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CBDCs: The Future of Inclusive and Sustainable Economic Growth: Opportunities and Challenges

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Abstract

The emergence of the contemporary digital era has altered how payments are made and how money is spent. The Central Bank Digital Currency (CBDC) is a revolutionary financial invention developed in reaction to the evolving digital economic landscape. Digital Rupee is the electronic version of our currency which can be used to carry out transactions or store value digitally, similar to the manner in which currency notes can be used in physical form. It is currently in pilot mode to test and explore the uses, features, technology and applications of Digital Rupee.

The primary objective of this research paper is to examine the effect of central bank digital currency as an advent towards engaging unbanked population in more formal Financial services and accessing its impact achieving sustainable growth in the enomony. This study will highlight the potential of CBDC to boost financial inclusion and promoting sustainable development by converting unbanked population to facilitate banking services.The paper emphasizes the trajectory of the Indian payment system, which opens the door for the widespread acceptance of CBDC and its advantageous implementation.

Keywords: Central bank Digital Currency, Financial Inclusion, Sustainable Development,

Introduction

Central bank digital Currency (CBDC), often known as fiat digital currency, is a type of digital legal cash. CBDC is one of the numerous advantages of having a digital currency

issued by a central bank is financial inclusion. Bringing unbanked adults into the formal financial system and giving them access to basic financial services that they can utilize to enhance their wellbeing is known as financial inclusion. On the otherhand increasing the number of people with accounts that are actively used for transactions is the aim of financial inclusion. Currently, the pilot is ongoing with 15 banks - SBI, ICICI Bank, Yes Bank, IDFC First Bank, Bank of Baroda, Union Bank of India, HDFC Bank, Kotak Mahindra Bank, PNB, Canara Bank, Axis Bank, IndusInd Bank, Federal Bank, Karnataka Bank and Indian Bank. (https://www.iba.org.in/cbdc/index.html). The total countries/regions with CBDC projects are 116 , including 92 countries at assessing feasibility, benefits, risk associated, 27 countries at constructing designes and prototype, 24 countries at pilot stage such as india, cancelled by 9 and launched by 4 countries (i.e., Nigeria, Zimbabwe, Jamaica, Bahamas (cbdctracker.org).

There have been claims that in nations with a high percentage of unbanked people, central bank digital currencies can promote financial inclusion.The financial inclusion index measures the extent of access to and usage of formal financial services, including banking, insurance, investments, pensions, and postal sectors. Based on the usage and functions performed , CBDC can be divided into 2 main categories i.e., Retail CBDC (General Purpose) (CBDC-R), and Wholesale CBDC (CBDC-W).

The concept of sustainability emphasizes the judicious use of resources to ensure that they are available for use when needed. At the same time, sustainable development demands innovative financial solutions that align economic progress with environmental responsibility. The government has also achieved significant progress in financial inclusion, with the Financial Inclusion Index of the Reserve Bank of India (RBI) increasing from 53.9 in March 2021 to 64.2 at the end of March 2024. (indiabudget.gov.in).

CBDCs in emerging market and low-income economies have the potential to bank their unbanked populations and boost financial inclusion which can increase overall lending and reduce bank disintermediation risks. Central Bank Digital Currencies (CBDCs) have emerged as a transformative tool that can address both financial inclusion and sustainability challenges. This paper examines how CBDCs can bridge financial gaps and support green economic initiatives.

Literature Review

S. No.	Title	Impact	Reference
1	Impact of Centralized Blockchain Digital Currency (CBDC): For Financial Inclusion and Sustainability	CBDC has the potential to improve financial inclusion, particularly in rural and unbanked regions, owing to rising smartphone adoption and internet access via programs such as Bharat Net. CBDC adoption also makes direct benefit transfers (DBTs) more accessible, hence fostering digital inclusion. The Reserve Bank of India (RBI) is developing CBDC to improve cross-border transactions, lower cash management costs, and increase payment efficiency. The adoption of the Retail (CBDC-R) and Wholesale (CBDC-W) models has resulted in lower financial transaction settlement risks. Furthermore, CBDC promotes FinTech innovation, reduces operating costs, and contributes to cashless economies. As a centrally controlled digital currency, it promotes environmental, social, and governance (ESG) objectives, hence assisting India in meeting the UN Sustainable Development Goals.	Mahesh K. M., P. S. Aithal, & Sharma K. R. S.
2	Challenges of Central Bank Digital Currency Implementation: A Review of Literature	Aneja et al. (2022) investigate CBDC as an evolution of money, highlighting its advantages as a stable unit of account, an efficient medium of	Aneja et al. (2022)

		exchange, and a secure store of value. Despite increased academic and practitioner interest, issues persist about its effectiveness and effects on financial systems. The paper analyzes current literature using text mining and systematic review methodologies, finding major issues about CBDC's technological, regulatory, and economic aspects. By combining earlier studies, the report sheds light on CBDC adoption patterns and obstacles. It emphasizes the need for more study to overcome uncertainty and help policymakers make educated decisions on CBDC deployment.	
3	Central Bank Digital Currency and Financial Inclusion	Retail CBDC is viewed as an important instrument for financial inclusion, especially in emerging nations. It improves access by encouraging unbanked people to create accounts while fostering credit building. CBDCs can increase lending when liquidity risks are minimal and the unbanked population is high. Even if lending slows, it benefits households by providing secure savings, efficient payments, and more credit availability. A two-tier distribution approach using non-bank PSPs broadens access without	Brandon Joel Tan (IMF),2023

		requiring bank accounts. While this may diminish bank deposits, the total benefits might exceed the concerns. More study is needed on the best CBDC architecture and regulatory frameworks.	
4	Promoting Financial Inclusion through Central Bank Digital Currency: An Evaluation of Payment System Viability in India	Digital currency research demonstrates their influence on financial inclusion in India between 2011 and 2020. While CBDCs can improve financial access, their impact on stock market volatility and policy-sensitive businesses is debatable (Wang et al., 2022). Monetary policy links are examined using methodologies such as VAR, DCC-GARCH, and SVAR (Lauridsen, 2000). CBDC adoption necessitates infrastructure, regulatory monitoring, and cybersecurity safeguards. Despite obstacles, digital finance has a favorable impact on financial inclusion, demanding pro-poor financial policies (Buchinsky, 1995; Demir et al.). More study is needed to understand CBDC's significance alongside existing digital payment technologies.	Srijanie Banerjee,Manish Sinha,(2023)
5	Analysis of the Potential Impact of Central Bank Digital Currency (CBDC) on Banking in	CBDC can alter payment systems by allowing direct transactions with central banks, increasing efficiency,	Risma Gunawan, Muh. Asrul Yatimi,

	Indonesia	and increasing financial inclusion (Wang et al., 2022). However, its implications for monetary policy and financial liquidity necessitate strict control. Before broad adoption, Indonesia must establish a solid regulatory framework, maintain enough infrastructure, and perform trials (Lauridsen, 2000). Collaboration with FinTech and financial institutions is critical for innovation, and constant monitoring and public education can help ensure effective adoption (Buchinsky, 1995; Demir et al.). Insights from other countries can help Indonesia mitigate risks and maximize CBDC adoption.	Farahiyah Sartika ,2024
6	Financial inclusion and sustainable development: an empirical association	Financial inclusion promotes sustainable development by improving economic and social systems (World Bank, 2021). Higher financial inclusion is associated with improved renewable energy generation, literacy rates, and industrial productivity (Zaidi et al., 2021). Granger causality connects public interest in financial inclusion to sustainable development (Ozili, 2022). Financial inclusion policies should be integrated with long-term development goals to maximize impact	Peterson K. Ozili.2022

7	Using Central Bank Digital Currency to Achieve the Sustainable Development Goals	CBDC enhances sustainable development by improving capital access, transaction efficiency, and investment in sustainability projects (Ozili, 2022). It supports UN SDGs by enabling faster payment systems and greater capital efficiency. Future research should explore CBDC's role in achieving circular economy goals and broader economic development objectives.	Peterson K. Ozili.2023
8	Effects of **financial inclusion** on economic **growth**, poverty, **sustainability**, and **financial** efficiency: Evidence from the G20 countries	Financial inclusion has a substantial influence on financial stability and efficiency, especially in the long run. It boosts economic growth, alleviates poverty, and promotes income equality. Effective legislation, digital finance, and financial literacy all play important roles, and future research should look into larger datasets and institutional quality.	N Khan, M Zafar, AF Okunlola, Z Zoltan, M Robert.2022

CBDCs can increase financial inclusion and payment system efficiency. CBDC usage is influenced by factors such as trust, security, affordability, public literacy, and education.. (Risma Gunawan, Muh, AsrulYatimi, Farahiyah Sartika,2024).A lot of studied are done to study the impact of introducing CBDC on Sustainable growth through Financial Inclusion. Some of the related work is been summarized and given.

Evolution of India's Digital Payment System

Factor	Key Developments

RBI Initiatives	Systemic policies and roadmaps have boosted digital payments (Mahesh & Bhat, 2022).
Leadership in Digital Payments	Since 2017–18, India has led in digital payments, driving CBDC implementation.
Smartphone & Internet Growth	Increased accessibility has fueled mobile wallets and digital transactions.
Mobile Payment Systems	Emergence of Airtel Money, Vodafone M-Pesa, and prepaid cards.
Payment Banks	11 persistent payment banks, including Airtel Payment Bank & Paytm.
2016 Demonetization	Forced urban populations to adopt digital payments; Paytm's users grew by 35%.
COVID-19 Impact	Pandemic accelerated the use of contactless digital payments (Singh, 2022).

Source: Srijanie Banerjee, Manish Sinha,(2023)

Research Questions

- How do the key features of CBDCs help people access financial services more easily?
- How does customer awareness influence the willingness to adopt CBDC as a digital payment tool?

Objectives

- To examine how Central Bank Digital Currency (CBDC) can improve financial inclusion.
- To analyse the impact of customer knowledge and awareness towards adoption of CBDC.

Hypothesis

- H1: The implementation of CBDC significantly improves access to financial services among unbanked and underbanked populations.
- H2: Higher levels of customer knowledge about CBDC are positively associated with its adoption.

Research Methodology

This study uses a qualitative, exploratory research design with a systematic literature review (SLR) technique. The goal is to collect and examine current research on the function of Central Bank Digital Currencies (CBDCs) in promoting financial inclusion and generating long-term economic growth, with a special emphasis on the Indian context. The review examines research publications, policy papers, institutional reports, and government databases to better understand the current trends, opportunities, and issues connected with CBDC implementation. Research papers were sourced from Google Scholar, Research Gate, inclusion of high quality articles published by International Monetary Fund (IMF), World Bank Associations, authentic reports published by RBI and BIS pertain to authenticity of database.

Findings

According to this review, there is a great deal of potential for Central Bank Digital Currencies (CBDCs), particularly Retail CBDC (CBDC-R), to improve financial inclusion and promote sustainable growth in India. By enabling people, especially the unbanked, to safely and reasonably access digital financial services, CBDCs provide an alternative to traditional banking. The Financial Inclusion Index increased from 53.9 in 2021 to 64.2 in 2024, according to RBI statistics, demonstrating advancements aided by digital initiatives (RBI, 2024; World Bank, 2023). The Reserve Bank of India's (RBI) Financial Inclusion Index rose from 53.9 in March 2021 to 6 Financial Inclusion Progress (2014–2024), demonstrating the government's notable advancements in financial inclusion (table-1).

Table.1. People Indulged in Banking from 2014-2024

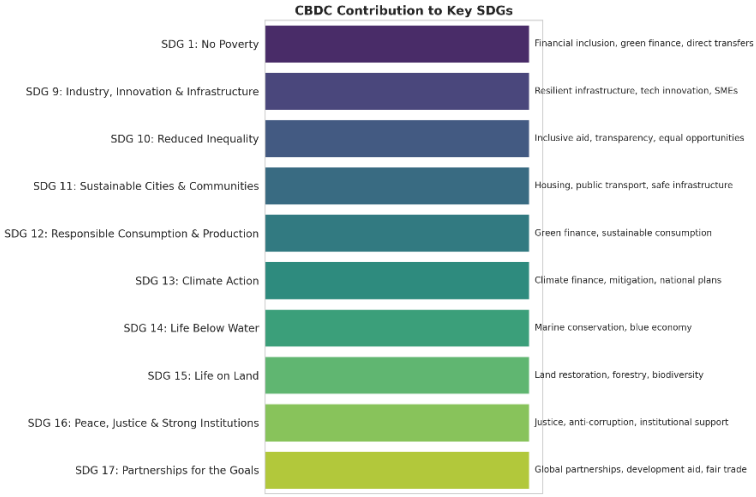
Year	**Percentage of Population with Formal Accounts**	**Financial Inclusion Index (FI-Index)**
2014	53%	53
2017	80%	43.4
2021	78%	53.9
2024	78%	64.2

Government measures like as the Jan Dhan Yojana led to a significant growth in formal account ownership, from 53% in 2014 to 80% in 2017. However, it plateaued at 78% in 2021 and 2024, emphasizing the need for increased account usage and digital engagement. The Financial Inclusion Index (FI-Index) has consistently improved, growing from 53 in 2014 to 64.2 by 2024. This indicates improved access, use, and quality of financial services throughout time.

The results reveal that, while access has increased, greater participation through education, digital infrastructure, and trust-building remains necessary.

By providing a stable, central bank-backed digital payment option and settlement infrastructure, CBDC has the potential to increase the credibility of the financial system, even if it is not extensively used. (Edona Reshidi, Natsuki Tsuda, Shiho Kanada, and Tayo Tunyathon Koonprasert, 2024).

CBDC as a tool for Financial inclusion will bring the positive impact on Sustainable Development Goals (SDG- 1, SDG-9, SDG- 10, SDG-11, SDG-12, SDG-13, SDG-14, SDG-15, SDG-16, SDG-17. CBDC supports these goals in every phrase (fig.1)



Sourse: Peterson K Ozili, 2023

Schematic illustration of the ways in which CBDCs support several Sustainable Development Goals (SDGs). Each bar demonstrates the strategic role that CBDCs play in promoting inclusive, sustainable growth by highlighting the main areas of focus that they support under the corresponding SDG.

Making everything into account, CBDCs appear to be innovative financial instruments that can raise targeted capital, ensure transparent distribution, and support inclusive and responsible financing approaches for a variety of development goals, increasing their strategic importance in advancing the 2030 Agenda.

Conclusion

India's Financial System plays a vital role in in the implementation of CBDC. (Srijanie Banerjee and Manish Sinha, 2023). India being a developing nation with majority of population residing in rural areas battling with the challenges of Financial Inclusion as well as infrastructure reason being, still around 30% of population not having bank accounts even after governments scheme, Pradhan Mantri Jan Dhan Yojana (54.97 crore) (department of Financial services). Central Bank Digital Currency will however may bridge gap by building Consumer Trust in Digital Financial Services, Mitigate Risk, Spreading awareness and Knowledge about the potential uses of Digital rupee (e-rupee). Opportunities for developing innovative technology-enabled goods and services. Central banks will have new powers for managing the money supply and influencing interest rates. Increasing payment system efficiency, increasing risk management, and boosting public trust in the financial system. Increase payment system efficiency by lowering transaction fees and processing times as it may eliminate the printing cost which may cost around 15-17 rupees per hundred rupee note which would be substituted with Digital rupee. Further the study has working on pilot basis facing the challenges of cybersecurity and customer perception, transparency and risk.

In regard with sustainability, CBDCs might decrease the need for actual currency, which will cut down on operating expenses and carbon emissions. Furthermore, social justice and green governance objectives may be supported by effective direct benefit transfers (DBTs) via CBDC (Ozili, 2023).

Advanced Research

Trust and digital literacy are also key obstacles. Concerns regarding security and privacy risks are raised by users, and CBDC is not well known. Studies emphasize the need of public education, safe venues, and open communication in building trust. (Aneja et al., 2022; Tan, 2023).

References

- Aneja, R., & Dygas, R. (2022). Literature review regarding digital currencies and cryptocurrencies in the new global financial system. *Digital Currencies and the New Global Financial System*, 1(1), 1–16.
- Gunawan, R., Yatimi, M. A., & Sartika, F. (2024). Analysis of the potential impact of central bank digital currency (CBDC) on banking in Indonesia. *ResearchGate*. https://www.researchgate.net/publication/384823423
- International Monetary Fund. (2023). *Central Bank Digital Currency and Financial Inclusion*. https://www.imf.org/en/Publications/WP/Issues/2023/03/18/Central-Bank-Digital-Currency-and-Financial-Inclusion-531104
- Ozili, P. K. (2022). Financial inclusion and sustainable development: An empirical association. *Journal of Money and Business*, 2(2), 186–198.
- Ozili, P. K. (2023). Using central bank digital currency to achieve the sustainable development goals. *ResearchGate*. https://www.researchgate.net/publication/368930860
- Government of India. (2023). *Economic Survey of India*. https://www.indiabudget.gov.in/economicsurvey/doc/echapter.pdf
- Indian Banks' Association. (2023). *CBDC India Overview*. https://www.iba.org.in/cbdc/index.html
- Reserve Bank of India. (2023). *Currency circulation statistics*. https://www.rbi.org.in/Scripts/BS_CurrencyCirculationDetails.aspx
- NABARD. (2014). *Inclusive Finance India Report*. https://www.nabard.org/auth/writereaddata/tender/0709170259IFIR2014.pdf
- Bank for International Settlements. (2023). *FSI insights on CBDC*. https://www.bis.org/fsi/publ/insights41.htm
- Statista. (2023). *India - Financial Inclusion Index*. https://www.statista.com/statistics/1421253/india-financial-inclusion-index/
- cbdctracker.org. (2024). *CBDC Tracker*. https://cbdctracker.org
- Srijanie Banerjee,Manish Sinha. (2023). Promoting financial inclusion through central bank digital currency: An evaluation of payment system viability in India. *ResearchGate* https://www.researchgate.net/publication/368366194

- Maurya, S. K. (2020). Professor Vipin Jain, Roy Setiawan, Alliyarov Ashraf, Kartikey Koti, K. Niranjan, Nik Alif Amri Nik Hashim, and S. Suman Rajest,"The Conditional Analysis of Principals Bullying Teachers Reasons in The Surroundings of The City", Productivity Management, 25(5), 1195-1214.
- Wang, J., Ramzan, M., Makin, F., Mahmood, C. K., Ramos-Meza, C. S., Jain, V., & Shabbir, M. S. (2023). Does clean energy matter? The dynamic effects of different strategies of renewable energy, carbon emissions, and trade openness on sustainable economic growth.
- Zhengxia, T., Batool, Z., Ali, S., Haseeb, M., Jain, V., Raza, S. M. F., & Chakrabarti, P. (2023). Impact of technology on the relation between disaggregated energy consumption and CO2 emission in populous countries of Asia. *Environmental Science and Pollution Research*, *30*(26), 68327-68338.
- Sikandar, H., Kohar, U. H. A., Corzo-Palomo, E. E., Gamero-Huarcaya, V. K., Ramos-Meza, C. S., Shabbir, M. S., & Jain, V. (2024). Mapping the development of open innovation research in business and management field: A bibliometric analysis. *Journal of the Knowledge Economy*, *15*(2), 9868-9890.
- Sharma, D. K., Boddu, R. S. K., Bhasin, N. K., Nisha, S. S., Jain, V., & Mohiddin, M. K. (2021, October). Cloud computing in medicine: Current trends and possibilities. In *2021 International Conference on Advancements in Electrical, Electronics, Communication, Computing and Automation (ICAECA)* (pp. 1-5). IEEE.
- Verma, C., & Jain, V. *Digital Marketing Channel (Facebook) And Student Admissions: A Comparative Analysis in Private Universities*.
- Anand, R., Jain, V., Singh, A., Rahal, D., Rastogi, P., Rajkumar, A., & Gupta, A. (2023). Clustering of big data in cloud environments for smart applications. In *Integration of IoT with Cloud Computing for Smart Applications* (pp. 227-247). Chapman and Hall/CRC.
- Shaikh, A. A., Doss, A. N., Subramanian, M., Jain, V., Naved, M., & Mohiddin, M. K. (2022). Major applications of data mining in medical. *Materials Today: Proceedings*, *56*, 2300-2304.
- Jain, V., Sharma, M. P., Kumar, A., & Kansal, A. (2020). Digital Banking: A Case Study of India. *Solid State Technology*, *63*(6), 19980-19988.

- Verma, C., Vijayalakshmi, P., Chaturvedi, N., Umesh, U., Rai, A., & Ahmad, A. Y. B. (2025, February). Artificial Intelligence in Marketing Management: Enhancing Customer Engagement and Personalization. In *2025 International Conference on Pervasive Computational Technologies (ICPCT)* (pp. 397-401). IEEE.
- Sumathi, M. S., Jain, V., & Zarrarahmed, Z. K. (2023). Using artificial intelligence (ai) and internet of things (iot) for improving network security by hybrid cryptography approach.
- Ehsan, S., Tabasam, A. H., Ramos-Meza, C. S., Ashiq, A., Jain, V., Nazir, M. S., ... & Gohae, H. M. (2023). Does Zero-Leverage phenomenon improve sustainable environmental manufacturing sector: evidence from Pakistani manufacture industry?. *Global Business Review*, 09721509221150876.
- Verma, C., Sharma, R., Kaushik, P., & Jain, V. (2024). The Role of Microfinance Initiatives in Promoting Sustainable Economic Development: Exploring Opportunities, Challenges, and Outcomes.
- Ramos Meza, C. S., Bashir, S., Jain, V., Aziz, S., Raza Shah, S. A., Shabbir, M. S., & Agustin, D. W. I. (2021). The economic consequences of the loan guarantees and firm's performance: a moderate role of corporate social responsibility. *Global Business Review*, 09721509211039674.
- Sharifi, P., Jain, V., Arab Poshtkohi, M., Seyyedi, E., & Aghapour, V. (2021). Banks credit risk prediction with optimized ANN based on improved owl search algorithm. *Mathematical Problems in Engineering*, *2021*(1), 8458501.
- Nasir Khan, Mahwish Zafar, Abiodun Funso Okunlola, Zeman Zoltan. (2022). Central bank digital currencies and the sustainable development goals. *MDPI Sustainability*, 14(19). https://www.mdpi.com/2071-1050/14/19/12688