

A Bibliometric Exploration of Central Bank Digital Currency and India's Economic Evolution

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Abstract: Purpose – The study aims to conduct a bibliometric analysis of the existing academic literature on Central Bank Digital Currency (CBDC) and its impact on the Indian economy. The review highlights key research themes, influential contributions, and future research directions. Findings – The findings indicate a significant surge in CBDC research, particularly post-2020, driven by India's digital rupee initiatives. Key research themes include monetary policy implications, financial inclusion, payment system efficiency, and regulatory challenges. The bibliometric analysis identifies leading authors, institutions, and journals contributing to the discourse, with a growing international collaboration trend. However, research gaps remain in empirical studies assessing India's CBDC pilot, its environmental impact, and cross-country comparative analyses. Practical implications – The review offers valuable insights for policymakers, financial institutions, and researchers by identifying research trends and thematic gaps, thereby guiding future investigations and policy decisions regarding CBDC implementation in India. Originality – This study contributes to the literature by systematically mapping the intellectual landscape of CBDC research in the Indian context. The findings help bridge knowledge gaps and inform future policy frameworks for digital currency adoption.

Keywords: Central Bank Digital Currency, CBDC, Digital Rupee, Indian Economy, Financial Stability, Bibliometric Analysis

1. Introduction

The emergence of Central Bank Digital Currency (CBDC) represents a pivotal development in the global financial landscape, with profound implications for both monetary systems and economic policy. In response to the growing influence of private digital currencies, central banks worldwide have begun to explore state-issued digital forms of fiat money. In India, the Reserve Bank of India's digital rupee initiative exemplifies this shift aiming to modernize payment systems, enhance monetary policy efficiency, and address long-standing challenges such as financial inclusion. Unlike decentralized cryptocurrencies, CBDCs offer a controlled and secure framework, bridging traditional finance with digital innovations to promote economic resilience, especially in economies with large underserved populations.

Scholars, policymakers, and financial institutions have increasingly focused on the transformative potential of CBDCs. This surge in academic interest has led to diverse studies examining the multifaceted impact of CBDCs on economies, particularly within the Indian context. Early research primarily addressed the theoretical and macroeconomic potential of digital currencies. For instance, Brunnermeier et al. (2019) argued that CBDCs could provide central banks with new tools for controlling liquidity and managing interest rates in environments characterized by extensive informal cash usage. Building on this foundation, Shahzad et al. (2022) explored how CBDCs might mitigate economic shocks and enhance financial stability.

Few literature promise financial inclusion in CBDC such as studies by Prasad (2021) and reports from the World Bank (2022) have emphasized the potential of CBDCs to bridge accessibility gaps for underserved populations. Gupta and Subramanian (2022) further contend that a digital rupee could remedy inefficiencies in India's traditional banking system by offering a low-cost alternative to conventional financial services. Complementing these views,



Sharma (2023) underscores the importance of enhancing digital literacy in rural areas to facilitate the widespread adoption of CBDCs.

In addition to their impact on monetary policy and financial inclusion, researchers have examined the role of CBDCs in transforming payment systems. Nasir et al. (2021) highlight the capacity of CBDCs to reduce transaction costs and improve cross-border settlements. In the Indian scenario, Singh and Mehta (2021) stress the critical need for interoperability between CBDCs and existing digital payment infrastructures to ensure seamless integration and user adoption.

The literature also brings to light several technological and regulatory challenges inherent in CBDC implementation. Gupta et al. (2023) discuss the fundamental role of blockchain technology in ensuring transparency and security for digital currencies, while also cautioning against issues related to scalability and energy consumption. Parallel investigations by Dahir (2020) and Bharadwaj (2021) have emphasized the necessity of establishing robust legal and regulatory frameworks to combat risks such as fraud and cybersecurity threats. These findings collectively suggest that while CBDCs have the potential to transform financial systems, their success depends heavily on overcoming technological bottlenecks and regulatory hurdles.

Against this backdrop, this bibliometric review aims to synthesize the evolving academic discourse on CBDCs and their impact on the Indian economy. By mapping key research themes, influential contributions, and collaborative networks, the study addresses the following research questions:

- How has the scientific production on the impact of CBDC on the Indian economy evolved over time, and which journals or sources have predominantly published this research?
- Who are the most influential authors in this field, and which universities or institutions are actively driving research on CBDC's impact on the Indian economy?
- What are the most globally recognized documents related to CBDC in the Indian economy?
- Which keywords and trending topics most frequently characterize the discourse on CBDCs in India?

By integrating insights from theoretical perspectives and empirical investigations, this review not only elucidates the current state of knowledge but also identifies gaps and future directions for research. In doing so, it provides a comprehensive framework for understanding how CBDCs might reshape economic structures and policy landscapes in India and beyond.

2. Research Methodology

This study adopts a bibliometric approach to analyze the impact of Central Bank Digital Currency (CBDC) on the Indian Economy. Bibliometrics is used to quantitatively assess academic literature, identify key research trends, authors, journals, and collaboration networks (Aria & Cuccurullo, 2017). The data for this study was sourced from the Scopus database, a leading repository of high-quality academic research (Elsevier, 2024). By using this search string ("central bank digital currency" OR "cbdc" OR "digital rupee" OR "digital currency" OR "cryptocurrency" OR "bitcoin" OR "alt coin" OR "electronic currency" OR "e currency"), total of 123 research papers were selected for analysis. The chosen articles span the period from 2014 to 2025, providing a broad overview of the CBDC over time. Only papers published in English were considered to ensure consistency and comparability. The selected papers were exported from Scopus in CSV format, which enabled further analysis using bibliometric tools. For the bibliometric analysis, two specialized software tools were employed. The first was RStudio using the Biblioshiny interface, which is part of the bibliometrix package. Biblioshiny allows for an easy-to-use, web-based environment that simplifies the process of bibliometric analysis and visualizing the results. Through this interface, a variety of metrics and visualizations, such as publication trends and keyword analysis, were generated with minimal coding knowledge required. The second tool used was VOSviewer, which is specifically designed for creating and visualizing bibliometric networks. VOSviewer excels at illustrating co-authorship, keyword co-occurrence, and citation networks, providing a detailed map of research collaborations and intellectual connections within the dataset (Van Eck and

Waltman, 2019). The analysis of the collected data involved two main tools: Biblioshiny in RStudio and VOSviewer. First, the CSV file we imported into Biblioshiny, where key bibliometric information was extracted. This included trends in publications over time, identification of the most prolific authors, as well as an analysis of the top journals publishing on CBDC and its impact on the economy.

Next, the data was imported into VOSviewer for more detailed network analysis. Keyword co-occurrence analysis mapped the relationships between keywords in abstracts and titles, helping to identify clusters of commonly researched topics related to this area.

Finally Bibliometric coupling in VOSviewer helps to identify the similarity between research papers, authors, or institutions based on shared references. Specifically, it examines how frequently two publications cite the same sources.

3. Results and Findings

Table 1: Main Information

Timespan	2014:2024
Sources (Journals, Books, etc)	103
Documents	123
Annual Growth Rate %	44.61
Document Average Age	1.63
Average citations per doc	8.179
References	5917
DOCUMENT CONTENTS	
Keywords Plus (ID)	250
Author's Keywords (DE)	421
AUTHORS	
Authors	345
Authors of single-authored docs	20
AUTHORS COLLABORATION	
Single-authored docs	20
Co-Authors per Doc	2.99
International co-authorships %	18.7
DOCUMENT TYPES	
article	123

Source: Created by the author

3.1 Main Information About Data

The dataset spans from 2014 to 2024, encompassing 123 documents sourced from 103 different outlets, with a significant annual growth rate of 44.61%. This indicates a burgeoning interest in CBDC research, particularly in the context of the Indian economy. The average document age of 1.63 years suggests a contemporary and dynamic field, reflecting the recent global discussions and national initiatives surrounding digital currencies. With an average of 8.179 citations per document and a total of 5917 references, the field exhibits strong academic engagement and

foundational depth. The comprehensive coverage of keywords, including 250 Keywords Plus and 421 Author Keywords, highlights the broad thematic scope of the research.

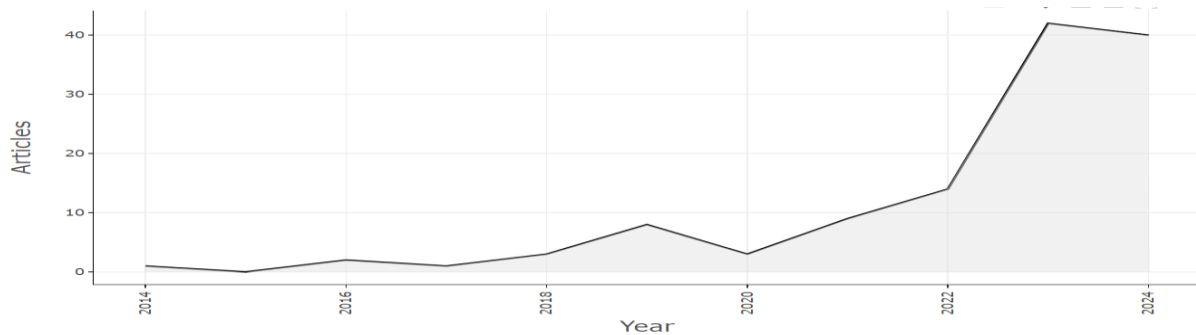


Figure 1 Annual Scientific Production

Source: Biblioshiny

3.2 Annual Scientific Production

Figure 1 showcases the annual scientific production of articles related to the impact of Central Bank Digital Currency (CBDC) on the Indian economy from 2014 to 2024. It reveals a steady but low level of output from 2014 to 2019, reflecting the nascent stage of the topic during that period. A noticeable rise begins in 2020, coinciding with increased global interest and policy discussions around CBDCs, particularly India's steps toward implementing its digital rupee. The sharp surge in publications in 2023, peaking at over 40 articles, indicates heightened academic and policy-related engagement, likely driven by the Reserve Bank of India's CBDC initiatives. This upward trend highlights the growing relevance of CBDC as a research focus. Looking ahead, future studies could delve into the long-term economic, financial, and societal impacts of CBDC in India, while also exploring interdisciplinary approaches and tracking sustained academic interest beyond 2024.

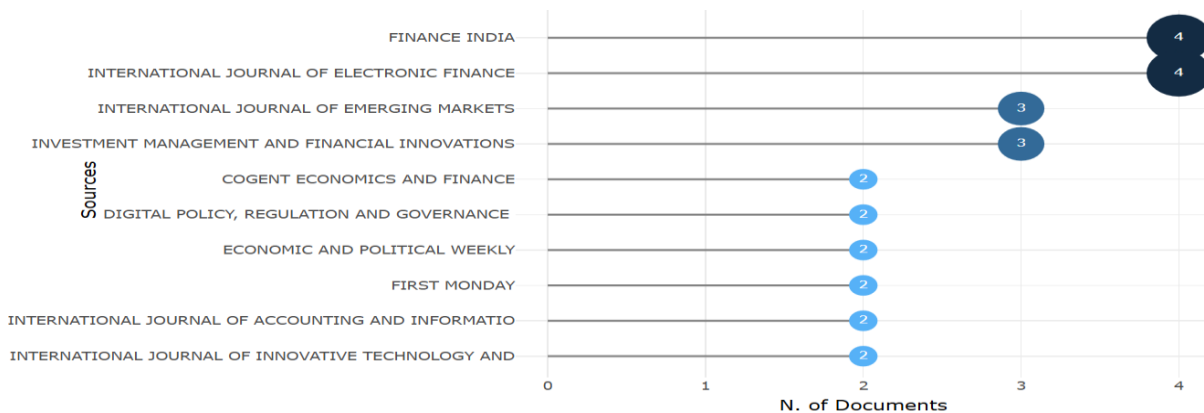


Figure 2: Most Relevant Sources

Source: Biblioshiny

3.3 Most Relevant Sources

Figure 2 highlights the most relevant sources contributing to the research on the impact of Central Bank Digital Currency (CBDC) on the Indian economy. Finance India and the International Journal of Electronic Finance emerge as the top contributors, each publishing four documents. These are followed by the International Journal of Emerging Markets and Investment Management and Financial Innovations, with three documents each. Other notable sources, including Cogent Economics and Finance, Digital Policy, Regulation and Governance, Economic and Political Weekly, First Monday, International Journal of Accounting and Information, and International Journal of Innovative Technology and, each published 2 documents.

including Cogent Economics and Finance, Digital Policy, Regulation and Governance, Economic and Political Weekly, and First Monday, have each contributed two documents. This distribution indicates that CBDC research spans a mix of specialized financial journals and interdisciplinary outlets, showcasing the topic's broad academic appeal. While the dominance of a few sources demonstrates concentrated interest in leading journals, the diversity in publication platforms underscores the multifaceted nature of CBDC research, encompassing economics, technology, and governance. Future research should aim for inclusion in globally recognized journals to increase visibility and impact, while interdisciplinary journals could further enrich the discourse by incorporating diverse perspectives.

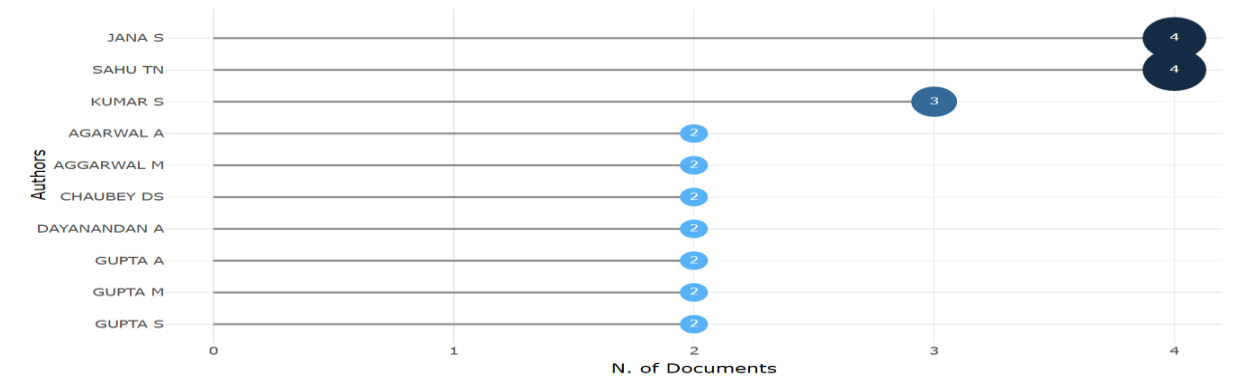


Figure 3: Most Relevant Authors

Source: Biblioshiny

3.4 Most Relevant Authors

The above figure illustrates the most relevant authors contributing to research on the impact of Central Bank Digital Currency (CBDC) on the Indian economy. Jana S and Sahu TN emerge as the most prolific authors, each contributing four documents, indicating their significant influence in shaping the discourse around CBDC. They are followed by Kumar S with three documents and a group of other authors, including Agarwal A, Aggarwal M, Chaubey DS, Dayanandan A, Gupta A, Gupta M, and Gupta S, each contributing two documents. This distribution highlights a concentrated yet collaborative field, with a few key researchers leading the way and other contributors providing valuable support. The presence of multiple authors with significant contributions suggests a growing interest in this area, with opportunities for increased collaboration. Future research could focus on fostering partnerships among leading authors to explore interdisciplinary themes, enhance the depth of analysis, and expand the reach of CBDC-related studies.

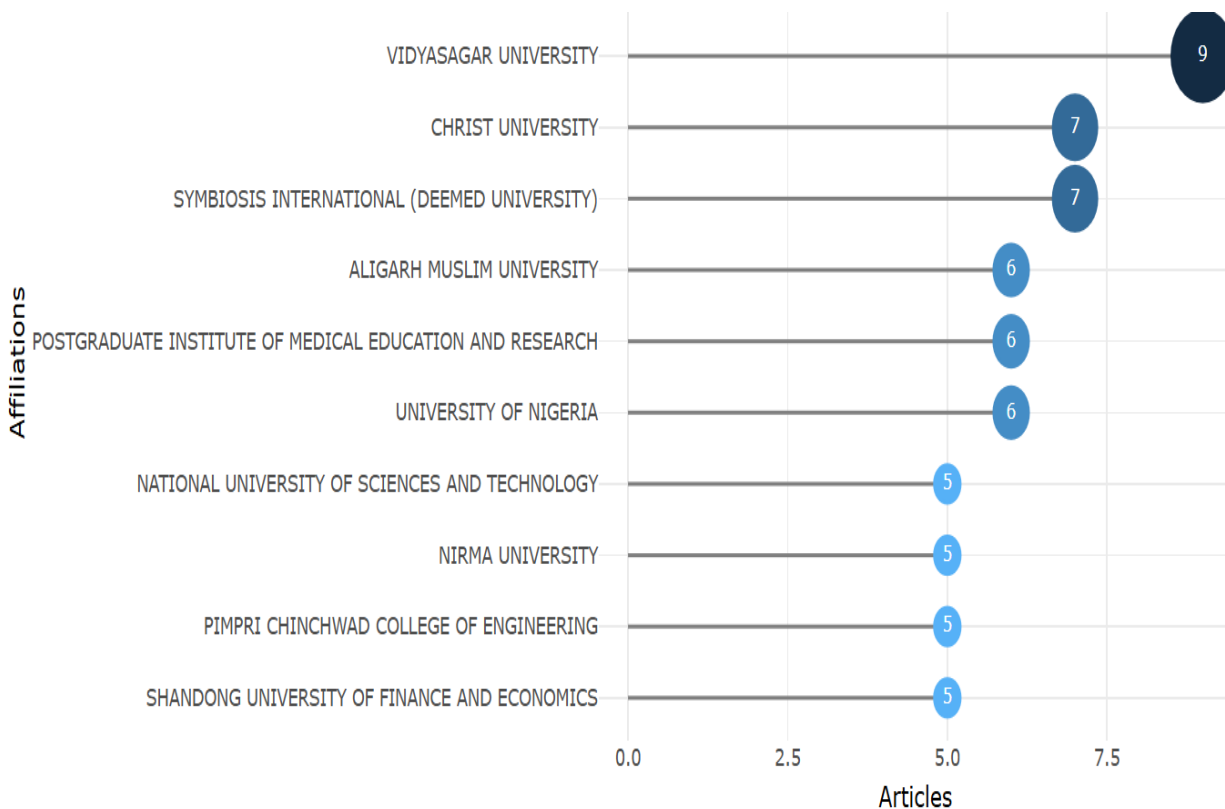


Figure 4: Most Relevant Affiliations

Source: Biblioshiny

3.5 Most Relevant Affiliations

Figure 4 highlights the most relevant affiliations contributing to research on the impact of Central Bank Digital Currency (CBDC) on the Indian economy. Vidyasagar University stands out as the leading institution, contributing nine articles, demonstrating its strong focus and expertise in this domain. It is followed by Christ University and Symbiosis International (Deemed University), each contributing seven articles. Other significant contributors include Aligarh Muslim University, the Postgraduate Institute of Medical Education and Research, and the University of Nigeria, each with six articles. Institutions like the National University of Sciences and Technology, Nirma University, Pimpri Chinchwad College of Engineering, and Shandong University of Finance and Economics have each contributed five articles. The prominence of Indian institutions in this list reflects the localized focus of the research on India's CBDC initiatives. However, the presence of international universities highlights a growing global interest in studying India's unique approach to CBDC. Future research could benefit from fostering international collaborations and partnerships to broaden the scope and impact of studies on CBDC's economic implications.

Table 2 Top Cited Publications

Paper	DOI	Total Citations	TC per Year	Normalized TC
BRUNNERMEIER MK, 2019, J MONET ECON	10.1016/j.jmoneco.2019.07.004	118	19.67	3.60

STENSÅS A, 2019, COGENT ECON FINANCE	10.1080/23322039.2019.1593072	96	16.00	2.93
SHAHZAD SJH, 2022, WORLD ECON	10.1111/twec.13138	67	22.33	6.09
NASIR A, 2021, IEEE ACCESS	10.1109/ACCESS.2020.3046931	58	14.50	3.20
GUPTA M, 2023, J RISK FINANC MANAG	10.3390/jrfm16060286	54	27.00	7.96
SALCEDO E, 2021, INT J INF MANAGE	10.1016/j.ijinfomgt.2021.102388	44	11.00	2.43
DAHIR AM, 2020, INT J MANAGE FINAN	10.1108/IJMF-03-2019-0117	42	8.40	2.33
BHARADWAJ S, 2021, FORUM SCIENTIAE OECONOMIA	10.23762/FSO_VOL9_NO4_7	41	10.25	2.26
JERIBI A, 2022, INT J EMERG MARK	10.1108/IJOEM-06-2020-0688	29	9.67	2.64
VINCENT O, 2019, J TRANSNATL MANAGE	10.1080/15475778.2019.1633170	29	4.83	0.89

Source: Created by the author

3.6 Top Cited Publications

Table 2 highlights the most globally cited papers related to Central Bank Digital Currency (CBDC) and associated topics, showcasing key metrics such as total citations, annual citation rates, and normalized citations. The most cited paper, Brunnermeier MK (2019) in Journal of Monetary Economics, with 118 total citations and 19.67 annual citations, underscores its foundational importance in monetary economics. Similarly, works by Stensås A (2019) and Shahzad SJH (2022) demonstrate significant academic impact with 96 and 67 citations, respectively, reflecting their relevance in the field. Recent contributions, like Gupta M's 2023 paper, stand out with an impressive 27 annual citations, indicating rapid uptake and contemporary relevance. Other papers, such as those by Nasir A (2021), Salcedo E (2021), and Bharadwaj S (2021), maintain steady influence, while lower-ranked papers like Jeribi A (2022) and Vincent O (2019) provide valuable yet underexplored insights. The data suggests that highly cited works often focus on broad theoretical frameworks or emerging technological applications. Future research should prioritize empirical studies on India's CBDC rollout, exploring financial inclusion, infrastructure, and regulatory dynamics, while fostering interdisciplinary approaches to bridge theoretical insights with practical implementation.

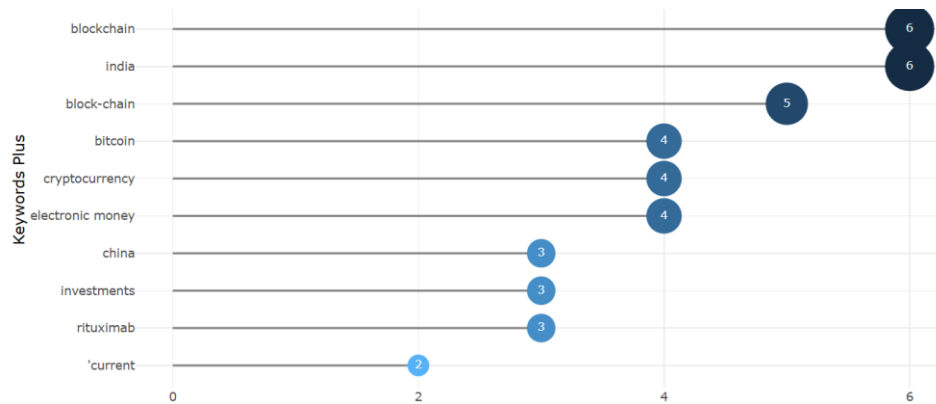


Figure 5: Most Frequent Keywords

Source: Biblioshiny

3.7 Most Frequent Words

Figure 5 highlights the most frequent keywords used in research related to Central Bank Digital Currency (CBDC) and its impact on the Indian economy. The keywords "blockchain" and "India" are the most prominent, each appearing six times, reflecting the central themes of technological infrastructure and geographical focus. "Block-chain" follows with five occurrences, indicating an alternative but closely related phrasing. Other frequently used keywords include "bitcoin," "cryptocurrency," and "electronic money," each with four occurrences, underscoring the interconnectedness of CBDC with digital assets and alternative monetary systems. Keywords like "China," "investments," and "rituximab," each appearing three times, introduce a mix of comparative studies, financial implications, and possibly niche topics or misclassifications like "rituximab," which may not directly relate to CBDC. The presence of such terms may reflect tangential discussions or interdisciplinary overlaps. This keyword distribution emphasizes the technological and economic focus of CBDC research, with limited attention to broader socio-economic or regulatory issues. Future studies could explore underrepresented themes such as financial inclusion, user adoption, and environmental implications, which are critical to understanding the broader impact of CBDCs.

Table 3 Trend Topics of CBDC

Item	Freq	Year_Q1	Year Med	Year_Q3
Blockchain	6	2022	2023	2023
India	6	2022	2023	2024
Block-Chain	5	2023	2023	2023

Source: Created by the author

3.8 Trend Topics

The above table highlights the trending topics in research on Central Bank Digital Currency (CBDC) and its impact on the Indian economy, focusing on keywords such as "blockchain," "India," and "block-chain." These keywords appear frequently, with "blockchain" and "India" occurring six times each and "block-chain" five times. The temporal distribution reveals that "blockchain" and "India" began gaining traction in 2022, peaked in relevance during 2023, and are projected to remain significant into 2024. The term "block-chain" is concentrated around 2023, reflecting an alternative phrasing of the blockchain theme. These trends indicate the increasing importance of blockchain technology as a backbone for CBDCs and India's pivotal role in global discussions about digital currencies. The consistent prominence of these topics across multiple years underscores their enduring relevance in both technological and regional dimensions. Future research should monitor post-2024 developments to identify emerging

trends, particularly in technological advancements, India's policy evolution, and interdisciplinary applications of blockchain and CBDCs.

3.9 Country Scientific Production

The world map illustrates the global distribution of research contributions or discussions on Central Bank Digital Currency (CBDC), particularly its impact on the Indian economy. Countries highlighted in blue indicate regions with active engagement, either through academic research, policy analysis, or technological innovation related to CBDCs. India is prominently featured, reflecting its central role in this area of study, driven by the Reserve Bank of India's initiatives. Developed countries like the United States, China, and Australia are also prominent, likely due to their advanced technological infrastructure and strategic interest in digital currencies. However, the limited representation from regions such as Africa and Latin America suggests gaps in research, policy development, or technological readiness in these areas. To bridge these disparities, future research could focus on fostering collaborations between technologically advanced nations and underrepresented regions. Comparative studies exploring the unique challenges and opportunities in different countries would also provide valuable insights into the global implications of CBDC adoption.

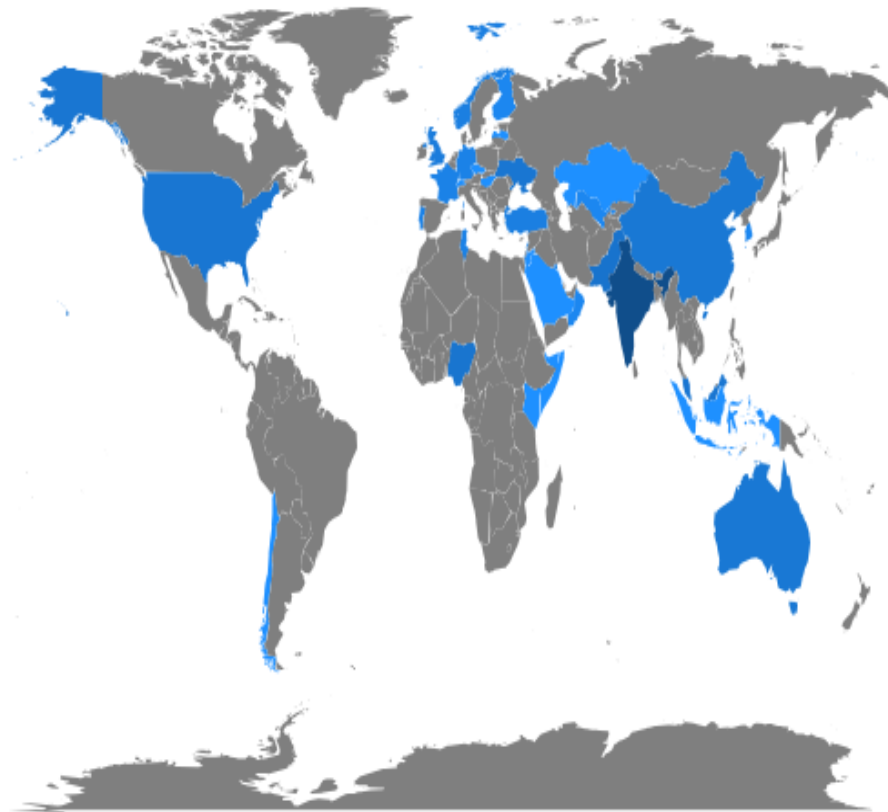


Figure 6: Country Scientific Production

Source: Biblioshiny

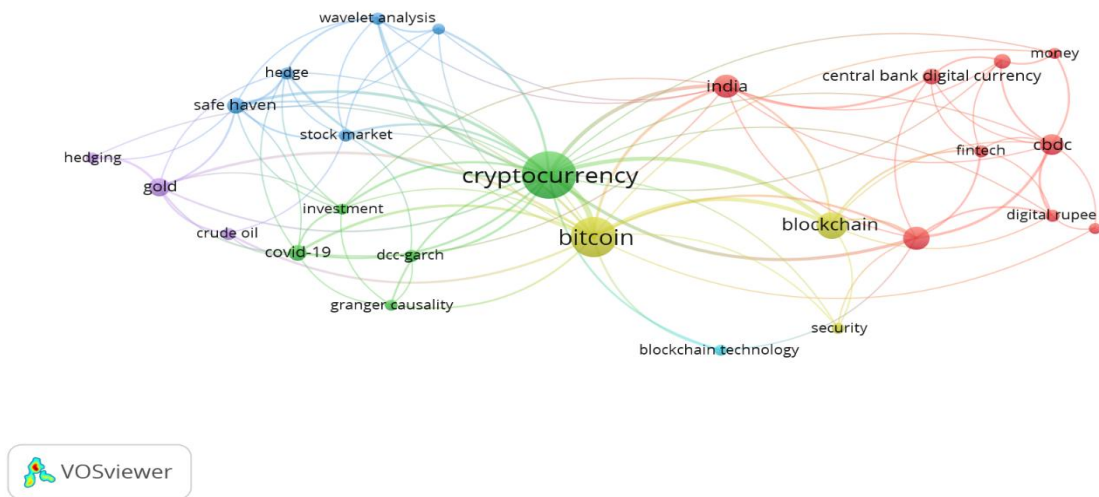


Figure 6: Co-occurrence Analysis

Source: VOSviewer

3.10 Co-occurrence Analysis

The above figure represents a co-occurrence analysis of keywords in research on Central Bank Digital Currency (CBDC) and its impact, showcasing clusters of related themes. Using VOSviewer, the analysis identifies frequently co-occurring keywords and groups them into distinct clusters based on thematic relationships. Each cluster, represented by different colours, highlights specific research themes, with node size reflecting keyword frequency and line thickness showing the strength of co-occurrence links.

a) Red Cluster (Policy and CBDC Adoption Focus): The red cluster centres on policy-related discussions and India's role in CBDC adoption, with key terms like CBDC, central bank digital currency, digital rupee, fintech, and money. This cluster highlights India's prominence in CBDC research, driven by initiatives such as the Reserve Bank of India's digital rupee pilot. Keywords like fintech reflect the integration of digital innovations into financial systems, while money underscores the broader implications of CBDCs on monetary frameworks. The strong presence of India emphasizes its unique position as a regional case study, offering insights into CBDC implementation in developing economies.

b) Green Cluster (Cryptocurrency and Financial Instruments): The green cluster focuses on the financial and economic dimensions of cryptocurrencies, with terms like cryptocurrency, bitcoin, gold, investment, and crude oil. It explores cryptocurrencies as alternative financial instruments, analysing their role as safe-haven assets during crises such as COVID-19. Quantitative methodologies such as dcc-garch and granger causality are employed to study market dynamics and relationships between digital assets and traditional commodities. This cluster reflects growing academic interest in cryptocurrencies' performance, resilience, and their integration into financial systems.

c) Yellow Cluster (Blockchain and Security Focus): The yellow cluster highlights the technological underpinnings of CBDCs, emphasizing blockchain, blockchain technology, and security. This cluster focuses on blockchain's role as a foundational technology for CBDC implementation, particularly its ability to enhance transparency, security, and trust in digital financial systems. The inclusion of security underscores concerns about

fraud prevention, cybersecurity risks, and data integrity. This theme reflects the critical need for robust technological frameworks to ensure the scalability, safety, and efficiency of CBDCs.

d) Blue Cluster (Hedging and Financial Stability): The blue cluster focuses on cryptocurrencies' role in financial stability and hedging strategies, with keywords like safe haven, hedge, wavelet analysis, and stock market. This cluster examines how digital assets like bitcoin can serve as safe-haven investments during economic uncertainties and market volatility. Advanced analytical tools, such as wavelet analysis, are frequently employed to assess the hedging potential of cryptocurrencies in relation to stock markets. The theme underscores the relevance of digital assets in portfolio diversification and risk management strategies.

e) Purple Cluster (Niche Financial Comparisons): The purple cluster is comparatively smaller and focuses on niche financial comparisons between cryptocurrencies and traditional assets, with keywords like gold, crude oil, and hedging. This cluster evaluates the performance and hedging capabilities of cryptocurrencies relative to established commodities like gold and oil. Such comparisons provide insights into the evolving role of digital assets as alternatives to traditional financial instruments, particularly during periods of economic and market instability.

Each cluster represents a distinct thematic focus, offering a comprehensive view of the research landscape surrounding CBDCs, cryptocurrencies, and their financial and technological implications.

4. Conclusion and Future Directions

This bibliometric review highlights the rapid growth and evolving landscape of research on Central Bank Digital Currency (CBDC) and its impact on the Indian economy. The analysis reveals that CBDC research spans several key themes, including policy adoption, technological foundations, financial market integration, and its role in promoting financial inclusion. India's leadership in piloting the digital rupee has placed it at the forefront of CBDC-related studies, reflecting its significance as both a case study and a model for other developing economies.

While the potential of CBDCs is immense, this study identifies critical gaps that need to be addressed in future research. Empirical studies evaluating the real-world performance of India's digital rupee pilot remain limited and should focus on its impacts on financial inclusion, monetary policy, and economic resilience. Additionally, studies exploring the environmental implications of blockchain technology and the integration of CBDCs into existing payment systems will provide deeper insights. Cross-country comparative studies can further enhance understanding by highlighting lessons and challenges faced by other economies adopting CBDCs.

Interdisciplinary approaches integrating finance, technology, policy, and social sciences are essential to address the multifaceted challenges of CBDC implementation. By fostering global collaborations and bridging existing research gaps, future studies can contribute to the development of secure, efficient, and inclusive digital currency systems that align with India's economic priorities and global financial trends. This will ensure that CBDCs achieve their intended transformative impact on the financial landscape while addressing societal and infrastructural challenges.

Gaps and Future Directions

While the existing literature provides valuable insights, several gaps remain unaddressed. Empirical studies on India's ongoing CBDC pilot are limited, and future research could analyse its real-world implications on financial inclusion and economic stability. Moreover, comparative studies exploring India's CBDC adoption in relation to global initiatives could yield actionable lessons for policymakers. Environmental concerns, such as the carbon footprint of blockchain technologies, also merit further exploration.

The literature underscores the transformative potential of CBDCs but also highlights the need for interdisciplinary research to navigate the complexities of their implementation. As India's digital rupee initiative evolves, the academic discourse must expand to address emerging challenges and opportunities, ensuring that CBDCs achieve their intended goals of financial innovation and inclusion.

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