

## EXPLORING THE VIABILITY OF CENTRAL BANK DIGITAL CURRENCIES (CBDCS) IN INDIA

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### **Abstract**

A pilot project for the Central Bank Digital Currency (CBDC) been announced by the Reserve Bank of India (RBI) in the end of the year 2022. It been a digital version of the rupee called the retail rupee (e-R). Additionally, CBDC is being looked upon by central banks worldwide. This essay assesses the scientific literature and major central banks' studies on CBDC. By introducing, synthesizing, and discussing diverse study fragments, the emphasis here is on offering a holistic understanding of the subject. A systematic literature review is used to find pertinent studies and publications for this purpose, which are then categorized into several categories. The reasons and justifications for issuing a CBDC are explained.

**Keywords**—Central Bank Digital Currency, CBDC, Digital Currency, Sustainable Finance

### **I. INTRODUCTION**

Money has been changing for millennia, moving from the barter system to the present-day digital currency. The idea of central bank digital currencies (CBDCs) has become more well-known in recent years. Digital currencies that are distributed and governed by a nation's central bank are referred to as CBDCs. When it comes to financial technology, India has been at the vanguard. India has advanced significantly in the field of digital payments, especially when it comes to realor nearly real-time financial transfers. This growth has been made possible by the creation of dependable 24-hour electronic payment systems like Real-Time Gross Settlement (RTGS) and National Electronic Funds Transfer (NEFT) [1]. The introduction of mobile-based payment systems like the Bharat Bill Payment System (BBPS) and National Electronic Toll Collection (NETC), as well as the launch of the Immediate Payment Service (IMPS) and Unified Payments Interface (UPI) for instant payment settlement, have also altered the nation's payments ecosystem [1][2].

Central banks from all over the globe, including those from China, Russia, the Bahamas, and the USA, are creating CBDCs. According to the Bank for International Settlements (BIS) [3], by

year 2021, 86 per cent of central banks worldwide were actively investigating the potential of CBDCs, while 60 per cent were trying the technology and 14 percent were implementing experimental programmes. In India, the adoption of CBDCs could reduce the demand for cash, minimize total currency management costs, and reduce settlement risk [4].

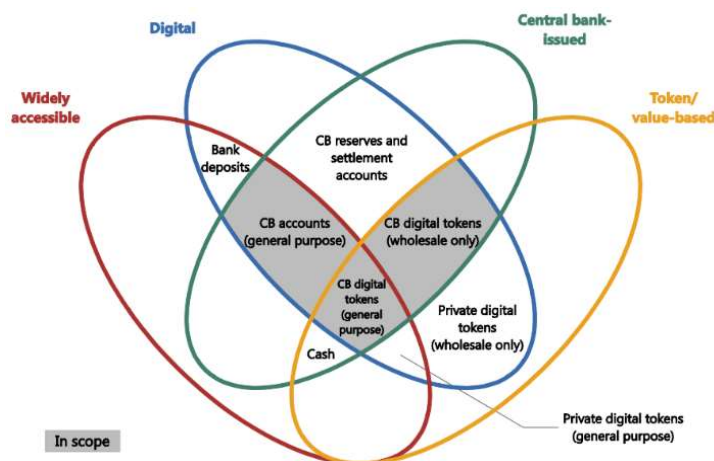
In the Union Budget that was presented to Parliament on February 1, 2022, the Indian government declared the launch of the Digital Rupee, a Central Bank Digital Currency (CBDC), beginning in FY 2022–2023. According to the budget statement, the creation of the CBDC would have a major positive impact on the digital economy. The budget also highlighted the overarching goals that would be achieved by CBDC's acceptance as a "more efficient and cost-effective currency management system" utilizing blockchain and other technologies. For simple issuance and distribution to the general public, a basic system is necessary for the implementation of CBDCs.

The purpose of this literature analysis is to evaluate the viability of CBDCs in India by highlighting the advantages, difficulties, and dangers of their implementation. An overview of the CBDC idea, its development, and its potential effects on the economy will come first in the review. The technical foundation needed for the implementation of CBDCs will then be discussed, including the use of blockchain technology. The review will also look at CBDCs' prospective advantages, such as their capacity to cut down on cash use, increase financial inclusion, and boost payment efficiency. On the other hand, the review will also cover possible risks and difficulties related to CBDCs, such as potential effects on monetary policy, the financial system's structure, and other issues. Research on significant central banks and central bank digital money initiatives are evaluated in this research (CBDC). Academic studies and significant central banks' efforts on CBDC are evaluated in the present study.

The sections of the study starts with defining CBDCs, post that we will discuss how to assess scholarly magazine research. The findings from the different research strands taken together offer a comprehensive analysis of the key CBDC features. The task is finished in the last section, which also points out any mistakes and provides suggestions for further research.

## II. CONCEPTUAL FRAMEWORK

Central Bank Digital Currency, or CBDC for short, is a digital version of fiat money that central banks have released. CBDCs, which can be used by the general population, are "a digital form of central bank money," according to the BIS [3]. CBDCs are issued and backed by the central bank of a nation, unlike other digital currencies like Bitcoin or Ethereum, which are decentralized and not backed by any government or central body. In the modern world, money is a crucial instrument that has changed over time. The issuing entity, shape, accessibility, and technology are the four unique characteristics of money, according to a CPMI-MC study. These traits are known as "The Money Blossom," which is a classification of money. Whether it is a central bank, a commercial bank, or a private company, the issuing entity is the organization that develops or distributes the currency.



**Figure 2.: The money flower: a taxonomy of money (Source: BIS, 2019)**

The use of CBDC in a country's financial and monetary environment can be roughly divided into two categories, wholesale and retail [5]. Wholesale CBDC is an example of a Central Bank Digital Currency that is intended for use by financial organizations rather than by private people or the general public is a wholesale CBDC. These CBDCs may entail permissioned networks and restricted access, and they are typically issued and managed by central banks. A retail CBDC (Central Bank Digital Currency) is a digital currency that can be used by people and companies for regular transactions. It is distributed by a central bank. It is meant to take the place of conventional bank deposits and physical currency. A retail CBDC could significantly alter monetary policy, financial security, and the function of commercial banks, among other aspects of the financial system.

### III. MOTIVATIONS FOR ISSUANCE OF CBDCS

Some nations have defended CBDC implementation for a variety of very distinct causes. A few of them are included in the list below:

A. Declining use of cash: The usage of cash has been reduced in many countries in the last ten years [3] which is fueled by factors like the rise in currency security concerns, the convenience of electronic payments, and the growth of digital payments [6].

B. Effectiveness of cash issuance: The countries with large populations of unbanked people or with weak conventional banking infrastructure [7] found the costs of handling currency be reduced by CBDCs usage [3].

C. Geographical restrictions on the physical movement of money: In the countries with geographic restrictions with moving real money can be costly and difficult, CBDCs hold the promise of quicker and more affordable deals [6].

D. Satisfying popular demand for virtual currencies: Due to the rise of digital payments and cryptocurrencies, there is a demand for digital currencies that are backed by central banks and offer the stability and security of conventional currencies [6].

CBDCs are being studied by central banks in developed countries to improve the security and sturdiness of domestic payment systems [8]. This allays worries about digital payment security,

lowers expenses, and supports central banks' directives for the smooth operation of retail and wholesale payments [8]. Modern payment systems in India are cheap, accessible, practical, effective, secure, and safe, all of which will boost the country's digital economy, increase financial inclusion, and improve the effectiveness of monetary and payment systems. India should investigate the prospect of issuing a CBDC for a number of compelling reasons. Among the key justifications are:

A. The use of the electronic system can result in cost savings for physical cash administration, including printing, distribution, and protection. This might help India's goal of transitioning away from a cash-based economy and increase the efficiency of its payment systems [7].

B. Fostering competition, efficiency, and innovation in payments: The computerized payment system can encourage these factors in the payments industry. Utilizing digital payments may enable new businesses to join the market and offer clients services that are more affordably priced and conveniently accessible [9].

C. Investigating the use of CBDC to improve cross-border transactions: The e-system may look into the use of CBDC to improve cross-border transactions. Financial inclusion for migrants and their families can be facilitated by the use of digital currency, which can speed up and reduce the cost of foreign remittances [6].

D. Promote financial inclusion: The e-system can promote financial inclusion in India by providing accessible and reasonably priced payment services to underbanked and unbanked groups. Users can obtain financial services through mobile devices by using digital payments, which reduces the need for physical infrastructure [9].

E. Defend the public's faith in the national money against the proliferation of crypto assets: The e-system can maintain the confidence of the common man in the national currency by providing a secure and reliable payment mechanism that is backed by the government. This can promote the use of digital currencies in India and lessen the risks posed by the growth of cryptoassets [6].

#### IV. **METHODOLOGY**

In this section, the systematic literature review strategy is thoroughly discussed. The literature review's classification is based on Cooper (1988) [10]. Even though the aim of the review was to harmonize concepts and explain the main issues raised by CBDC research, the focus is on the study findings, hypotheses, and applications. A representative sample of the scientific literature as well as central banks' work on this subject should be included in the approved papers. Additionally, they must be displayed objectively and arranged thematically.

Papers and reports from RBI, Scopus, IEEE Xplore, BIS and other online sources are used for this study. The reports from foreign banking organizations were chosen because it serves as a coordinating body and its significance for global commerce. These databases offer an extensive literature of the themes addressing CBDCs, even though they are unable to include all of the literature that is presently available in all pertinent fields. The search term was selected in line with the relevant source's search interface. The initials "CBDC" were used as the basis for each inquiry. Where possible, the singular form and the plural form were both accounted for by the abbreviated complete phrase. More than 30 papers were found to be satisfying the requirements

for inclusion. Thematic and Content analyses been performed on the data explored. The studies, which examined different facets of CBDC in India, were published between 2017 and 2021.

#### V. MAJOR RESEARCH THEMES IN CBDC

This section discusses the themes encompass the literature on a variety of topics including the acceptability and growth of CBDC, financial inclusion, central bank functions and goals, bank competition, design, welfare implications, and CBDC's role in macroeconomic and financial stability.

TABLE I.  
TAXONOMY OF THE REVIEW ON CBDC ADOPTION IN INDIA

Characters	Research Themes	Research Questions	Findings
Goal	CBDC Adoption	What variables affect the use of CBDC in India?	The main objectives of the CBDC adoption in India are financial inclusion, efficiency, and creativity.
Perspective	Consumer perspective of CBDC	How is CBDC perceived by customers in India?	For CBDC to be adopted in India, consumer knowledge and confidence are essential.
Domain	CBDC Development in India	What are the most recent CBDC advancements in India?	The Reserve Bank of India (RBI) has published a Concept Note on CBDC and is aggressively investigating its potential.
Method	Integration with existing payment systems in India	How can CBDC be incorporated into India's current payment infrastructure?	With the help of interoperability and standardization, CBDC can be merged with the country's current payment infrastructure.
Time	Legal and Regulatory Framework for CBDC in India	What is the legal and administrative structure in India for CBDC?	A legal and regulatory structure for CBDC in India is being created by the RBI.
Scope	Security risks and potential benefits of CBDC	What are the possible advantages of CBDC in India as well as the security risks?	While CBDC has the potential to lower transaction costs and broaden financial participation, it also carries security risks like the possibility of cyberattacks.
Level	Implications for Monetary Policy	What effects will CBDC have on India's monetary policy?	CBDC might have an influence on how well monetary policy works because it might make money move more quickly and make interest rate targeting less effective.

### A. CBDC adoption and development

The Reserve Bank of India (RBI) has declared the launch of pilot programmes for both wholesale and retail digital rupees. The e-W prototype went into service on November 1, 2022. The e-R trial began operations on December 1, 2022. These trials are likely to yield important insights into the viability and potential of central bank digital currency (CBDC) acceptance and growth in India. Given the lessons from this pilot, future ones will concentrate on different wholesale deals and international payments. The following nine banks have been chosen by the RBI to participate in the wholesale pilot initiative for the Digital Rupee: State Bank of India, Union Bank of India, HDFC Bank, ICICI Bank, Kotak Mahindra Bank, Yes Bank, IDFC First Bank, HSBC, Bank of Baroda.

Before CBDC can be extensively used, it still needs more research and testing as it is still in the early stages of development and adoption in India. However, the RBI's involvement in the CBDC investigation indicates that digital currency in India has a bright future.

### B. Potential advantages and disadvantages of CBDC use in India

CBDC research and use in India are still in their early stages, and more research and testing are required before it can be broadly adopted. However, the RBI's involvement in the CBDC investigation indicates that digital currency in India has a bright future. The study by Gupta et al. (2023) specifically examined the benefits of CBDC in reference to India. According to the authors, CBDC has the potential to expand financial inclusion in India, particularly for individuals who do not have access to traditional banking services [11]. Minesso et al. (2022) emphasized the possible benefits of CBDC for India. The authors postulated that CBDC might help lessen the economy's dependence on cash, which might lead to greater effectiveness and openness [12]. The authors also stated that CBDC could broaden financial inclusion by allowing access to digital payment systems to individuals who lack bank accounts or receive insufficient traditional banking services [13].

A BIS analysis from 2021 expressed concerns about privacy and security flaws associated with the implementation of CBDC [3]. Authors suggest handling problems with data privacy, cybersecurity, and financial stability calls for a legal and regulatory structure [14]. Overall, there are many complex factors to take into account when weighing the benefits and drawbacks of adopting the CBDC in India. Even though CBDC might benefit the Indian financial system, there are risks and challenges that need to be carefully examined and managed.

### C. Concerns about privacy and security related to CBDC in India

The researchers claim that while CBDC may broaden financial access, it also presents grave risks to information security, cybersecurity, and individual privacy [15]. A significant amount of personal data would need to be disclosed by the central bank, commercial banks, payment processors, and merchants for CBDC usage [16]. As a result, sizable databases of confidential data might be produced, making them vulnerable to hacker attacks and other security flaws.

The focus of the research conducted by Mohamed (2020) is the risk of cyberattacks and data breaches in CBDC systems. The importance of addressing these issues is emphasized by the authors to keep the safety and security of CBDC transactions. The paper emphasizes that CBDCs

are vulnerable to cyberattacks because of their digital character [17]. To address these issues, the writers suggest implementing a multi-layered security framework with physical, technical, and procedural controls [18]. In its study on the subject, the Reserve Bank of India [19] mentions possible security risks associated with the introduction of CBDC in India. The research suggests that the CBDC system's architecture should make it resistant to a range of dangers, such as malware, denial-of-service attacks, hacking, and other security flaws. The report also emphasizes the significance of collaboration among stakeholders, including the central bank, financial institutions, and technology providers, in order to guarantee that CBDC is applied in a secure and effective way. With a focus on promoting financial inclusion, innovation, and privacy and security needs in India's digital economy, these steps should strike a balance between these factors.

#### D. Financial equality by implementation of CBDC in India

The National Institute of Bank Management investigated possible impacts of CBDC on financial inclusion in India. The report claims that by reducing the cost of financial services and improving the unbanked and underbanked population's access to financial products and services, CBDC has the potential to boost financial inclusion [20]. According to the study, a sizable portion of India's population is either unbanked or has limited access to formal banking services [21]. The main cause of this is the high costs associated with conventional banking services, such as transaction fees, account management fees, and other costs. Additionally, CBDC might reduce the cost of financial services, opening up formal banking to more individuals and small businesses [22].

Providing a widely accessible, secure, and safe digital payment option through CBDC can help to progress financial inclusion, according to a new study from the Reserve Bank of India [19]. However, some studies have also highlighted potential barriers to CBDC usage for financial inclusion. For instance, a recent study by India's National Payments Corporation (NPCI) looked at possible roadblocks to CBDC adoption there [23]. The report claims that in order to overcome these barriers and ensure that India's underbanked and unbanked people can completely participate in the digital economy, sizable investments in digital infrastructure and programmes promoting digital literacy are necessary [23]. According to the study, there may be issues with the implementation of CBDC, including the potential for cyberattacks and the need to ensure that the system is secure and resilient to potential disruptions. In order to progress financial inclusion, it is crucial to assess the potential benefits and challenges of CBDC as it develops in India.

#### E. Inclusion of CBDC in India's current payment methods

The advantages and disadvantages of integrating CBDC with the nation's existing payment systems are covered in a report by PwC India [24]. The major conclusions of the paper are summarized in the report, along with the benefits of CBDC integration and any problems that still need to be fixed. First off, CBDC can speed up and streamline transactions by eliminating the need for intermediaries and enabling quick settlement. This will increase the effectiveness of the payment system and significantly lower processing costs. Second, CBDC can improve transaction security by providing a tamper-proof log of each transaction. This might reduce fraud

while increasing the transparency and responsibility of the payment system. Thirdly, by providing access to digital payment systems to those who lack bank accounts or are underserved by traditional banking services, CBDC can broaden financial inclusion. Interoperability with current payment systems is a key component for CBDC in order to offer streamlined and secure operations. In addition, regulatory compliance is important because CBDC would need to follow all relevant rules and regulations [24].

Another study by the RBI highlights the importance of carefully considering the technical and operational aspects of integrating CBDC with the existing payment systems. According to the report, integration will require thorough evaluation of system design, interfaces, and security protocols. The acceptance and growth of CBDC in India generally centre around its integration with the country's existing payment systems, with numerous studies outlining the benefits, challenges, and technical issues that need to be addressed.

#### F. India's legal and regulation environment for CBDC

The researches in CBDC emphasize the need for a solid legal and regulatory framework that takes data protection, privacy, and security issues into account. The study recommends that the legal and regulatory framework ensure that the collection, storage, and processing of personal data related to CBDC transactions complies with the basic principles of data protection and privacy [25]. The writers emphasize the significance of creating clear guidelines for the collection and processing of personal data as well as security measures against unauthorized access and use. They suggest that the legal and regulatory framework should set requirements for the security of CBDC transactions, including encryption and authentication techniques [26].

According to a researchers the principles of inclusion, openness, and transparency should serve as the foundation for the legal and regulatory framework for CBDC [26]. This would involve ensuring that the regulatory framework is accessible to all parties, including individuals, businesses, and other organizations. As a result, financial transactions would proceed more quickly, more effectively, and more affordably, increasing the total effectiveness of the financial system [27]. The authors contend that this can be achieved by establishing a rigid regulatory framework that promotes innovation while also ensuring customer security and economic stability [14]. A comprehensive legal framework that addresses these issues is required to ensure that CBDC is used in a safe and secure manner, to support financial inclusion and the growth of the digital economy, and to ensure that it is utilized in a manner that supports data protection, privacy, and security.

#### G. Effects of CBDC on India's monetary strategy

One of the major research topics pertaining to CBDC in India is its effects on monetary policy. Numerous studies have examined the impacts of CBDC implementation on the monetary policy framework and how well it supports the objectives of the policy. For instance, the Reserve Bank of India (RBI) just released a study that concentrates on the technical design factors for CBDC and their potential effects on Indian monetary policy [28]. The authors emphasize the advantages of CBDC in improving the effectiveness of monetary policy because it would give the central bank full control over the money supply. According to the research, the creation of CBDC could



enhance the transmission mechanism of monetary policy by reducing the lag between the implementation of a policy and its effects on the economy [29]. By completing transactions more swiftly and effectively, the central bank would be able to implement real-time interest rate adjustments and other flexible monetary policies.

The investigation by Yang and Zhou (2022) examines the potential impacts of central bank digital currency (CBDC) on the traditional transmission mechanism for monetary policy, much like the earlier research. The implementation of CBDC, according to the authors, has the ability to significantly change India's current monetary policy framework [29]. Banks borrow money from the central bank as part of the traditional way of communicating monetary policy, which affects the amount of money available to the economy [30]. The authors argue that by reducing their dependence on them as middlemen, CBDC could reduce the need for commercial banks to borrow money from the central bank.

## VI. CONCLUSION

In general, study on CBDC adoption and development in India suggests that the introduction of a digital rupee has a sizable potential to increase financial inclusion, improve payment efficiency, and lessen security concerns. The RBI is dedicated to looking into the potential of CBDC in India, as evidenced by recent pilot projects in the wholesale and retail sectors, which have produced promising results. Obstacles include the need to establish a legal and regulatory framework, guarantee interoperability with existing payment systems, and deal with possible monetary policy repercussions.

Future study should focus on the many facets of CBDC adoption and development in India, such as the consumer perspective, integration with existing payment systems, legal and regulatory issues, and possible monetary policy repercussions. Future studies might also examine the impact of CBDC on India's financial participation and economic growth. As CBDC becomes an increasingly important topic for central banks and policymakers worldwide, ongoing research and development in this area will be required to inform decision-making and ensure that it is implemented in a way that maximizes any potential benefits while minimizing any potential drawbacks.

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