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CBDC Adoption: A Case Study with reference to China

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Abstract

The Reserve Bank of India's (RBI) digital rupee program marks a significant step toward modernising monetary policy tools, increasing financial inclusion, and decreasing reliance on physical currency. This comparative case study analysis of China's e-CNY offers valuable insights into India's digital rupee adoption within the framework of government schemes. This paper examines the integration of government schemes such as Jan Dhan Yojana, Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), and Direct Benefit Transfer (DBT) to promote Central Bank Digital Currency (CBDC) adoption. Using the grounded theories like Technology Acceptance Model (TAM), Prospect theory, Trust Theory, and Innovation Diffusion Theory (IDT) as theoretical foundations, this paper has derived a deductive model. The research critically examines the behavioural, infrastructure, and factors influencing CBDC deployment and has proposed a conceptual model in studying the role of government schemes in CBDC adoption. A comparative analysis and case examination of China's e-CNY provides cross-national insights and emphasises Challenges in Government-led CBDC Promotion and technological readiness for successful CBDC implementation in India. Policy recommendations are offered to guide the effective CBDC adoption in India.

Keywords: CBDC, CBDC Adoption, Central Bank Digital Currency, Digital India, Financial Inclusion, Government Schemes

JEL Classification: E42, E58, O33, G28, G21

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Introduction

Digital Rupee, or e-rupee, is India's CBDC. It is the digital form of India's physical currency, the Rupee, issued by the RBI in digital format. The Digital Rupee offers features similar to physical cash, such as convenience of use, guaranteed by the RBI. The Digital Rupee (e-Rupee) ensures instant and hassle-free transactions, offering simplicity and speed. It reduces the time and cost associated with cross-border payments. By minimising cash handling and transportation, CBDC can potentially cut expenses and lower security risks. Additionally, CBDC functions both online and offline, further boosting financial inclusion. India's digital ecosystem has grown for various reasons, including the government's push for digitisation, internet and

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smartphone usage, and the rise of e-commerce. Government schemes have enabled significant growth in CBDC adoption in countries like China and others. In India, these initiatives help Indian banks expand their operations rapidly, but the adoption of CBDC, or the e-rupee, for retail use progresses at a slower pace. CBDC adoption enables financial inclusion and digital literacy are be facilitated on a large scale. Through several programs, including Start-up India, Make in India, and Digital India, the Indian government has aggressively encouraged digital technologies. These programs seek to boost the adoption of digital technology across various industries, including healthcare, education, and agriculture, while fostering an atmosphere supporting start-ups' growth. The expansion of the digital ecosystem has also been significantly aided by India's rising internet and smartphone penetration rates. The digital equivalent of government-backed fiat money is called Central Bank Digital Currency (CBDC). India's digital rupee which will be supported by the RBI, the country's central bank.

India's Unique Landscape

Phases & Rollout of the CBDC: India launched the pilot of its digital rupee in December 2022. According to the RBI, CBDCs can be categorised into Wholesale, or CBDC-W, for the banking and financial institutions; Retail, or CBDC-R, for the people at large. The former has been in operation in places at large for some time. The former has already operated in interbank operations and government securities. Collaborating banks provide consumers with the retail versions of digital wallets, which offer the possibility of P2P (Peer-to-Peer) and P2M (Peer-to-Merchant) transactions. The projects have objectives such as an expanded financial system and economic digitisation.

Literature Review

Kahneman and Tversky's (1979) Prospect Theory suggests that people assess profits and losses asymmetrically. When faced with uncertainty, people tend to be risk-averse because they are more sensitive to possible losses than to comparable rewards. This theory helps in deducting sensitivity to data control loss, perceived security and privacy risks, willingness to adopt CBDCs and confidence in regulatory frameworks as research variables. It explains new paradigms of financial interaction, such as government-controlled digital currencies and decreased transaction anonymity brought about by the shift from UPI (Unified Payments Interface) to CBDCs. The paradigm provides a framework of understanding risk aversion in financial decision-making is provided by this seminal research, which describes how people evaluate possible benefits and losses differently. This theory provides insights, particularly in understanding the hesitation people experience when adopting new financial technologies. Privacy concerns, trust aspects are deducted to understand how security, privacy perceived and financial risk are key factors in resistance toward innovations like CBDCs or digital payment systems.

Hansen (2014) opined that, according to trust theory, innovations can be accepted and successful if people have faith in the institutions, processes, and governing authorities. Trust can be effective (based on emotional ties) or cognitive (based on logical assessment). Furthermore, arguments suggest that decision-making is disproportionately influenced by

perceived losses, which is particularly relevant to public reluctance towards adopting CBDCs.

Charness and Rabin (2002) offered a thorough framework for institutional trust, which is essential for embracing innovations such as CBDCs. Mayer *et al.* (1995) examined trust through its three key components: ability, integrity, and benevolence are crucial factors in technology adoption, which is directly relevant to understanding public trust in CBDCs adoption in India.

Gefen *et al.* (2003) explored the relationship between control and trust, highlighting how trust is influenced by perceptions of oversight and governance. This framework can be applied to strike a balance between the public's confidence in the RBI and the regulatory supervision of CBDCs.

Das and Teng (1998) provide theoretical depth for analysing public confidence in digital systems and highlight fundamental insights into the significance of trust in societal interactions. Trust as a social mechanism, risk and confidence dynamics factors enable researchers to study the public adoption of CBDCs.

Luhmann (2018) and Roger (2003) Innovation Diffusion Theory (IDT) explains the pattern and speed at which information about innovations reaches the population. The theory outlines five key components, like Innovation characteristics, Relative advantage, Compatibility, Complexity, Trialability, Observability, Adopter Categories, Communication Channels and Social Systems. Adopter categories help to identify who is likely to adopt CBDC and when. Communication channels indicate how information about the CBDC is shared and how people can be informed and persuaded. Lastly, social systems explain where the adoption of CBDC may be fast or slow and why these variations happen.

Roger (2003) and Wani and Ali (2015) suggest that the information about innovations is diffused or spread through certain channels to people. These Communication channels through which innovation is communicated can greatly influence people's interest in the innovation and their response to it, leading to different adopter categories: early adopters, early majority adopters, late majority adopters and laggards. (Roger, 2003). This theory implies that communication channels through which people learn about the central bank digital currency play a vital role in people's interest in CBDC adoption or usage. Positive messaging that addresses concerns about security, transparency and usability and misinformation or lack of clear communications contributes to scepticism.

Davis (1989) The Technology Acceptance Model (TAM) suggested two important elements: Perceived Usefulness (PU): the conviction that using technology takes little effort. These elements have an impact on Behavioural Intention to Use (BIU) and Attitude Toward Use (ATU), both of which are indicators of actual technology adoption. (Davis, 1989) In the context of CBDC adoption, this theory suggests a person who perceives technology or innovation as easy to use. Easy to learn, time-saving and valuable, will be more likely to accept and use the technology. The implications of this theory for CBDC are that the central bank digital currency needs to undertake effective marketing or campaigns to create a positive perception about the ease of use and usefulness of the Digital Rupee among the population.

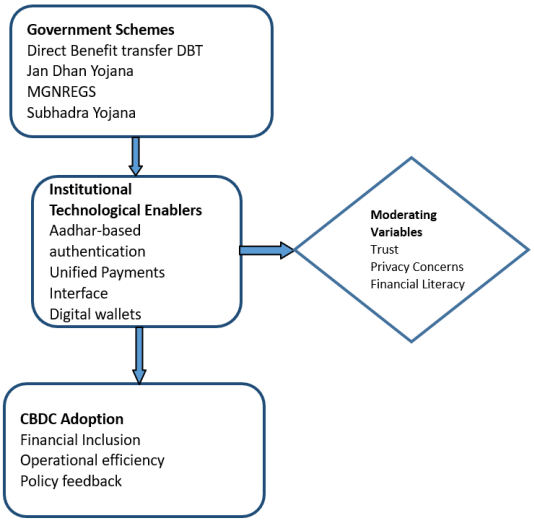


Figure 1. Conceptual Framework.
Source: Information collated by the author

Research Design

Figure 1 represents a conceptual framework illustrating how institutional enablers and government schemes such as Direct Benefit Transfers (DBT), Jan Dhan Yojana, MGNREGS, and Subhadra Yojana help unbanked populations into to formal economy, enabling broader outreach of digital financial platforms to influence the adoption of CBDC. The Digital rupee, framed as a function of financial inclusion, operational efficiency, and policy feedback loops, is expected to promote faster settlements and reduce physical cash (Bank for International Settlements, 2020). This relationship is moderated by individual-level factors such as financial literacy, privacy concerns, and trust. This model facilitates the development and dissemination of institutional technological enablers, such as Aadhaar-based authentication systems, UPI, and digital wallets. They represent the infrastructural readiness for CBDC roll-out and act as mediators between policy and adoption (Rao & Ghosh, 2022). Furthermore, technical infrastructures lay the foundation for scalable and CBDC adoption. The final node is conceptualised as an outcome shaped by both institutional setup and citizens' readiness to engage. Trust in digital finance and the central bank is very important. Previous research showed that higher trust correlates positively with willingness to use digital currency. However, when CBDCs are perceived as surveillance-prone, individuals may hesitate to adopt them. (Borgonovi & Pokropek, 2023) Moreover, financial literacy will better enable able to evaluate the benefits and challenges of CBDC, and it also moderates the influence of digital infrastructure on user behaviour.

Research Question

How government schemes are effectively integrated with CBDC to accelerate adoption in India?

Problem Statement

The successful adoption of the Digital Rupee can transform India's financial ecosystem, navigating social change and providing new routes for economic participation both domestically and globally. In spite of the potential benefits, CBDCs face significant challenges. To increase the use of the digital rupee, the Reserve Bank of India is exploring government schemes as a means to promote the digital rupee. The role of government incentives and schemes in the adoption of CBDC is a topic that needs to be researched.

Research Objectives

To examine how existing government schemes support and magnify the CBDC adoption.

To determine the antecedents which drive financial inclusion in terms of CBDC and major issues and challenges faced by policymakers.
To offer the policy implications based on the current qualitative study.

Research Methodology

This research is quantitative. The study is based on data obtained from secondary sources. The information is collated from various published sources like the Ministry of Finance, the government of India, the RBI, journals, e-newspapers, research papers, government policies, case studies, fintech industry reports, websites, *etc*. One of the strategic measures implemented under China's Digital Yuan (e-CNY) initiative involves the use of government schemes and incentives as a key mechanism to drive the adoption of central bank digital currency (CBDC). By integrating e-CNY into public services and welfare disbursements, China has effectively leveraged state-led financial inclusion to encourage widespread usage. This paper involves a case study analysis of China's adoption strategies and provides valuable insights into potential pathways, challenges, and approaches for other countries exploring CBDCs, particularly India. Through a comparative case study methodology, two key strategic directions emerge for India: First, leveraging government programs to facilitate the adoption of its CBDC; and second, addressing context-specific challenges through robust policy design, inclusive stakeholder engagement, and enhanced technological infrastructure.

Digital Yuan (e-CNY) in China: Case Analysis
A case study on International markets like China, where digital currency has gained prominence, pilot studies were conducted, which were tied to lotteries and subsidies. Citizens received free digital yuan to spend, creating grassroots engagement.

The e-CNY, China's digital currency, is similar to digital cash issued and monitored by the Chinese central bank. It works like physical money, can be used for payments, deposits, and tracking the actual balance. However, every transaction was digitally recorded and retrieved when required.

The monetary framework has two levels:

(i) Big Bank- Few commercial banks in China can convert cash or deposits into e-CNY
(ii) The central Bank, the People's Bank of China, regulates and monitors the money supply and ensures easy transactions.

China's digital currency network operates under three layers.

(i) The digital yuan is guaranteed by the PBOC (People's Bank of China).
(ii) Two databases: the PBOC database, managed by the Chinese central bank of all monetary transactions, and another managed by lower-tier banks.
(iii) Three Centres-they reside with PBOC, include identity verification, tracking digital wallets and transactions, and analysing financial data of users (Lee *et al.*, 2021).

The Chinese government claims that, unlike paper currency, digital yuan (e-CNY) transactions are monitored. However, user privacy is ensured. The primary purpose of this monitoring is to prevent money laundering and tax evasion.

The major reasons for the digital yuan (e-CNY) in China are made possible by two profound reasons.

First, on the domestic front, the digital yuan (e-CNY) simplifies financial transactions while also enabling the Chinese central bank to monitor and prevent illegal activities and financial fraud and strengthens regulatory omissions.

Secondly, on the international front, China wanted to have a strong financial position in international finance and to reduce its dependence on the US dollar-denominated financial system. Further, digital yuan is fully controlled by the PBOC (People's Bank of China), transactions are private to the general public but monitored by the Chinese government. Governments worldwide face a trade-off between security and privacy as countries move toward cashless transactions.

China's Digital YUAN (e-CNY) and Government Incentives

The following points highlight China's Digital Yuan (e-CNY) with government incentives regarding adoption, economic impact and regulatory frameworks.

China Government Incentives to Leverage CBDC Adoption

China's e-CNY is the largest CBDC pilot globally regarding the amount of currency in circulation and the number of users. Various government incentives were implemented, like public transportation, retirement benefits, school tuition, and tax payments. It also used promotional discounts to encourage the use of e-CNY.

Improved Financial Inclusion

The e-CNY has improved access to digital payments in remote rural areas of China, enabling offline payments through digital wallets. The digital Yuan offers many benefits, including transparency, reduced transaction costs, and increased financial inclusion.

Monetary Policy and Economic Control

The People's Bank of China (PBOC) Digital Yuan has increased the capacity of monetary policy of China. PBOC's implementation of the digital Yuan was able to address economic fluctuations and adjust the money supply or interest rates.

Privacy and Data Governance

The Digital Yuan allows privacy between everyday users and businesses. However, the government maintains oversight to track larger transactions for security reasons in a system known as "controlled anonymity".

Competition with UPI and other Digital Payments

The e-CNY allows users to connect numerous bank accounts. It offers to pay using QR codes, like Alipay and WeChat Pay. However, e-CNY offers a new feature called tap-to-pay that allows customers to make and receive payments without a phone signal.

Cross-Border Trade and Internationalisation

The Digital Yuan extends beyond financial transactions; it serves as a foundational pillar in reshaping global finance by driving the de-dollarisation trend, reinforcing financial

sovereignty, and challenging the dominance of the US dollar in International trade.

Lessons Learned from China's Digital Yuan (E-CNY) and Government Incentives: Insights for India's CBDC Adoption

The suitability of CBDCs as a tool for improved financial inclusion must be carefully assessed on a country-specific basis. In India, with its diverse demographics, widespread use of smartphones as a customisable interface for various phone types, and expansion of rural Point of Sale (POS) infrastructure, has laid a strong foundation for digital payments. However, technical infrastructure, such as data centres, servers, and network capacity, if limited, can impact the scalability and performance of CBDC systems and create vulnerabilities to cyberattacks. Financial inclusion is still viewed with speculation.

India's CBDC needs a privacy framework to ensure that citizens' financial data is protected while allowing them to maintain control over their personal information. There won't be a digital footprint because the digital currency will transfer directly between wallets. As a result, the entire procedure becomes anonymous. To enhance user privacy while maintaining security, India's digital rupee should adopt General Data Protection Regulation (GDPR) best practices used in Europe.

The Reserve Bank of India (RBI) is working on integrating UPI QR codes with CBDC wallets. This interoperability allows users to scan any UPI QR Code for transactions. Indian banks have introduced incentives such as cashback and reward points to encourage businesses and individuals to adopt the digital rupee. CBDC adoption leads to direct bilateral trade agreements with BRICS, ASEAN and Gulf countries and reduced dependence on third-party currencies. Businesses and governments aim to reduce foreign exchange costs. And also India is strengthening its financial sovereignty in global trade.

Challenges for CBDC Implementation in India

The RBI is focusing on government schemes to facilitate CBDC adoption, improve efficiency, promote financial inclusion, and reduce operating costs. The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), DBT, Pradhan Mantri Jan Dhan Yojana (PMJDY), and Subhadra Yojana for the successful adoption of CBDC in India (Table 1). To assess the operational performance, certain parameters have to be considered, like infrastructure integration, financial literacy implications, and alignment of these with digital payment mechanisms.

Subhadra Yojana scheme is the first government initiative to utilise CBDC under this scheme, Rs. 10000 is annually deposited into beneficiaries' bank accounts without intermediaries. The digital rupee can be spent using UPI QR codes, transferred to bank accounts, or withdrawn as cash. High transaction volumes help the banks identify user issues and address them quickly. Providing women with safe access to money through user-friendly digital wallets.

Connect DBT and CBDC wallets with real-time payments and Aadhaar. Using Aadhaar-based identity verification, link DBT straight to CBDC accounts. Use quick, safe payment methods (such as UPI) or use digital wallets to ensure payments are made right away. To distribute

CBDC using Jan Dhan accounts and mobile wallets. Use basic mobile wallet apps and Jan Dhan bank accounts to send and store CBDC. This will make it easier to receive and use digital currency, especially for those without smartphones or prior digital experience.

In certain MGNREGS districts with enough infrastructure, pilot CBDC in rural areas where MGNREGS runs and where banking and a strong mobile network are available, begin small-scale CBDC payments trials. This will elevate the effectiveness of CBDC in wage programs in rural areas.

Table 1. Comparative Analysis of Government Schemes

Sl.No	Parameter	DBT	Jan Dhan Yojana	MGNREGS	Subhadra Yojana
1	**Primary Objective**	Transfer welfasre subsidies directly to beneficiaries	Financial inclusion via zero-balance accounts	Employment guarantee with wage payments	Proposed scheme (e.g. for women's cash benefit scheme)
2	**Target Population**	Low-income, rural, and urban poor	Unbanked individuals, especially rural poor	Rural labor force	Women, particularly from lower-income households
3	**Digital Infrastructure Integration**	High – uses Aadhaar-linked bank accounts and digital modes	High – foundational layer for digital payments	Medium – increasingly digitized wage disbursement	Potential – depending on execution via DBT or digital wallets
4	**Financial Literacy Impact**	Medium – limited to transactional interaction	High – foundation for digital transactions	Low – focused on employment more than financial tools	Potential – if integrated with digital literacy drives
5	**Banking Penetration**	Strong – Aadhaar-linked accounts are widely used	Very Strong – enabled approximately 50 crore accounts	Moderate – bank access may be limited in remote areas	Variable – depends on rollout design
6	**CBDC Adoption Potential**	Very High – existing digital transaction rails compatible with CBDC	Very High – acts as foundational layer for wallet/account integration	Medium – may face challenges due to lower digital literacy and infrastructure	Moderate to High – if used as CBDC transfer mechanism for women's welfare

Source: Information collated from various sources by the author

Policy Implications

Integrated Infrastructure Development

To facilitate the distribution and payment of subsidies, digital wallets must be integrated with the current government infrastructure, including Jan Dhan accounts, Aadhar verification, and UPI QR codes, for the successful implementation of CBDC.

Targeted Scheme Pilots

Implementing pilot CBDC programs in districts with high MGNREGS usage and sufficient infrastructure confirms the efficiency of salary distribution and improved financial inclusion in rural areas.

Digital Literacy Campaigns

To build user trust, particularly among low-income and rural groups, literacy programs are essential. These initiatives should include training people how to use wallets safely and safeguard their privacy must be included with schemes.

Trust and Data Governance

To strike a balance between user privacy and government monitoring, a framework of "controlled anonymity," similar to China's Model, must be established along with strong GDPR-aligned data standards to ensure data security and compliance.

Cross-Sector Incentives

Given China's e-CNTs' success in areas like taxation, education, and transportation, India could expand CBDC's applicability to public services, promoting regular use.

Monetary Sovereignty and Trade

India's monetary sovereignty could be strengthened, and its reliance on foreign currencies may be reduced by the integration with the BRICS, ASEAN, and Gulf nations.

Conclusion

The transition from physical currency to digital currency, with the introduction of CBDC, signifies a paradigm shift in India's financial infrastructure, specifically, and its economic systems, more broadly. India's digital rupee is a game-changing initiative, backed by strong government support, a digital ecosystem, and a policy commitment to financial inclusion. However, a balanced approach is required due to the Complexities of user behaviour, infrastructure constraints, and privacy considerations. Government programs are a key means of disseminating CBDCs, and when combined with Aadhar, mobile wallets, and Jan Dhan accounts, they can establish a financial system that is inclusive, safe, and easily accessible. China's e-CNY offers important lessons about how incentives, trust, and interoperability may boost adoption. In order to mainstream CBDCs in India's economy going ahead, a user-informed and trust-centric implementation approach supported by robust policy alignment and digital resilience is essential.

Directions for Future Research

Future Research on CBDC should investigate different groups of people (Urban vs rural, young vs elderly) to examine trust and privacy aspects through qualitative methods. Comparative analysis studies of countries already implementing CBDC can provide insights and lessons for India's CBDC adoption. Studies should examine the long-term impact

of the economic policies, and there is a need to explore how CBDC could be used for international trade. Furthermore, research can also be conducted on the privacy and cybersecurity aspects associated with CBDC implementation.

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