



International Journal of Management Practice

ISSN online: 1741-8143 - ISSN print: 1477-9064

<https://www.inderscience.com/ijmp>

The policy endorsement of central bank digital currency - trend analysis and research scope using bibliometric review

Srijanie Banerjee, Manish Sinha

DOI: [10.1504/IJMP.2024.10058536](https://doi.org/10.1504/IJMP.2024.10058536)

Article History:

Received:	31 March 2022
Last revised:	04 May 2023
Accepted:	01 June 2023
Published online:	03 December 2024

The policy endorsement of central bank digital currency – trend analysis and research scope using bibliometric review

Srijanie Banerjee* and Manish Sinha

Symbiosis Center for Management and Human Resource Development,
Symbiosis International University,

Plot Number 15, Rajiv Gandhi Infotech Park, MIDC,

Hinjewadi, Pune, India

Email: srijanie_banerjee@scmhrd.edu

Email: manish_sinha@scmhrd.edu

*Corresponding author

Abstract: The digital advancement is moving at a faster pace especially after the outbreak of the pandemic has paved the way for advancement of digital currency. The moving era of digital currency introduces digital wallets and the commencement of central bank digital currency (CBDC) – a centralised system. The intention behind this paper is to centralise the idea of a bibliometric analysis to gain insights regarding the literature status, authors contributing to the topic, major countries where the study is prominent and also to focus on the research gap to understand the future objective of research. The bibliometric analysis is done using two famous peer reviewed journals indexed in Scopus and Web of Science. Therefore, this paper will aim to provide an overview for researchers to give a synoptic insight of the status quo which manifests the contemporary trends of central bank digital currencies.

Keywords: cryptocurrency; blockchain; central bank digital currency; CBDC; bibliometric analysis; Scopus; Web of Science.

Reference to this paper should be made as follows: Banerjee, S. and Sinha, M. (2025) 'The policy endorsement of central bank digital currency – trend analysis and research scope using bibliometric review', *Int. J. Management Practice*, Vol. 18, No. 1, pp.64–91.

Biographical notes: Srijanie Banerjee is a Research Scholar at Symbiosis Center for Management and Human Resource Development (SCMHRD), Pune, India. She has earned her Masters of Arts from Rabindra Bharati University, Kolkata, India. Apart from academics, she is proficient with statistical software. Her research interests include macroeconomics, econometrics and machine learning for economics.

Manish Sinha has done his Post-graduation in Economics from Gokhale Institute of Politics and Economics and doctorate from Symbiosis International University. He has been in the field of post graduate management education since the last 22 years. He has taught subjects like microeconomics, macroeconomics, global business environment, international finance and debt market in India. He also has to his credit publication of various papers in referred national and international journals and also a monograph titled 'Business, Society and Government'. He has also been a part of various corporate consultancy assignments at SCMHRD which dealt with econometric modelling and demand forecasting aspects of business. His current area of work is asset markets and monetary policy.

This paper is a revised and expanded version of a paper entitled ‘The policy implication of central bank digital currency – a bibliometric analysis’ presented at International Conference on Advances in Management and Technology, Noida, India, 24–26 February 2022.

1 Introduction

The word cryptocurrency has gained momentum since 2008. We can define it as binary data, designed as a medium of exchange that does not rely on banks to verify transactions. Currencies in digital form have been around for a while. Still, one of the most peculiar consequences of the great financial crisis was the formation of a virtual currency called Bitcoin that does not rely on financial intermediaries (Böhme et al., 2015; Nakamoto, 2008). But when we talk about the central bank digital currency (CBDC), it is a digital form of an economy’s fiat currency. It has grown in response to changes in the payment system and increased dependence on technology caused by the pandemic outbreak. The acclaim of the CBDC is due to technological breakthroughs that have attracted the central banks of the world economy through digital money and online payment techniques (Pana, 2021). The announcement of the expected implementation of the cryptocurrency in 2009 serves as a trigger note for systematic digital currency planning (Turskytė and Šapkauskienė, 2021). The potential benefit incorporated with the introduction of CBDC lies in individuals’ economising on their dependency on cash transactions. This event has the tendency to increase government revenue through seigniorage since the introduction of CBDC will have its own cost-effective measures. It can be envisioned that the advancement of technology in the financial sphere, specifically in the banking sector, is the future. As of 2021, according to the Bank of International Settlements (BIS), a survey reveals that 86% of the Central Bank is researching CBDC. In recent years, CBDC has had the potential to become a digital banknote; the difference lies in the fact that CBDC is backed and issued by the Central Bank and is centralised, while cryptocurrency is fully decentralised. It is a combination of liabilities for the Central Bank with universal accessibility and digital acceptance, where both cash reserves and bank accounts on digital wallets are involved. The CBDC can be categorised as

- indirect CBDC – is indirectly handled by the central bank and claimed by intermediaries who handle retail payments
- direct CBDC – is a legal claim on the central bank
- hybrid CBDC – is a direct claim of the central bank with an intervention of the private sector.

As a large part of the global economy adjusts to the CBDC, it is becoming more popular. Recent data shows that seven countries, like the Bahamas, Nigeria, Saint Lucia, etc., have already implemented the CBDC. There are 16 economies that are running pilot projects, including some major countries like Sweden, the UAE, and Saudi Arabia. Other majors include 14 countries in the development stage and 40 in the research stage, including nations like India, Australia, and Germany. It is based on the same concept of blockchain

technology as cryptocurrency, with the central bank controlling it. The digital currency has a lot of benefits. For example, it can be used as a faster alternative to the traditional payment system, since it does not need information and takes less time to make a transaction than traditional methods. It has its own cost-effective measures for transferring funds across international boundaries. One of the most striking features of a blockchain-based payment system is its reduced transaction cost. Duffie (2019) also stressed the merchants' need for a faster payment system with considerably lower interchange fees. Smith and Kumar (2018) exemplified this by comparing the cost of transactions to be 8–9% with international remitters, but it came down to 1% for transactions held in bitcoin. The reason for considering bitcoin as a cryptocurrency substitute is that it is a relatively strong cryptocurrency that has sparked debate across ideological lines (Zhao, 2021). Most cryptocurrency transactions can be traced or linked to wallet addresses, making them public cryptocurrencies, according to a basic technical definition. Then there are the cryptocurrencies that use distributed ledgers to provide anonymous transactions. These coins obfuscate a user's true wallet balance and address, and they may merge many transactions to avoid chain analysis. Private cryptocurrencies are what they're called. The CBDC is a combination of cryptography and digital ledger technology (DLT) that comes up with a proposal for a technology-driven variant of money supply endorsed by the Central Bank. It, therefore, becomes the liability of the Central Bank to access this payment system. The problem with cash lies in its cost-effectiveness. Its issuance and circulation require expensive infrastructure. However, certain issues with the existing cryptocurrencies, like scalability and energy bills, have not been solved. This is due to the proof of work (PoW) for a secure public network. The shortcoming is the ease with which DLT platforms have emerged. Using the new consensus protocols and networks, DLT is not only increasing performance but also validating transaction procedures. This is improving scalability and processing efficiency. A study proposed a two-tier retail CBDC concept that extends the CBDC tokens exchanged via the DLT network to the general public via commercial banks (De Lis and Sebastián, 2019). Another aspect of the study is the policy implementation of CBDC. According to the Bank of Canada, a study notes that issuing a CBDC is not likely to help central banks improve the effectiveness of their monetary policy. The infrastructure will depend on whether the type of CBDC is wholesale or retail. While the wholesale model does not seem to have problems, the retail model is complex to analyse. There are obviously many questions about whether CBDC will have an effect on the economy and whether it will be a substitute for bank deposits. However, the major limitations of digital currency are related to volatility measures. The risk associated with digital currency is mainly due to its volatile nature with respect to the liquidity of its exchange rate, which results in market disequilibrium. Also, the possibility of being vulnerable to fraud poses a big threat to consumers. Various studies have revealed that because most transactions are anonymous, the transfer of funds via digital currency may be vulnerable to criminal activity. This makes the need for the CBDC to control the digital currency of its nation as a centralised monetised system. The bibliographic technique is a quantitative analysis of publications. Here we have focused on two of the most popular peer-reviewed journals, Scopus and Web of Science. The bibliometric analysis is antiquated to visualise the research prominence in the relevant scope of the study, and the surging trend objective of CBDC in recent years.

To talk about the bibliometric analysis may be defined as the quantitative study of the bibliometric evidence for delivering a scientific pictorial view of the proposed study that

might be associated with different categorical subsets of the analysis of the research trend in the relevant field (Merigó and Yang, 2017).

We want to look at the most important information and points of view on the CBDC topic with the help of this bibliometric analysis, outlining what appears to be the next steps to take and possible research directions.

Using bibliometric and content analysis of 174 Scopus documents (Bhaskar et al., 2022), the paper presents the publication trends in CBDCs since 2018 and highlights the top publishing source with the most contributing authors in their affiliated countries. We discuss CBDC research trends, gaps, and future priorities while highlighting notable papers, key themes, and the CBDC literature's intellectual framework. Research interest in the systematic framework, importance, and structural implications of CBDC as a structural shift in the digitisation of the financial system fuels. CBDCs could lead to a global currency and affect monetary and payment systems. CBDCs and international trade and assets, especially cryptocurrencies, are being studied by researchers. Therefore theoretical, contextual, and methodological advancements are needed.

Central banks are being prompted to examine their position in an increasingly digital environment as a result of rapid technological advancements in electronic money and means of payment. The global financial and monetary systems are undergoing fundamental revisions at the moment, prompting a variety of responses from policymakers, one of which was the introduction of digital currencies by central banks. Pana (2021) paper uses performance, cocitation, and co-word analysis of the retrieved literature to describe the most important journals, countries, people, authors, as well as newly developing areas of study in the realm of central bank digital currencies.

The alignment of the paper is generally in the following fashion: the data source and methodologies are introduced in the first segment. Second, the analysis results are presented from two main aspects of the bibliometric inquiry, namely, a descriptive methodology followed by a relational methodology. Under the descriptive methodology analysis based on research growth, citations, patent rights, the contribution of the authors in the relevant field of research, affiliations of the organisations, topological spread, and beneficent subjects are considered. Moving forward with the relational methodology, keyword and co-citation analysis are being considered. The analysis is based on recent journals from Scopus and Web of Science, and it employs network mapping and density mapping. Finally, some implications and future research directions for such a perspective are discussed.

2 Data and methodology

A comprehensive study was done by collecting data from the Scopus-indexed journals and the Web of Science (WoS) directory. Scopus and the WoS database are the largest abstracting and indexing databases in the world. Scopus is updated every day, while the WoS database is updated once a week. Also, a lot of reputable journals that publish research use the Scopus database for bibliometric and content analysis. We use the Scopus database to get bibliographic information about documents that have been written about CBDC. The information from 2018 to 2022 can be looked at (Bhaskar et al., 2022; Patel et al., 2022). An appropriate keyword is critical in identifying articles that are relevant to the study. For this paper, we explore the keywords and titles of the articles in

the Scopus and WoS databases. The initial document search of Central Bank Digital Currency gives 166 results in Scopus and 61 results in WoS. To conduct the analysis, certain inclusion and exclusion criteria are set in the database for extracting relevant data. For the inclusion criteria, we confine the study to language parameters and incorporate all papers that are in English from the Scopus and WoS databases, published in the time span of 2018 to 2022. We take into consideration articles, book chapters, and review articles for those publications that are in the final stages. The articles that meet the exclusion criteria are those from conferences, workshops, and editorials. Furthermore, any language other than English is not considered. Publications of those articles in the press are also excluded. The time span is considered strictly keeping in mind the common time span available for both Scopus and WoS databases. The keyword focuses on 'central bank digital currency', 'electronic money', 'CBDC', 'blockchain', 'monetary policy' and 'cryptocurrency'. For data extraction and synthesis, the foremost objective was to get appropriate literature for review. After refining, we get screened data from 154 documents in Scopus and 57 documents in WoS. Data related to the publication of papers, citation of the relevant papers, contributing authors, subject area, access, and the location was extracted from the Scopus and WoS database. The data collected were analysed using Excel and VOSviewer for data visualisation. The data comparison was done between Scopus and WoS to get a better comparative analysis of the recent research trend. In an effort to identify the most relevant field of study, certain criteria were taken into consideration. The prominent among them are subject matter, the importance of the subject on the basis of findings, and accessibility of the content and the paper. The call for present-day analysts requires a comprehensive awareness of scientific behaviour for concluding logical interpretations (Gauthier, 1998). There are two broad categories for classifying the bibliometric study. To apprehend the volume and impact of research, descriptive indicators, for example, a listing of papers, citations, and patent rights are considered to determine and identify the research trend. A frequently used methodology grounded by the calculation of scientific publications, for example, authors, institutions of the ongoing research, country-wise analysis or geographical scope, and subject area or disciple associated, refers to the enumeration technique. To consider the relationship signifying the liaison between the co-author, co-word, and co-citation for the interacting flow of knowledge, the Relational Indicators classification technique is on the leading edge.

In this section, a comparison study is done based on the bibliometric data for different parameters, such as the number of papers published per year, the number of citations per year, the types of open-access papers, the subject area, the main author who contributed to the study, the document type, the source type, and an analysis of the CBDC by country. Bibliometric analysis shows a quantitative analysis. The goal of a thorough bibliometric analysis was to comprehend the uniqueness of literature, the vigilance for research, authors, and papers with the greatest number of publications, and citation analysis. For research growth, the bibliometric analysis provides insight into the academic advancement of the implementation of digital currency in the economies of the world. For the purpose of the study, various diagrammatic representations are used. The most prevalent visualisations of statistics in mainstream and technical literature applied in this study are bar graphs and pie charts. The notion that these visualisations are relatively basic is one of the fundamental characteristics. Bar charts are visual representations of facts that have been grouped together. It is used to compare two sets of data that are not related. The pie chart is another example of a visual representation. Pie charts enhance

data comparison by providing immediate analysis and the capacity to quickly interpret information based on facts given in a planned and efficient manner. A geographic graph, which is a plot featuring intersections associated with geographies, is applied in addition to the aforementioned two. Furthermore, we used VOS viewer because VOSviewer's capacity to manage big maps is a crucial characteristic. VOSviewer can readily generate maps with a large number of objects, and it can display maps with more than 10,000 objects (Van Eck and Waltman, 2011). VOSviewer's zooming, scrolling, and searching capabilities make it possible to examine big maps in depth. When displaying a map, VOSviewer employs a specialised algorithm to identify which labels can be displayed and which cannot be displayed without overlapping. The use of VOSviewer is sufficient in this study, since it is working on a small set of data, and hence CiteSpace and Sci2 are not considered.

The components of a bibliometric analysis are nodes and edges. The nodes may be articles, journals, researchers, or keywords, for instance. The edges represent the relationships between two nodes. The most widely examined types of relationships are citation, three keywords, and co-authorship relationships. Regarding citation relations, one can differentiate between direct citation relations, co-citation relations, and bibliographic coupling ties. Typically, bibliographic networks are weighted networks. Therefore, edges not only indicate if there is a relationship between two nodes but also the strength of that relationship.

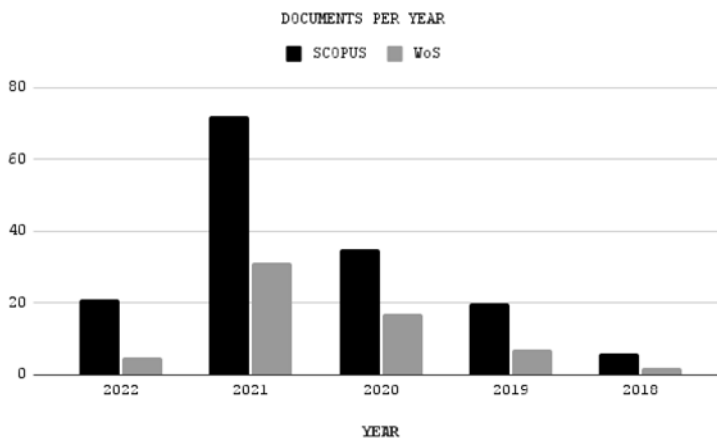
3 Analysis

3.1 Descriptive analysis

3.1.1 Research growth

The chronological publication trend in displaying the number of papers published each year is reflected by the growth pattern of research when the keyword search of 'central bank digital currency' is procured.

Figure 1 Documents published per year



Source: Scopus and Web of Science database

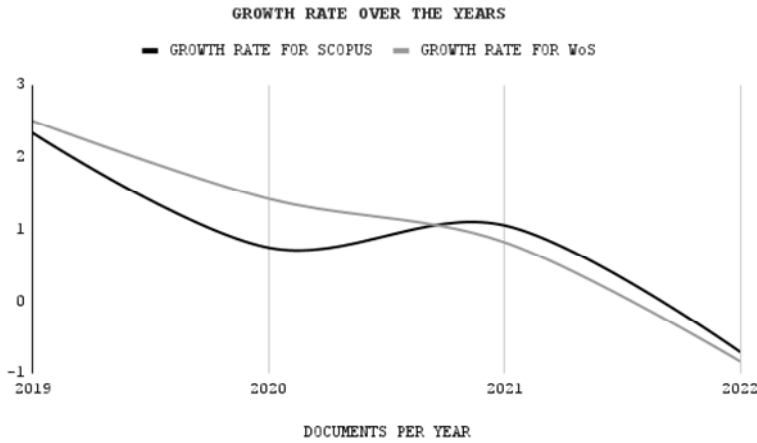
The yearly published paper is visualised in Figure 1. From 2018, the rapid expansion of research in the CBDC has been steadily increasing for both Scopus and WoS. From 2018 to March 2022, the maximum number of papers was published in 2021. The upward trend indicates that more papers are being accepted for publication each year. Also, the publication in Scopus-indexed journals is included in the count of WoS-indexed journals.

We calculate the growth rate of published papers over the span of 5 years. To define the growth rate, we calculate

$$G_n = \left(\frac{\text{Papers published in year } n}{\text{Paper published in year } n-1} \right)^{1/n} - 1$$

The pattern shows a substantial growth in the proportion of papers published illustrated in Figure 2 raising the curve in 2019 for both Scopus and WoS-indexed journals. The degrading curve towards 2022 can be reasoned as the fact that we collected data till March 2022, and further publications are highly anticipated.

Figure 2 Research growth trend



Source: Scopus and Web of Science database

3.1.2 Citation

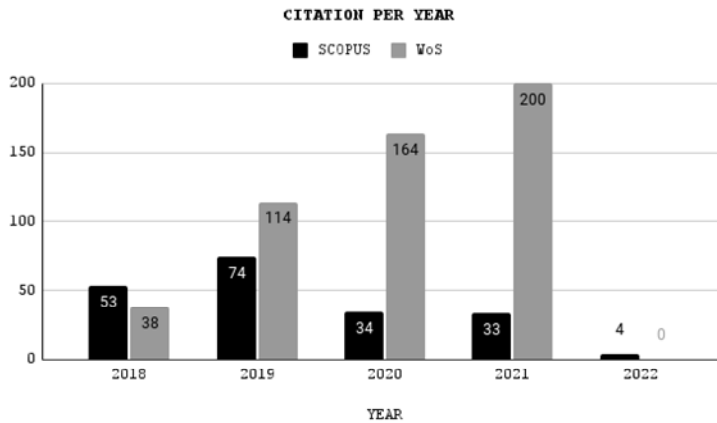
Bibliometric citation report helps determine the crucial journals and trending articles that researchers in the CBDC discipline should explore while conducting their analysis.

The citation pattern seems to increase for WoS but for Scopus there is an increase till 2019 and then a gradual decrease.

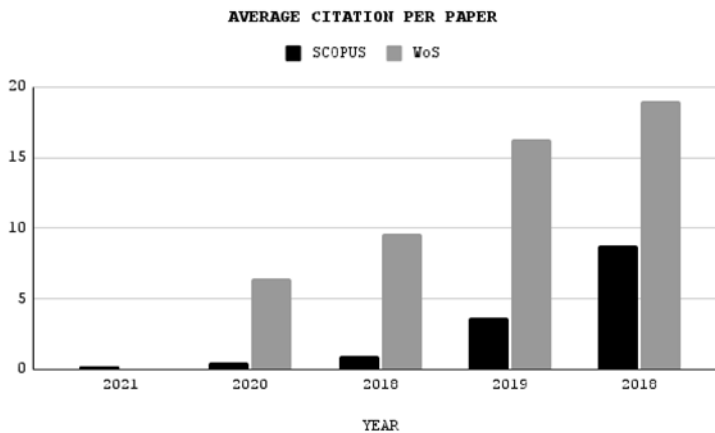
We focus on an analysis of the average citation per paper (ACPP) which is calculated as

$$ACPP = \frac{\text{Total number of citation in the year } n}{\text{Total number of paper published in the year } n}$$

A comparison is done between Scopus and WoS which helps to understand the influence of the journal. The average citation per paper provides insight as a useful indicator for determining a paper's impact.

Figure 3 Citation per year

Source: Scopus and Web of Science database

Figure 4 Average citation per paper over the years

Source: Scopus and Web of Science database

It is illustrated and thus conclusion can be drawn that the average citation for CBDC is highest for Scopus in 2019 and for WoS in 2021. There is a gradual decrease in the keyword search for Scopus and an increase in WoS.

Citation mapping, in conjunction with literature review, provides comparable effects with a detailed sociological perspective on how CBDC has progressed as a stream of research, how key research articles have been theorised and developed, and which potential research directions have a high socioeconomic or ecological impact. The application of a knowledge synthesis technique will help to define future research directions.

3.1.3 Patent contribution

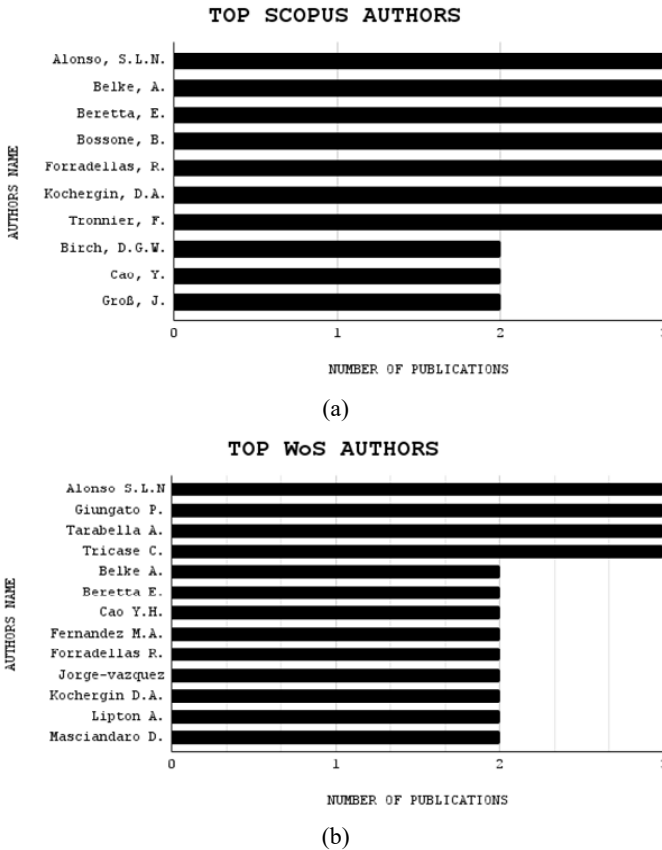
Another important aspect of descriptive indicators is the patent indicators. The top contributing organisations for patent rights are consigned with US Patent and Trademark Office, European Patent Office, and World Intellectual Property Organization concerning Central Bank digital currency as the preeminent attention.

There are 19 patents that correspond to the Scopus database but in the case of WoS, the issuance of patents is dismal. Hence, listing patents and citations becomes a major challenge.

3.1.4 Contributing authors

On the other hand, one of the extensive enumeration techniques is rationed accompanying the authors' contribution in the pertinent domain.

Figure 5 Top contributing authors for (a) Scopus and (b) WoS indexed journals



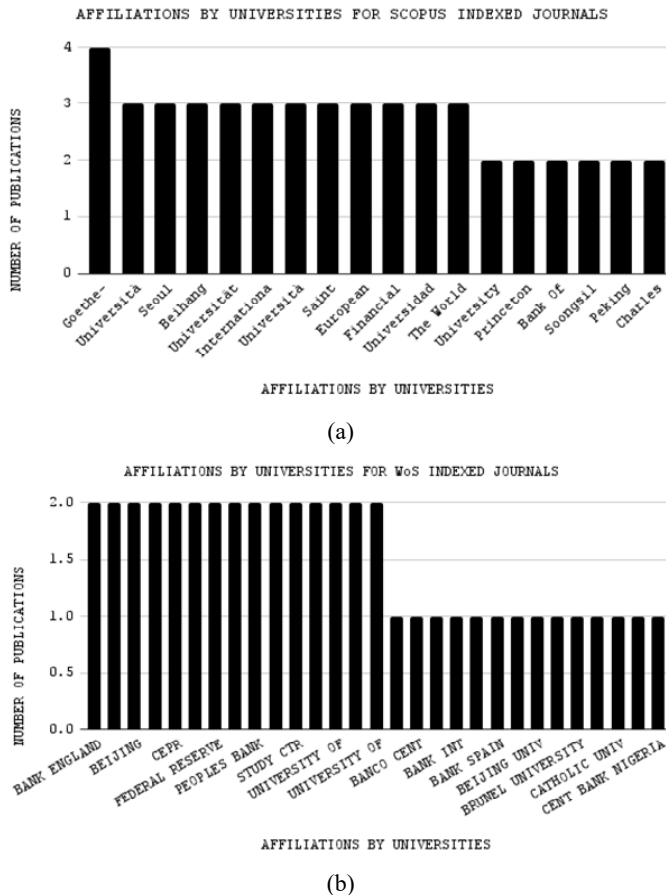
Source: Scopus and Web of Science database

The figure shows the top contributing authors in Scopus and Web of Science which strengthens the background in the field of research to identify which important journal to refer to in regard to CBDC. The common theme of these authors.

3.1.5 Contributing organisations

Affiliations of the institutions in the domain-specific study play a key role in understanding the pattern of region-specific research.

Figure 6 (a) Affiliations of the Scopus-indexed journals (b) affiliations of the WoS-indexed journals



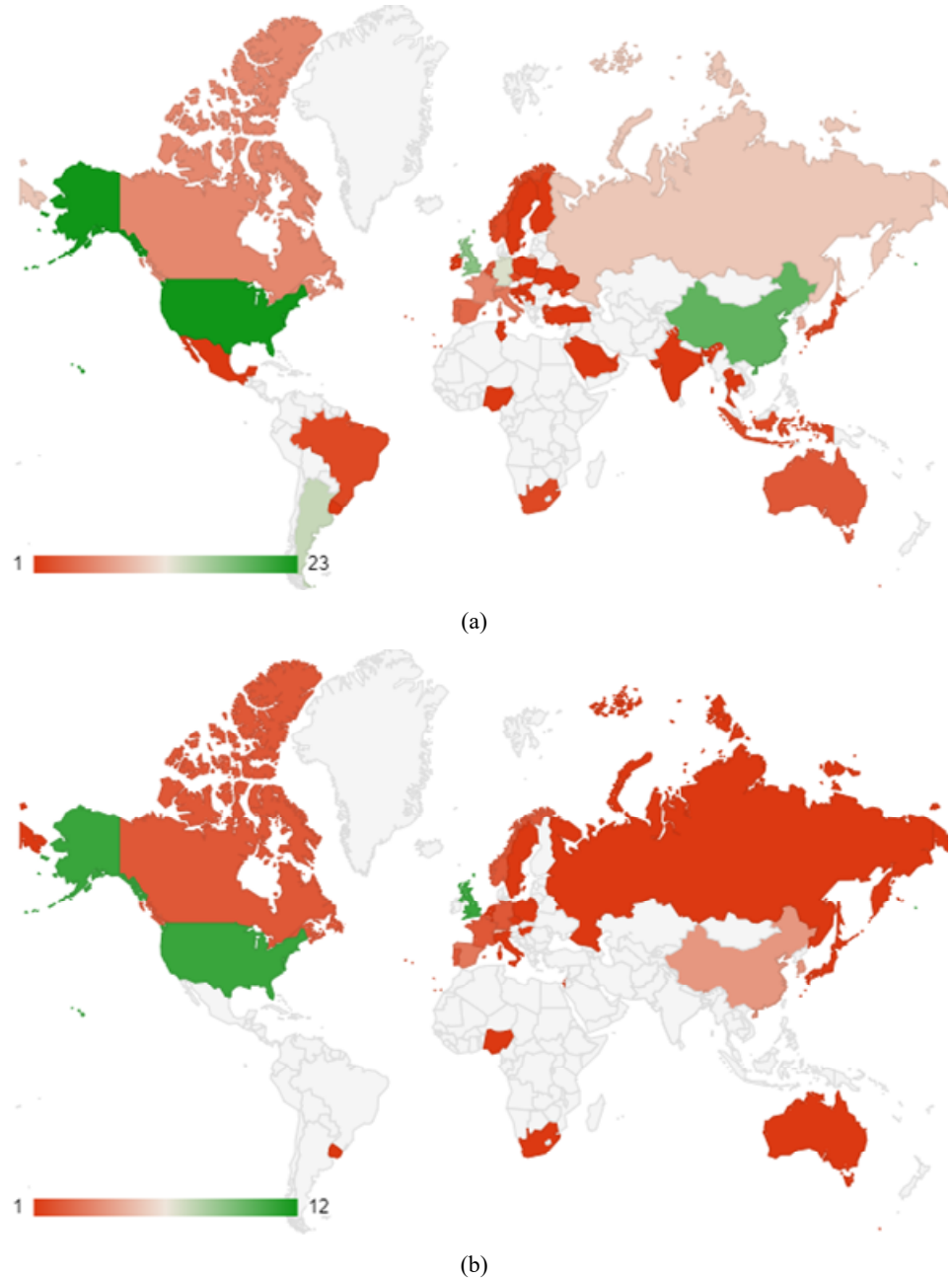
Source: Scopus and Web of Science database

3.1.6 Geographical escalation

Figure 8 highlights the countries that are contributing to more publications in CBDC as a research area. While Figure 8(a) shows the maximum publication country wise for Scopus, Figure 8(b) shows for WoS. The United Nations and China rank the highest for both Scopus and WoS contributing enormously. The implications such that many countries are yet to explore, as it is seen in the case of developing countries as diminutive and hence zenith future scope for country specific research. The diagram is represented in a scale motive where moving from red to green represents the movement from minimum

to maximum. Hence the country contributing the maximum for the research of CBDC is marked in black.

Figure 7 (a) Country wise research contribution for Scopus journals (b) country wise research contribution for WoS journals (see online version for colours)

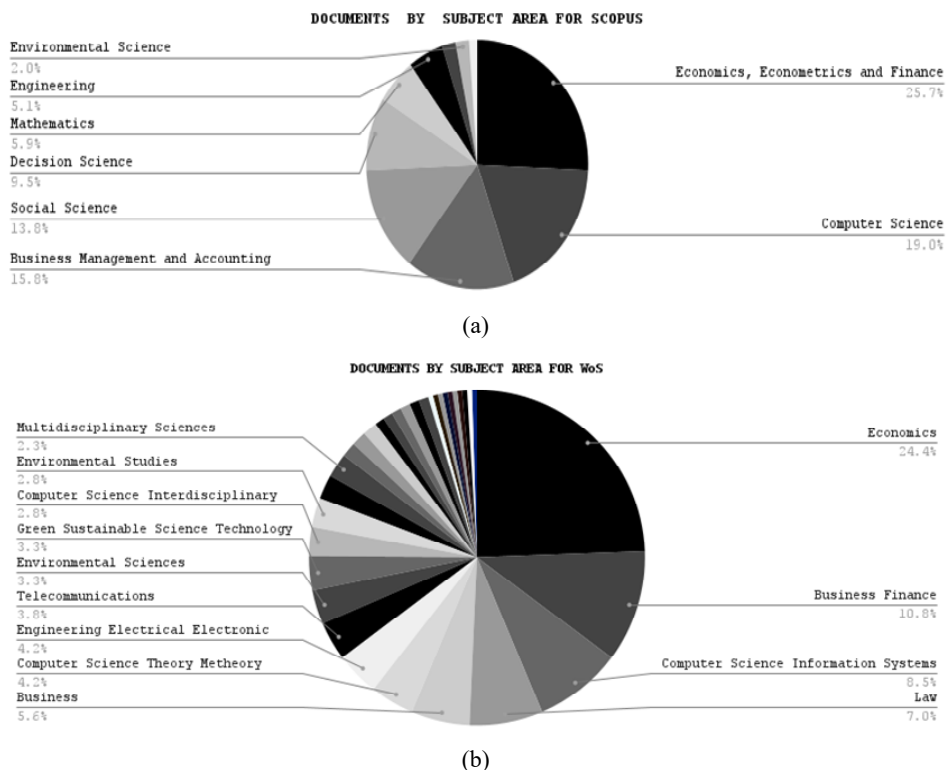


Source: Scopus and Web of Science database

3.1.7 Documents by subject area

The categorisation of articles based on subject area is demonstrated as a key aspect of the descriptive enumeration method for bibliometric analysis. The discipline with the key research is economics for both Scopus and WoS. The area highlighted by the subject area analysis focuses on economics, finance, econometrics, and computer science validating the advancement of technology in the digital economy. On average 25% of the research is contributed by these relevant disciplines. The diagrammatic representation is done by a pie chart where each segment demonstrates the percentage contribution of each subject. This information would help academicians and research scholars to identify which are the important journals to refer to for getting articles on CBDC and its policy implication, as well as which journals need to be targeted when positioning their research.

Figure 8 (a) Discipline of research contributing to Scopus journals (b) Discipline of research contributing to WoS journals



Source: Scopus and Web of Science database

3.2 Relational analysis

Using software VOSviewer, a comparative study is done to examine the keywords relevant as a network visualisation map of words frequently used. The software encapsulates data based on networking, layering, and intensity perceptions. The concentration evaluation is based on a wide range of other criteria that vary depending on

the level of items and clusters constructed. We have implemented VOSviewer to create and view bibliometric maps. VOSviewer may be used to create maps of authors or journals based on co-citation data or keywords based on co-occurrence data. The tool provides a viewer that permits in-depth examination of bibliometric maps. VOSviewer may display a map in a variety of ways, each highlighting a certain facet of the map. It offers zooming, scrolling, and searching capabilities, allowing for a deep analysis of a map. VOSviewer's viewing capabilities are particularly beneficial for maps with at least a considerable number of elements (e.g., at least 100 items). The majority of computer tools used for bibliometric mapping do not display such maps adequately.

3.2.1 *Keyword analysis*

Figure 10 shows the abstracts and prominent keywords from Scopus indexed journal and WoS indexed journals with a lot of prominence focusing on 'digital currency', 'cryptocurrency', 'central bank', 'monetary policy', 'bitcoin' and 'blockchain'. Each bubble shows the frequency of occurrence. What is depicted for every bubble is the magnitude reflecting the rate of occurrence of that keyword. Moreover, how they are correlated to their cluster holding is also graphitised by the same tint of thread, where each of the lines signifies their collaborative relationship. The colour of each bubble also shows the keyword the journals are associated with. The density is measured from blue to red as lowest to highest respectively. The overall figure shows an insight into the interconnectedness among keywords of higher frequency mentioned in the journals. The research keywords from the abstract VOSviewer have identified a number of sources that have supplied thorough information on the literature. Conceptual understanding of the trending research issues on CBDC was largely dispersed in:

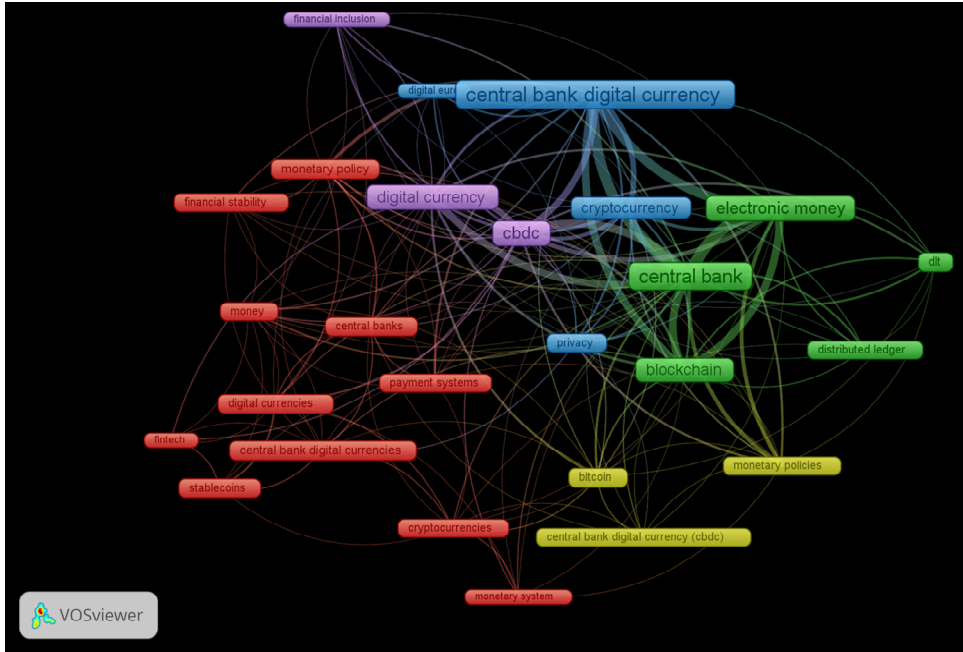
- a digital currency
- b central bank
- c blockchain
- d monetary policy
- e central bank digital currency, predicted on the high-frequency keywords.

There is an urgency of research which will be a promising option for study in Central Bank Digital Currency Policy Implications.

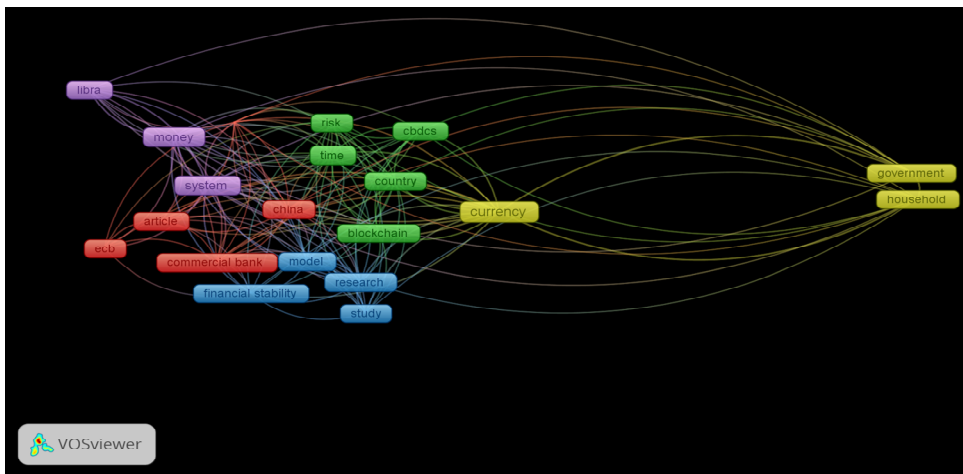
Moving ahead we consider the density analysis based on the saturation of keywords formed from the items categorisation and cluster formation. This gives a better insight into the prominent keywords. The items with the same visual cluster density are labelled as item dots based on hue. This approach is convenient and hence gains an encapsulation of the underpinning of the bibliometric map. It is worthwhile taking density maps into consideration for better acceptance of the elements essential for investigation.

The density cluster map is visible where there are item clusters. Quite identical to item density mapping, cluster mapping is presented for each cluster of objects. The importance lies in the fact that cluster analysis dispenses an observation based on how keywords are assigned to the clusters and how the clusters are interconnected to the keywords.

Figure 9 (a) Abstracts and keywords network from Scopus-indexed journals (b) Abstracts and keywords network from WoS-indexed journals (see online version for colours)



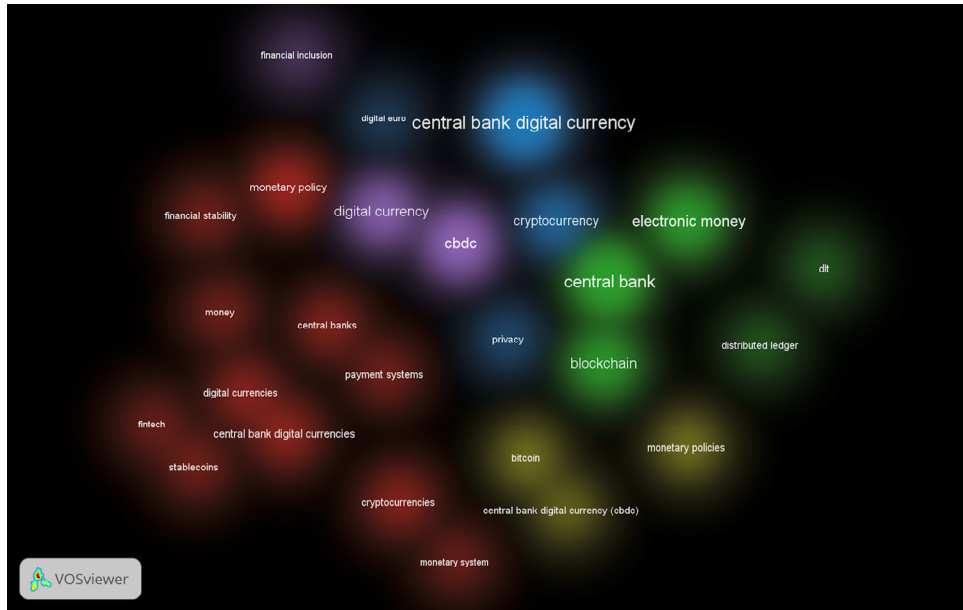
(a)



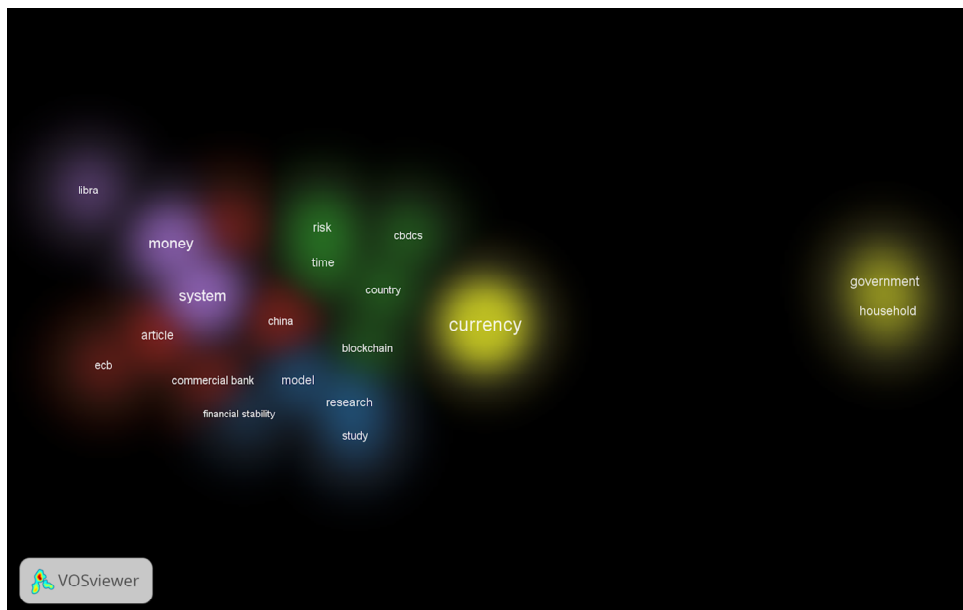
(b)

Source: VOSviewer software

Figure 11 (a) Abstracts and keywords cluster density map of the Scopus-indexed journals
(b) Abstracts and keywords cluster density map of the WoS-indexed journals



(a)



(b)

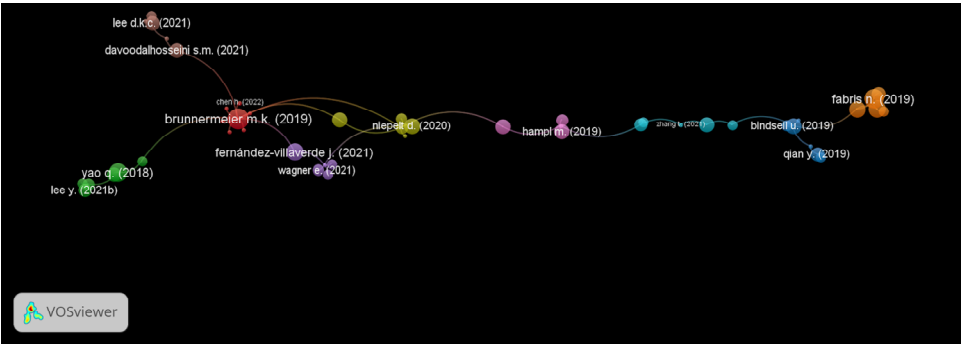
Source: VOSviewer software

Table 1 Keyword statistical analysis

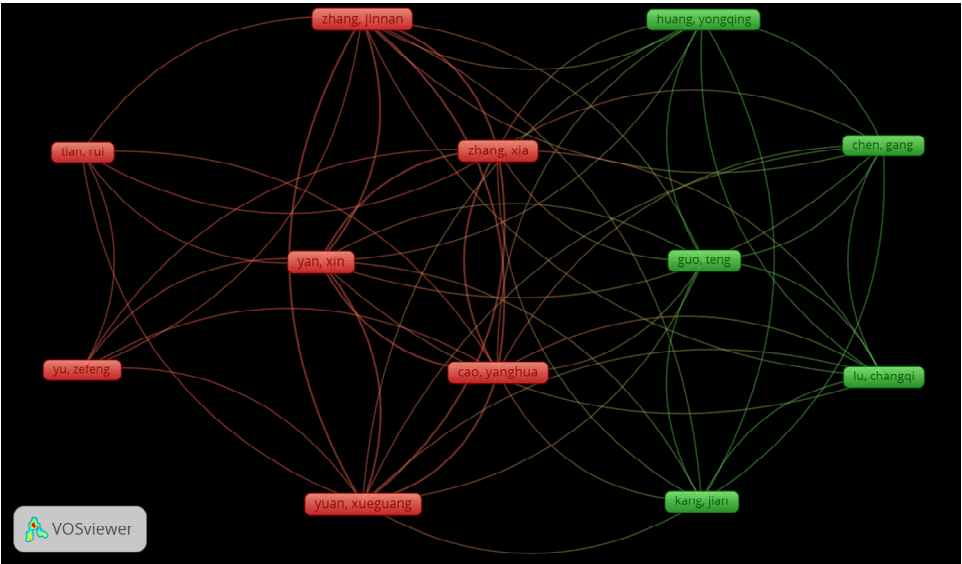
	<i>Scopus</i>	<i>WoS</i>
ITEMS	43	16
CLUSTERS	4	4
LINKS	699	101
TOTAL STRENGTH	10,160	1,790

Source: VOSviewer software

Figure 13 (a) Co-citation mapping of the Scopus-indexed journals (b) Co-citation mapping of the WoS-indexed journals (see online version for colours)



(a)



(b)

Source: VOSviewer software

3.2.2 Co-citation analysis

The objective behind co-citation analysis is to identify the crosslinking research parameters executed by the authors for recognising researchers associated in this field (White and McCain, 1998). Aiding the determination of the scientific publication, co-citation analysis becomes important when a researcher cites a paper and thus the frequency of the focused area becomes more influential.

The analysis of the co-citation based on items, clusters, links and total strength is reported in Table 2 as how the repercussion of the co-citation networking is interlinked.

Table 2 Co-citation statistical analysis

	<i>Scopus</i>	<i>WoS</i>
ITEMS	12	13
CLUSTERS	2	2
LINKS	56	40
TOTAL STRENGTH	8.50	9.00

Source: VOSviewer software

4 Discussion

A review of the citations for policy implications of CBDC as a whole shows that it is a new area of research that is being worked on by many developed countries. However, it has a lot of room for expansion in the contexts of different countries because it is a new system that many countries around the world will be adopting. It is easiest to understand how much CBDC could change the economy when monetary policy and how it interacts with a fiscal policy are clear (Bordo and Levin, 2017). For future research studies, it is also helpful to know the top authors, sources, and disciplines that have contributed to the literature. Also, both databases' keyword analysis and co-citation analysis give information about the most popular keywords, like 'digital currency' and 'central bank digital currency'.

A thorough look at the literature shows that a centralised digital currency is the most cost-effective way for countries to use digital money. There is an ongoing discussion about how the supply of money should be regulated, how volatile cryptocurrencies are, and what that might mean for digital money. It also looks at inflation and digital ledger technology, which could change how hedging works and adapt to traditional currency. After looking at the delicate balance between the problems policymakers face when introducing digital currency and how monetary policy has changed in the past to deal with threats to financial stability, digital currency needs to replace paper money as a legal form of payment. However, there is still a risk associated with the introduction of CBDC (Belke and Beretta, 2020). The goal is to figure out why the old way of making payments was better than digital settlement tools. In their study 'Cryptocurrencies and fraudulent transactions: risks, practices, and legislation for their prevention in Europe and Spain', Sanz-Bas et al. (2021) point out that it is important to find out how people and criminal groups use cryptocurrency phenomena to commit fraud, as well as to give an overview of the tools that Spain has made to fight these crimes. Without a doubt, cryptocurrencies are good for the economy, but it's important to understand the crimes and risks they've

caused in order to stop them. This leaves a hole in the market for a different way to control crime. There has been a remarkable change in the sphere of digital currency due to the ongoing pandemic (Alonso et al., 2021a, 2021b; Fernández et al., 2021). The paper ‘Central Banks’ monetary policy in the face of the COVID-19 economic crisis: monetary stimulus and the emergence of CBDCs’ analyses the economic crisis caused by the COVID-19 pandemic and how it affects the monetary policy implications of the world’s major economies. According to the paper, central banks pursue expansionary monetary policy and respond in a predictable manner. The ongoing debate on whether a central bank can potentially introduce a CBDC by eliminating cash is being researched by the major economies internationally. An assessment of whether a central bank can bear two forms of fiat currency, paper, and digital money, involves an interpretation of the digital currency’s potential interest-bearing attribute and the cost-effectiveness of holding it. There are two scenarios that may arise: CBDC and cash as perfect substitutes and CBDC and cash are not perfect substitutes. Assuming perfect substitutes exist. If the transaction cost of carrying CBDC is low, CBDC can be employed as an optimum policy; otherwise, cash is favoured over CBDC. Welfare under coexistence may be dominated if the cost is an intermediary. But this totally depends on the fact that this coexistence should not lead to the underutilisation of CBDC. If there is underutilisation associated with CBDC. While CBDC and cash are not perfect substitutes, it is optimum to prefer both. For the study the model is based on Lagos and Wright (2005) with two means of payment: paper money and legally backed digital money is used (Davoodalhosseini, 2021). The monetary economist strives for transparency and a systematic approach toward monetary policy, thereby interfering with the central bank’s accountability toward the public. The preliminary objective is to provide provision for the interest rate associated with CBDC as a tool of monetary policy. On whether the CBDC be served as an asset or liability to short-term government holdings in agreement to meet the demand for CBDC. It provides the transactional confidentiality of cash, but crypto transactions use distributed ledger technology based on blockchain technology for long-distance transactions without the involvement of a middleman. The CBDC possibly can adopt the technological element of the transaction mechanism. The transaction units become more distinct thereby the looming blockchain technology is allowing reciprocated micropayment protocol indulging several transactions between parties.

There’s also a lot of misinformation about what private cryptocurrencies are. They have yet to be recognised by the authorities. Most cryptocurrency transactions are tracked by the wallet address, rendering them public cryptocurrencies, according to a basic technical definition. Then there are the cryptocurrencies that use distributed ledgers to provide anonymous transactions. These coins obfuscate a user’s true wallet balance and address, and they may merge many transactions to avoid chain analysis. Private cryptocurrencies are what they’re called. Nevertheless, the bill ensures that cryptocurrencies will almost certainly never become legal cash in India. The original goal of crypto was to find a sustainable alternative to existing fiat currencies. Crypto enthusiasts have long emphasised the open nature of cryptocurrency and believe that decentralised transactions are the way to go. In the digital era, central banks have both obstacles and possibilities. In a digital, sharing, and decentralised service economy, central banks must preserve public faith in fiat currencies in order to stay in the game. The central bank’s importance in the digital economy grows by making centralised digital currency more obligatory as a medium of exchange by providing a more genuine non-volatile unit of currency than decentralised crypto assets.

Regarding bibliometric analysis, the study involves creativity in technical visualisation for a better understanding of the economy (Castillo-Vergara et al., 2018). The study is based on Excel and VOSviewer for exploring the evaluation process of the research trend for the future scope of study and also contributing to the research gap in understanding the adaptability and accessibility of any field of research (Ding and Yang, 2020). The free software allows you to examine not only the network visualisation but also the relative strength of the links that connect to it (Van Eck and Waltman, 2011). For the Scopus-indexed journals, the possibility of firmness is determined by the total link strength of 10,160 and that of WoS which is 1,790, for keyword analysis. Also, the co-citation link strength is 9.00 for Scopus and 8.75 for WoS. More specifically, the subdivision of the links is specified showing interdependence (Table 12 in the Appendix). In conclusion for both aspects, the relative linkage and strengths of the items and clusters formed are stronger in Scopus.

5 Limitation

Apart from the fact that the topic under consideration is undoubtedly a vast field of scientific research to be designed in the near future, which is also at the source of current developments and findings, the report sees no special restrictions. There is a shortfall in the citation analysis since the papers published gained momentum in 2019 and the scope of research is relatively vast in terms of ongoing exploration. We consider that the results are focused on articles published in peer-reviewed journals in Scopus and Web of Science databases only. However, there may be some more relevant article sources like Google Scholar that can impact the study. The current time period focused is 2018 to November 2022. Any study occurring before and after the referred time span is eliminated from the study. Some articles might also get added from the time this paper is communicated to the presentation of the paper. The study is limited to CBDC and its policy implications. The authors acknowledge the possibility of missing some important research publications on CBDC and that some relevant records could be missing, if the query phrases used for topic searches did not match some records, because the focus of this study is limited to publications that mentioned MDM in the database and are publicly available on the website between 2011 and 2019. Ideally, future studies will cover a longer time frame to provide additional context for the subject, its practitioners, and their output. Hopefully, anticipating this publication will allow new researchers to more easily examine related works using visualisation and bibliometrics.

6 Conclusions

The bibliometric analysis adds to the existing literature review by giving more information about the growth of research and keyword analysis of the abstract. The average citation per paper also shows that journals have a big impact. Open access shows how often a topic is looked up. The evolution of technology is remarkably changing in this sphere of digital currency. This paper combined a graphical representation with a methodological examination of the ongoing topic of central bank digital currency and the monetary policy implications it can have on developed and developing economies. The provision for research in the study of CBDC broadens the scope in terms of implementing

the country's technologically driven currency to financial exchange across counters, which is backed by government and legislation. The indirect effects of the fiscal phenomenon of revenue generation compared with economic advancement allow the potential for further research. Given this study of bibliometric analysis, the aforementioned criteria have immense possibilities for future development in those fields.

One of the most talked-about things about CBDC right now is how it will be developed. There is still a need for more in-depth research into issues like the optimal CBDC design, the regulation and taxation of CBDC, the details of CBDC for each country and region, the country-specific implications on financial stability and monetary policy, the effect of CBDC on currency value, and the effects of CBDC on different and specific sectors of activity. But in this new setting, where cryptocurrency already exists, and demand for them is growing, the issuing of CBDC appears to be more of a question of when and how than of if.

The knowledge of CBDC has been greatly expanded by recent studies, particularly with regard to the significance of digital currencies, notably financial institutions, the impact of blockchain and Bitcoin technologies, and the diversity of digital currencies with respect to the central bank. This study evaluates the progress of CBDC, although there are still many ways to influence this sector. It provides further context for earlier research and adds to an examination of CBDC research outcomes utilising a large archive database. Overall, the analysis revealed a dearth of research, while studies on CBDC as a whole have been undertaken. There need to be more studies done on CBDC because of its potential for expansion and because it is a relatively contemporary field of study.

References

- Alonso, S.L.N., Jorge-Vazquez, J. and Forradellas, R.F.R. (2021a) 'Central banks digital currency: detection of optimal countries for the implementation of a CBDC and the implication for payment industry open innovation', *Journal of Open Innovation: Technology, Market, and Complexity*, Vol. 7, No. 1, p.72.
- Alonso, S.L.N., Jorge-Vázquez, J., Fernández, M.Á.E. and Forradellas, R.F.R. (2021b) 'Cryptocurrency mining from an economic and environmental perspective. Analysis of the most and least sustainable countries', *Energies*, Vol. 14, No. 14, p.4254.
- Andersen, L., Duffie, D. and Song, Y. (2019) 'Funding value adjustments', *The Journal of Finance*, Vol. 74, No. 1, pp.145–192.
- Belke, A. and Beretta, E. (2020) 'From cash to central bank digital currencies and cryptocurrencies: a balancing act between modernity and monetary stability', *Journal of Economic Studies*, Vol. 47, No. 4, pp.911–938.
- Bhaskar, R., Hunjra, A.I., Bansal, S. and Pandey, D.K. (2022) 'Central bank digital currencies: agendas for future research', *Research in International Business and Finance*, December, Vol. 62, p.101737.
- Böhme, R., Christin, N., Edelman, B. and Moore, T. (2015) 'Bitcoin: economics, technology, and governance', *Journal of Economic Perspectives*, Vol. 29, No. 2, pp.213–38.
- Bordo, M.D. and Levin, A.T. (2017) *Central Bank Digital Currency and the Future of Monetary Policy*, No. w23711, National Bureau of Economic Research.
- Castillo-Vergara, M., Alvarez-Marin, A. and Placencio-Hidalgo, D. (2018) 'A bibliometric analysis of creativity in the field of business economics', *Journal of Business Research*, April, Vol. 85, pp.1–9.
- Davoodalhosseini, S.M. (2021) 'Central bank digital currency and monetary policy', *Journal of Economic Dynamics and Control*, September, Vol. 142, p.104150.

- De Lis, S.F. and Sebastián, J. (2019) 'Central bank digital currencies and distributed ledger technology', *Banking Watch*, November.
- Ding, X. and Yang, Z. (2020) 'Knowledge mapping of platform research: a visual analysis using VOSviewer and CiteSpace', *Electronic Commerce Research*, DOI: 10.1007/s10660-020-09410-7.
- Duffie, D. (2019) 'Digital currencies and fast payment systems: disruption is coming', in *Asian Monetary Forum*, May, mimeo.
- Fernández, M.Á.E., Alonso, S.L.N., Jorge-Vázquez, J. and Forradellas, R.F.R. (2021) 'Central Banks' monetary policy in the face of the COVID-19 economic crisis: monetary stimulus and the emergence of CBDCs', *Sustainability*, Vol. 13, No. 8, pp.1–18.
- Gauthier, É. (1998) *Bibliometric Analysis of Scientific and Technological Research: A User's Guide to the Methodology*.
- Lagos, R. and Wright, R. (2005) 'A unified framework for monetary theory and policy analysis', *Journal of Political Economy*, Vol. 113, No. 3, pp.463–484.
- Merigó, J.M. and Yang, J.B. (2017) 'A bibliometric analysis of operations research and management science', *Omega*, December, Vol. 73, pp.37–48.
- Nakamoto, S. (2008) 'Bitcoin: a peer-to-peer electronic cash system', *Decentralized Business Review*.
- Pana, E. (2021) 'Central bank digital currencies: a bibliometric analysis', *The Journal of Applied Business and Economics*, Vol. 23, No. 7, pp.1–7.
- Patel, R., Goodell, J.W., Oriani, M.E., Paltrinieri, A. and Yarovaya, L. (2022) 'A bibliometric review of financial market integration literature', *International Review of Financial Analysis*, Vol. 80, p.102035.
- Sanz-Bas, D., del Rosal, C., Nández Alonso, S.L. and Echarte Fernández, M.Á. (2021) 'Cryptocurrencies and fraudulent transactions: risks, practices, and legislation for their prevention in Europe and Spain', *Laws*, Vol. 10, No. 3, p.57.
- Smith, C. and Kumar, A. (2018) 'Crypto-Currencies – an introduction to not-so-funny moneys', *Journal of Economic Surveys*, Vol. 32, No. 5, pp.1531–1559.
- Turskytė, I. and Šapkauskienė, A. (2021) 'Bibliometric analysis of central bank digital currency research', in *Accounting, Audit, Analysis: Transformation of Science and Business in new Economic Reality: International Scientific Conference*, Book of Extended Abstracts, Vilnius University Press, 25–26 November, pp.103–105.
- Van Eck, N.J. and Waltman, L. (2011) *Text Mining and Visualization using VOSviewer*, arXiv preprint arXiv:1109.2058.
- White, H.D. and McCain, K.W. (1998) 'Visualizing a discipline: an author co-citation analysis of information science, 1972–1995', *Journal of the American Society for Information Science*, Vol. 49, No. 4, pp.327–355.
- Zhao, L. (2021) 'The function and impact of cryptocurrency and data technology in the context of financial technology: introduction to the issue', *Financial Innovation*, Vol. 7, No. 1, pp.1–3.

Appendix

Table 3 Documents published per year

<i>Documents per year</i>	<i>Scopus</i>	<i>WoS</i>
2022	21	5
2021	72	31
2020	35	17
2019	20	7
2018	6	2

Table 4 Research growth rate

<i>Documents per year</i>	<i>Growth rate for Scopus</i>	<i>Growth rate for WoS</i>
2022	−0.7083333333	−0.8387096774
2021	1.057142857	0.8235294118
2020	0.75	1.428571429
2019	2.333333333	2.5

Table 5 Citation per year

<i>Year</i>	<i>Citation</i>	
	<i>Scopus</i>	<i>WoS</i>
2022	4	0
2021	33	200
2020	34	164
2019	74	114
2018	53	38

Table 6 Average citation per year

<i>Year</i>	<i>ACPP</i>	
	<i>Scopus</i>	<i>WoS</i>
2022	0.1904761905	0.00
2021	0.4583333333	6.45
2020	0.97	9.65
2019	3.70	16.29
2018	8.83	19.00

Table 7 Publication of the contributing author for Scopus-indexed journals

<i>Author name</i>	<i>Number of publications</i>
Alonso, S.L.N.	3
Belke, A.	3
Beretta, E.	3
Forradellas, R.F.R.	3
Birch, D.G.W.	2
Bossone, B.	2
Jang, H.	2
Jorge-Vazquez, J.	2

Table 8 Publication of the contributing author for Scopus-indexed journals

<i>Author name</i>	<i>Number of publications</i>
Alonso, S.L.N	3
Giungato, P.	3
Tarabella, A.	3
Tricase, C.	3
Belke, A.	2
Beretta, E.	2
Cao, Y.H.	2
Fernandez, M.A.E.	2
Forradellas R.F.R.	2
Jorge-Vazquez, J.	2
Kochergin, D.A.	2
Lipton, A.	2
Masciandaro, D.	2

Table 9 Affiliations of the organisation for Scopus-indexed journals

<i>Affiliations of the organisations</i>	<i>Number of publications</i>
Goethe-Universität Frankfurt am Main	4
Università della Svizzera italiana	3
Seoul National University	3
Beihang University	3
Universität Duisburg-Essen	3
International Monetary Fund	3
Università Bocconi	3
Saint Petersburg State University	3
European Central Bank	3
Financial University under the Government of the Russian Federation	3
Universidad Católica de Ávila	3
The World Bank, USA	3
University of Johannesburg	2
Princeton University	2
Bank Of China	2
Soongsil University	2
Peking University	2
Charles University	2

Table 10 Affiliations of the organisation for WoS-indexed journals

<i>Affiliations of the organisations</i>	<i>Number of publications</i>
BANK ENGLAND	2
BANK OF ENGLAND	2
BEIJING UNIVERSITY OF POSTS TELECOMMUNICATIONS	2
CENTRE FOR ECONOMIC POLICY RESEARCH UK	2
CEPR	2
CORNELL UNIVERSITY	2
FEDERAL RESERVE SYSTEM USA	2
NATIONAL UNIVERSITY OF SINGAPORE	2
PEOPLES BANK CHINA	2
SEOUL NATIONAL UNIVERSITY SNU	2
STUDY CTR GERZENSEE	2
UNIV BERN	2
UNIVERSITY OF BERN	2
UNIVERSITY OF CAMBRIDGE	2
UNIVERSITY OF LONDON	2

Table 10 Affiliations of the organisation for WoS-indexed journals (continued)

<i>Affiliations of the organisations</i>	<i>Number of publications</i>
AUTONOMOUS UNIVERSITY OF BARCELONA	1
BANCO CENT URUGUAY	1
BANCO DE ESPANA	1
BANK INT SETTLEMENTS INNOVAT HUB	1
BANK KOREA	1
BANK SPAIN	1
BEIJING UNION UNIVERSITY	1
BEIJING UNIV POSTS TELECOMMUN	1
BRUNEL UNIV LONDON	1
BRUNEL UNIVERSITY	1
CATHOLIC UNIV AVILA	1
CATHOLIC UNIV MURCIA	1
CATHOLIC UNIV VALENCIA	1
CENT BANK NIGERIA	1

Table 11 Country wise publication

<i>Country</i>	<i>Number of publications</i>
	<i>Scopus</i>
USA	23
China	19
United Kingdom	17
Germany	13
Russian Federation	10
South Korea	8
Canada	6
France	6
Switzerland	6
Italy	5
Australia	4
Portugal	4
Spain	4
Australia	3
Hong Kong	3
Luxembourg	3
Netherlands	3
Singapore	3
Belgium	2
Brazil	2
Czech Republic	2
Indonesia	2
Japan	2
Norway	2
South Africa	2
Bahrain	1
Croatia	1
Finland	1
Hungary	1
India	1
Ireland	1
Mexico	1
Nigeria	1
Poland	1
Saudi Arabia	1
Serbia	1
Slovenia	1

Table 11 Country wise publication (continued)

<i>Country</i>	<i>Number of publications</i>
	<i>Scopus</i>
Sweden	1
Thailand	1
Tunisia	1
Turkey	1
Ukraine	1
United Arab Emirates	1
Uruguay	1

Table 12 Country wise publication

<i>Country</i>	<i>Number of publications</i>
	<i>WoS</i>
People's Republic China	12
England	11
USA	11
Switzerland	5
China	4
South Korea	4
Spain	3
Belgium	2
Canada	2
France	2
Germany	2
Norway	2
Portugal	2
Singapore	2
UK	2
Australia	1
Czech Republic	1
Hungary	1
Israel	1
Italy	1
Japan	1
Luxembourg	1
Netherlands	1
Nigeria	1
Poland	1
Russia	1
South Africa	1
Sweden	1
Uruguay	1

Table 13 Linkage occurrence and relevance

<i>Term</i>	<i>Occurrences</i>	<i>Relevance</i>
Household	11	6.92
Government	13	2.29
Digital money	20	1.95
CBDCs	16	1.54
Risk	47	1.46
CBDC design	13	1.44
Blockchain technology	19	1.44
Currency	322	1.35
Author	16	1.28
Blockchain	51	1.23
Bitcoin	12	1.21
Application	19	1.15
Creation	15	1.11
Deposit	29	1.08
Future	12	1
Financial inclusion	12	0.89
Emergence	13	0.88
Cost	24	0.87
Financial system	20	0.85
Order	13	0.81
World	17	0.8
Stablecoin	18	0.78
Need	20	0.78
Effect	21	0.74
Function	21	0.69
CBDC	293	0.65
Privacy	27	0.65
State	18	0.64
China	22	0.6
Form	31	0.58
Cash	56	0.58
Role	22	0.55
Country	57	0.5
Challenge	28	0.49
Concept	19	0.47
Regulation	24	0.47
Term	17	0.46
Access	25	0.46
Topic	14	0.43
Bank	205	0.42
Use	34	0.41
Study	35	0.4

