryptocurrencies between 2013 and 2022. This time frame was chosen because it is commonly accepted as the period during which cryptocurrency adoption skyrocketed, and thus, when the public's attention was most captivated by the phenomenon. A lot of emphasis was placed on choosing the correct terms. Cryptocurrency, Cryptocurrency, Blockchain, and Distributed Ledger Technology were some terms used. Data networks and spread were visualized by entering the articles into the VOS browser and R software. Figure 2 shows just 35 of the many papers released in 2019 cited in the study conducted over ten years. The most well-known cryptocurrency publications are listed in Table 2 of the poll. Figure 3 shows how fields like Economics and Finance, Business Management and Accounting, Computer Science, Engineering, Decision Sciences, and Social Sciences are connected to cryptocurrency. This chart exemplified why more investigation into cryptocurrency was needed in decision science. This suggests that studying Cryptocurrency in emerging nations is difficult due to significant social disparities and poor reading levels. As shown in Table 3, we reveal 332 authors representing 261 different groups from 56 countries who have written articles on cryptocurrency. We find that Guglielmo Maria Caporale is the most cited author in this area with three works and 147 Citations up to the moment of our study. We also find the most Cryptocurrency-focused institution is the Sumy State institution in Ukraine, which has produced two papers up to the moment of our study. As shown in Table 5 we find that India gets the most publications in the area, followed by the United States, China, the United Kingdom, Russia, and so on, and the United Arab Emirates comes in last place regarding cryptocurrency-related publications. On the other hand, we show in Table 6 the top ten most-cited cryptocurrency-related papers from 2013 to 2022, both domestically and internationally, and show the top keywords of Cryptocurrency in Table 7 based on the research's topic analysis. The study claims no consensus on defining cryptocurrency, leading authors to use varying terms. In finance, words such as cryptocurrency, blockchain, cryptocurrency, and distributed ledger technology are often used equally. Nevertheless, cryptocurrency research has seen a significant uptick over the past decade (as shown in Figure 6) and is increasing at an impressive rate.

7. Limitations and scope for future research

The present study concentrated only on the papers published in the Scopus database. Web of Science, PubMed, and the Stoical Sciences Research networks are other sources that might contain additional papers matching the search terms. On the other hand, articles not released with a DOI and freely available online through means such as Google Scholar were also not included. Thus, an extension of our paper could include sources of research like the Web of Science, PubMed, the Stoical Sciences Research networks, and Google Scholar in the analysis. In this paper, we show that "Cryptocurrency" was also used online to locate relevant information for the investigation. Further investigation into this topic could also reveal new or complementary viewpoints. Moreover, Cryptocurrency, Blockchain, and Electronic Money could also provide a solid foundation for future study.

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