

The Impact of the Digital Rupee on Payment Systems: Disruption or Coexistence in India's Financial Ecosystem

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ABSTRACT

Purpose: This research will look into whether or not the introduction of the Digital Rupee will affect current Indian payment systems and if it would be able to survive alongside these systems. This will involve studying the changing place of a Central Bank Digital Currency (CBDC) within a rapidly evolving digital payment environment dominated by the Unified Payments Interface (UPI) while focusing on creating more efficient, inclusive, and innovative payment systems.

Methods: In this study, we have adopted a qualitative and exploratory research design, using only secondary data as our source of information. The data used for this research paper is from reputable sources; these include reports published by the Reserve Bank of India (RBI) and the Bank for International Settlements (BIS), along with other published academic literature. We have developed a comparative research framework that compares the digital rupee against established digital payments, such as cash, traditional banking, and the UPI.

Findings: The study shows that instead of replacing current forms of payments, the Digital Rupee will exist in parallel to them. The Digital Rupee's advantages, such as greater security, lower fees, and better access to finance for those without it, will allow it to complement existing retail payment systems, which are predominantly UPI. The Digital Rupee's most beneficial applications will be in the areas of high-value transactions and cross-border payments.

Implications: The findings contribute to the growing literature on central bank digital currencies (CBDCs) by supporting a coexistence model for the digital rupee in developing economies. They offer practical insights for policymakers and financial institutions in designing regulatory frameworks and innovative digital financial services while highlighting the digital rupee's potential to improve transaction efficiency; enhance financial inclusion, particularly among underserved populations; and support sustainable economic growth and reduced inequality.

Originality: This research project has two fundamental differences when compared with any paper ever written on the subject of disruption vs. coexistence: First, the country studied was India; second, there is already a dominant digital method of paying in India, namely UPI (unified payments interface). Therefore, instead of focusing on CBDC in general, as has been done previously (in at least one other academic paper), a real comparison was made with regard to India's payment ecosystem.



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1. Introduction

Digital technology is rapidly changing how Indian banks operate. The introduction of UPI has changed how Indian citizens make digital payments, and through UPI and other digital payment technologies, cashless options have become more available and widely used. What happens to payment systems and financial service providers after the Reserve Bank of India (RBI) introduces the Digital Rupee? While many people have asked this question over the years, there haven't been any indicators of change in the Indian payment

system. The "Digital India" campaign that India has been trying to create has laid the foundation for UPI to become an integral component of the payment infrastructure. The RBI's work towards the digital rupee will also be introduced to help support the platform's overall revolutionisation of India's payments ecosystem while protecting against risks during the development of a robust digital-based economy. Since the last decade, we have seen a major transformation from using cash or paper methods to making payments via digital methods such as IMPS, UPI, NEFT, or mobile

wallets within India's payments ecosystem. According to the RBI, in H1 2025, digital payments accounted for approx. 99.8% of total transactions (The Economics Times, 2025). In 2024 alone, the UPI platform processed 17,221 crore transactions totalling ₹246.8 lakh crore – just under 85% of aggregate payment volume (Business Today, 2025).

1.1. Objectives of the study

- To review the design and implementation framework of India's Digital Rupee initiative.
- To evaluate the potential for disruption vs coexistence of the digital rupee with the existing payment infrastructure.

1.2. What is the Digital Rupee?

The RBI has outlined a vision for the digital rupee, which is a type of CBDC used as a digital version of the Indian

rupee and will be developed and regulated by the RBI. Digital Rupees will be different from cryptocurrencies in that they will have stability and be legal tender; they will be backed by the RBI. Additionally, the Digital Rupee is expected to improve efficiency, lower costs associated with currency handling and transferring money and help to revolutionise the current financial system. The main characteristics of the digital rupee include the ability to operate offline, as well as assurance of financial inclusion through faster settlements, less reliance on the Internet to conduct business and improved security through the implementation of blockchain technology. Physical forms of currency that can be classified as traditional currencies, such as coins and paper money, do not have an equivalent digital counterpart. In comparison to these physical forms of currency, a digital rupee would be able to move electronically between individuals as well as be used frequently to conduct business.

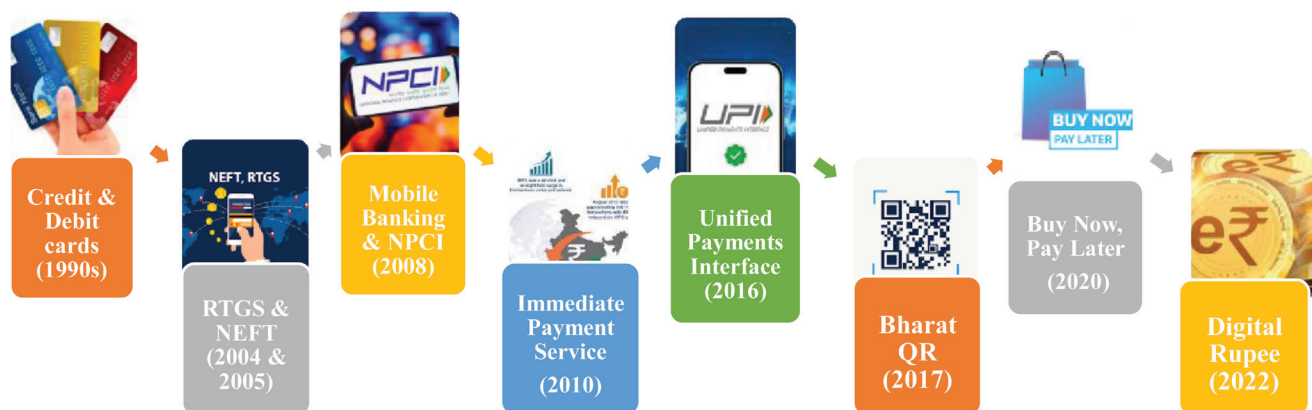


Figure 1: Evolution of Digital Payment Systems in India

Source: Author's Own Compilation

1.3. The Working Principles Behind Digital Rupee

The purpose of the Digital Rupee is to support digital payment methods and reduce the economy's dependence on cash. The digital rupee will have the same value as physical coins and notes of the same denomination and may be purchased by individuals from their choice of intermediaries, who are licensed banks from which they may obtain their digital rupee. The Digital Rupee can take two types of forms when used electronically: account- or token-based (Figure 2). The Reserve Bank of India has suggested a token-based model, which is intended to enhance collaboration with existing e-payment technology.

Account-based CBDC

An account-based CBDC necessitates maintaining a record of balances and transactions of all holders of the CBDC and denotes the ownership of monetary balances. This intermediary will also most likely confirm the identity of the account holder. This is the favored model also for wholesale CBDC.

Token-based CBDC

It will operate as a bearer instrument similar to banknotes; whoever possesses the tokens at a specific time will be presumed to own them. This is a preferred mode for retail CBDC, as it is close to physical currency.

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Figure 2: Form of Design: Token-Based and Account-Based

Source: Author's Own Compilation

1.4. The Digital Rupee: Design and Implementation

Two main options are available under the Bank for International Settlements (BIS) proposal to create a digital rupee (CBDC): retail CBDC (CBDC-R) and wholesale CBDC (CBDC-W). The hybridized architecture outlined in BIS's global proposal for the operation of CBDCs involves important functions, such as enrollment (creating cash in) and destroying cash (cash out) along with making intra-ledger transfers (Bank for International Settlements, 2024).

Table 1: Difference Between Retail and Wholesale CBDCs

Aspect	Retail CBDC	Wholesale CBDC
Target Users	General public, businesses, merchants	Banks, financial institutions
Purpose	Facilitates everyday transactions	Improves efficiency in interbank settlements & financial markets
Transaction Type	Peer-to-Peer & Peer-to-Merchant (P2P & P2M) payments	Large-scale transactions, interbank settlements, securities trading
Issuance Model	Two-Tier Model: RBI issues to banks, which distribute to users	Direct Model: RBI issues and directly manages transactions
Transaction Mode	Online & Offline (for cash-like usability)	Online Only
Interoperability	Works with UPI, digital wallets, QR codes	Integrated with existing financial systems (RTGS, SWIFT, etc.)

Verification Model	Token-Based (like cash)	Account-Based (like bank accounts)
Anonymity	Possible (similar to cash transactions)	Fully traceable
Security Risks	Risk of digital fraud & cyber threats	Lower fraud risk due to strict institutional controls
Advantages	Financial inclusion, reduces reliance on cash & supports offline transactions	Faster interbank settlements, reduce transaction costs & enhance financial stability
Challenges	Requires widespread adoption, cybersecurity risks, potential disruption to commercial banks	Regulatory complexities, potential impact on monetary policy
Examples	Buying groceries, paying bills, ecommerce transactions	Clearing & settling government securities, cross-border payment

Source: Author's Own Compilation

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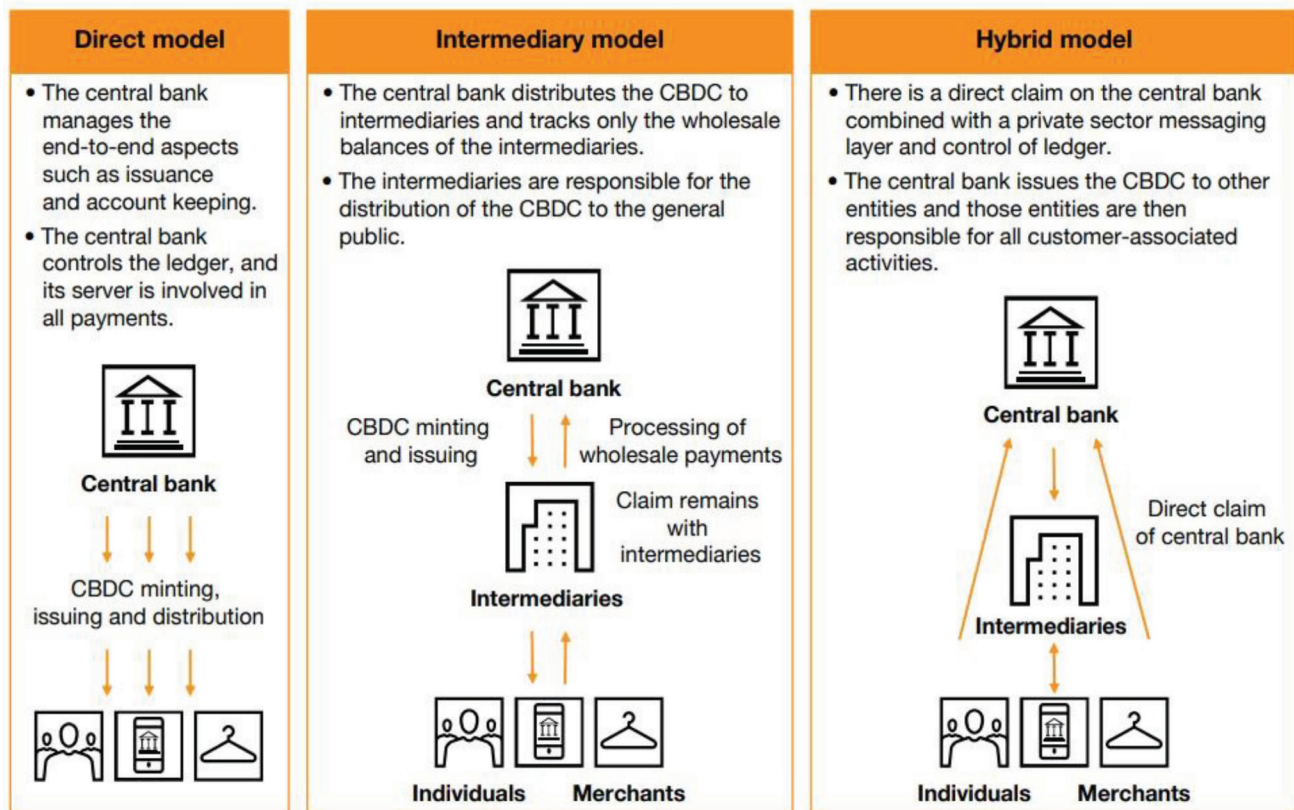


Figure 3: Models for Issuance: Direct, Intermediary, and Hybrid
Source: (PwC, 2024)

2. Review of Literature

2.1. Concept of CBDCs

The Bank for International Settlements (2023) described CBDCs as an enhancement to payment efficiency, financial inclusion, declining cash usage, and enabling programmability of money. Although the aims and designs of CBDCs are different in each jurisdiction, there are similar themes within the literature on CBDCs. The description of the risks associated with issuing a CBDC includes information security, operational, technological, and third-party risks. A country seeking to modernize its payment system will have a better opportunity to do so as a result of having a digital currency. A digital currency will also increase the availability of financial services to users through secure transactions and give them more security when using their cashless transaction means. In addition, other areas that will be addressed as part of creating an alternative payment option for citizens are privacy, scaling, and individuals with limited knowledge or access to digital payment options. Achieving success with the Digital Rupee will require public acceptance and approval from regulators (Haque & Shoaib, 2023).

2.2. India's Payment Ecosystem Evolution

India's digital payments ecosystem has full-fledged explosively. The share of UPI in payment volume increased from around 34% in 2019 to over 83% by the end of 2024 (The Economics Times, 2025). The digital payments volume itself flowed 34.8% in FY2024-25, with UPI accounting for 84% of retail digital payments by volume (Business Today, 2025). A drop in RBI confidence is related to a preference for cash savings and inflation forecasts. The study highlights how financial literacy shapes trust and suggests that central banks should focus on raising the common people's level of financial literacy to foster further trust (Niṭoi & Pochea, 2024). The report restrains about the challenges of transitioning to a wholly digital monetary system but recommends that a well-regulated CBDC system can supplement existing banking systems (Azzone & Barucci, 2023).

2.3. Disruption vs. Coexistence in Payment Systems

According to the innovation theory, disruptive innovations take the place of recognized systems; though in payment

systems, novel channels often integrate and coexist with current systems rather than entirely replacing them. Research comparing CBDC architecture suggests that hybrid models of CBDC will be used alongside commercial banks' currency (Braine & Shukla, 2025). Although CBDC has great potential, there are many concerns about how CBDC will affect the overall economy, transmission of monetary policy, and financial stability. Many unknowns remain in the area of how they will impact inflation targeting, liquidity, and crossborder financial spillovers. Further research is required to fully understand the social, ethical, and technological impacts of adopting CBDC (Elsayed & Nasir, 2022). A wide variety of academic disciplines (e.g., economics, sustainability, and technology) are interested in studying CBDC, and the authors echo the need for continued interdisciplinary research related to CBDC adoption, especially concerning implementation strategies, cybersecurity, and public opinion. Future research should be conducted to investigate the economic and social consequences of CBDC (Prodan et al., 2024).

The swift rise of Central Bank Digital Currency (CBDC) has ignited diverse discussions on whether it would overshadow current payment systems or work together with them. While earlier works suggested CBDCs would act as possible alternatives for deposits in commercial banks and private digital systems, as their digital format affords access to central banks' funds, new data suggest CBDCs are increasingly becoming complementary payment systems that support existing financial systems rather than substituting them. The focus has changed from competition to a cooperative nature along with changeability and creativity (Fund & Fund, 2025).

The potential of the digital rupee paired with blockchain to enhance financial stability through payment systems and credit is massive. Central banks have an opportunity to reduce their dependence on current banking procedures and implement blockchain-based methods for accelerating financial transactions. However, the possibility for central banks to destabilize developing country financial institutions is concerning (Sadiq et al., 2023). Addressing macroeconomic volatility can also be achieved by combining traditional monetary policy with a digital monetary policy based on price, which could potentially aid nations experiencing external shocks in stabilizing their economies by focusing on their overall structure and interaction between traditional and digital monetary policies. Further investigation into issues such as asset redistribution, interest rates, and how central banks digitally represent financial markets is warranted (Zhou, 2024). Technological, social, and financial obstacles exist in implementing CBDC. The report discusses the importance of prudently managing the possibilities of

disrupting current financial systems, such as changes in the lending behavior of commercial banks and liquidity problems caused by a financial crisis. The impact of CBDCs on monetary policy, interest rates, and financial stability needs more investigation (Committee on Payments and Market Infrastructures & Markets, 2018). Whereas CBDCs have the possibility to advance monetary policy and offer payment system modernizations. The present debate surrounds them and shows that they also carry substantial risks, including the likelihood of privacy issues and interruptions to the banking system. The study suggests accompanying additional research on how CBDCs can strike a balance among advantages and drawbacks, particularly about financial inclusion and competition (Dionysopoulos *et al.*, 2024).

New measures taken by RBI reinforce the coexistence model. The RBI Annual Report (2025-26) reveals that the pilot run of the Digital Rupee has steadily evolved from just retail payments to various government welfare schemes, automatic direct transfers (DBT), and experiments with cross-border payments in association with international monetary authorities. Also, it continues to engage with multilateral projects at the BIS Innovation Hub focused on improving cross-border interconnections, proving that the goal of the digital rupee is to improve rather than displace existing payment systems in India (Ashwin Manikandan, 2026).

Another crucial advancement is with regard to programmability. CBDCs are unique in their ability to apply programmable payment requirements through the use of either smart contracts or rules-based transaction logic, setting them apart from traditional financial instruments. Programmable currency allows governments to effect welfare payments subject to usage conditions, effect subsidies, and grant funds based on conditions laid down in the contract. Recently, discussions at NPCI show that pilot projects using blockchain technology to apply the Digital Rupee to targeted transfers of government benefits are already operational (The Times of India, 2025).

The idea of tokenization is greatly connected with the concept of programmability. CBDCs based on tokens work in much the same way as digital money. The important difference is that the ownership of digital money is based on the ownership of digital tokens instead of the conventional balance of funds. Tokenisation increases the safety of payments, makes P2P transfers possible, minimises the risk of settlements, and gives birth to programmable financial assets. The most recent studies show that designs based on tokens are the most widely used among the options for design because they are very similar to cash but provide a high degree of privacy and efficiency for transactions (Tang & Si, 2025).

2.4. Research Gap

Despite the rapid growth of research on Central Bank Digital Currencies (CBDCs), there are still gaps in the literature. For example, much of the available research focuses on developed markets such as Sweden and China but does not discuss emerging markets like India, which have an advanced digital payment ecosystem (Prodan et al., 2024). In addition, CBDC research emphasizes adoption, financial inclusion, and monetary policy, and not many studies cover the impact of CBDCs on the established payment systems, for example, if they form a complementary relationship with UPI (Dionysopoulos et al., 2024). Also, there is a lack of comparative research analyzing the Digital Rupee and payment systems such as UPI, cash, and conventional banking in terms of several parameters for evaluating their effectiveness such as accessibility, security, interoperability, as well as financial inclusion. Furthermore, most of the studies utilize one theory to explain CBDC implementation in practice. The research does not analyze CBDC effect based on the synthesis of several theories such as Diffusion of Innovation Theory and Financial Intermediation Theory. Finally, most of the research conducted is theoretical, and not enough studies analyze the real evidence that could give insight into the current CBDC ecosystem in India.

2.5. Theoretical Foundation

2.5.1. Diffusion of Innovation Theory

Roger's Diffusion of Innovations Theory is the foundation of this study and describes how new technologies diffuse through a social system. There are five factors affecting the adoption of technologies: perception of relative advantage, compatibility, complexity, trialability, and observability.

The Reserve Bank of India is developing the Digital Rupee as a financial innovation; however, the Digital Rupee will evolve through complementary adoption rather than disruption. UPI has a large network effect; therefore, many merchants have already adopted UPI, giving many consumers confidence in UPI; therefore, consumers will likely experience the adoption of the Digital Rupee gradually with complementary/coexisting features to UPI (rather than as direct substitutes).

2.5.2. Financial Intermediation Theory

Financial intermediation theory is the basis for the research conducted in this study. Financial Intermediary Theory focuses on how financial intermediaries help facilitate transactions, reduce information asymmetry between transacting parties, and create liquidity in financial markets through providing liquidity to holders of money when it is needed, or real-time processing of payment transactions. The introduction of CBDC can potentially change the current method in which transactions occur today; however, it is not

likely that banks or payment intermediaries will go out of business once CBDCs are introduced. This means that it is more likely that both banks and payment intermediaries will continue to exist alongside one another rather than there being a disruption to either or both.

3. Research Methodology

3.1. Research Design

The exploratory research methodology being utilized for this research study is based on the analysis of secondary (existing) data sources to determine whether India's Digital Rupee ("e₹") is capable of disrupting or coexisting with current payment systems within the overall financial system.

3.2. Data Sources and Search Strategy

Numerous types of different information have been collected for this secondary analysis project. There are a number of different agency reports and/or policy documents found via a variety of academic databases that can be used for this secondary analysis project; the principal databases that could be reviewed include the following:

- Scopus
- Web of Science
- Google Scholar
- RBI Publications and Reports
- Bank for International Settlements (BIS)
- International Monetary Fund (IMF)
- World Bank Reports
- National Payments Corporation of India (NPCI)

3.3. Keywords Used

The literature search employed combinations of the following keywords:

- Digital Rupee
- Central Bank Digital Currency (CBDC)
- e₹
- UPI and CBDC
- Digital Payments India
- Financial Inclusion and CBDC
- CBDC Adoption
- CBDC and Monetary Policy
- CBDC Coexistence
- CBDC Disruption
- Digital Currency India

3.4. Time Period Covered

The review covers literature and policy documents published between 2018 and 2026, reflecting the period during which CBDC research and implementation accelerated globally.

3.5. Selection Criteria

3.5.1. Inclusion Criteria

- Peer-reviewed journal articles
- RBI and BIS publications
- Government reports
- Empirical and conceptual CBDC studies
- Publications in English

3.5.2. Exclusion Criteria

- Non-peer-reviewed blogs
- Duplicated studies
- Articles lacking relevance to CBDC implementation or payment systems

3.6. Analytical Framework

A comparative analytical framework was employed to evaluate the digital rupee against existing payment mechanisms, including UPI, cash, and traditional banking systems. The comparison was conducted across the following dimensions:

- Accessibility
- Security
- Transaction Speed
- Financial Inclusion
- Cost Efficiency
- Regulatory Oversight
- Monetary Policy Implications
- Cross-Border Payment Capability

The findings were subsequently synthesized into thematic categories to identify patterns regarding coexistence and disruption.

4. India's Digital Payment Ecosystem

4.1. Growth Trends

- India's usage of digital payments increased significantly from 2021 to 2022—by 34.8% in number of

transactions and 17.9% in overall transaction value. In just one year (2023-2024), India processed over 11,761 million digital payments, totalling ₹180.24 billion (~\$25 million) (Business Today, 2025).

- It is estimated that UPI processed 17,221 million digital payments—worth an estimated ₹246.8 billion (~\$35.9 million)—accounting for 85% of total monthly digital retail purchase payments (The Financial Express, 2025).
- In 2025, UPI processed 10,637 million digital payments (representing 99.8% of overall digital transactions) and represented a total of ₹143 billion (~\$20 million) in overall digital payment volumes (The Financial Express, 2025).

4.2. Consumer Preferences and Market Share

- UPI's share of total digital payments grew from about 34% at the start of 2019 to an expected 83% by the end of 2024 (The Economic Times, 2025a).
- UPI focuses primarily on small-value transactions (P2P and P2M), which involve lower amounts than large-value transactions (using RTGS), which comprise a much lower volume but represent significantly higher financial value (The Economic Times, 2025b).

4.3 Evaluating the Digital Rupee's Position in India's Payment Ecosystem

The digital rupee, cash, UPI, and traditional banking mechanisms were linked to give a comprehensive understanding of the possible role of the digital rupee in India's fast-evolving payments ecosystem. A digital currency is vital for implementing modern payment systems within a country. Creating a digital currency would create greater accessibility and allow for more secure transactions (and thus, better security for users using cashless transactions) than before. The potential problems of privacy, scalability, and those who lack the knowledge or ability to use a digital payment option will also have to be taken into account as work progresses with developing this new option for consumers in this country.

Table 2: Comparative Analysis: Digital Rupee vs. UPI, Cash, and Banks

Feature	Digital Rupee (CBDC)	UPI	Cash	Traditional Banks
Launch Year	Launched in December 2022	Launched in April 2016	Ancient (since civilization)	Established in the 18th–19th century

Primary Use Case	Digital payments and store of value	P2P and merchant payments	Physical transactions	Deposits, loans, and financial services
Technology Platform	Distributed ledger technology (DLT)	Application programming interface (API)-based digital platform	Physical notes and coins	Centralized IT systems
Interoperability	Planned with UPI and banks	Interoperable across banks and payment apps	Limited (requires physical exchange)	Interoperable with digital platforms
Accessibility	Requires a digital device	Requires a smartphone and internet	Universally accessible	Requires an account and physical branch access
Security	High (cryptographic security)	High (two-factor authentication)	Physical security risk (theft, loss)	High (regulated and insured)
Transaction Speed	Instantaneous	Instantaneous	Immediate (physical)	Varies (instant to several days)
Cost of Transactions	Low to none	Low to none	None (but subject to physical handling and storage costs)	Varies (interest rates and fees)
Public Trust	In development	High	Very high	Very high
Regulation	Regulated by the Reserve Bank of India (RBI)	Regulated by RBI and National Payments Corporation of India (NPCI)	Governed by currency acts	Regulated by RBI and banking acts
Impact on Monetary Policy	Direct influence	Indirect influence	Direct influence	Direct influence
Anonymity	Limited	Limited	High	None (KYC-compliant)
Role in Financial Inclusion	High potential	High (especially for the underbanked)	Limited (dependent on access)	High (but historically limited by physical access)
Cross-Border Transactions	Future development	Limited	Not applicable	Available (with fees and time delays)
Advantages	RBI-backed, programmable, offline	Widely accepted, fast	Anonymous	Trusted
Disadvantages	Adoption low	Internet needed	Theft risk	Higher cost

Source: Author's Own Compilation

Table 2 provides a comparison of the digital rupee and UPI with respect to regulatory control, purposes, and how developed they both are, although they are both digital and

can complete transactions successfully. The Digital Rupee was launched in December 2022 by the Reserve Bank of India (RBI). This new digital currency can be used as a

means of exchange and a store of value, with the RBI acting as the supporting factor (Reserve Bank of India, 2022). The Digital Rupee will use Distributed Ledger Technology (DLT), which provides cryptographic security and allows for the direct settlement of transactions, leading to improved transparency and greater efficiencies for future transactions (Bank for International Settlements, 2022). In contrast, the UPI was introduced in 2016 and relies on API-based interoperability between various payment apps and financial institutions to allow for peer-to-peer transactions, immediate transactions, and transactions with merchants (National Payments Corporation of India, 2025). Both UPI and the CBDC have low transaction costs and quick processing times; however, because the CBDC has the support of the central bank, this may enhance monetary policy oversight. The UPI is already well accepted, whereas trust and user confidence in the digital rupee are just starting.

Cash and traditional banking systems are two examples of nonmodern forms of financial instruments that have distinct characteristics and still relevant but different purposes. Cash is readily available and provides anonymity to users; however, it does not provide any electronic features, there is a high chance that your cash could be stolen, and there are numerous costs associated with physically managing cash (e.g., transportation, security, etc.). In contrast to cash, traditional banks have an essential role in financial intermediation, acting as sources of investment, saving, and credit. But the operational processes that are

integral to a traditional bank often create higher costs of transacting, as well as longer lead times for processing transactions (International Monetary Fund, 2024). While cash and traditional banking systems are constricted to being physically present to conduct transacting activity, both the digital rupee and UPI provide an opportunity for increasing financial inclusion, especially within the rural and underbanked communities. Furthermore, at present, the only area of cross-border transactions is with traditional banks, which tend to charge incredibly high transaction fees and/or take long periods of time to process, while the digital rupee is still in the preliminary phase of usage in this area. Based on the data in the table, the Digital Rupee is likely to exist as a regulated, low-risk, and innovative substitute for traditional banking and/or UPI rather than substituting either UPI or traditional banking in the Indian payment ecosystem.

4.4. Global Case Studies on Central Bank Digital Currencies (CBDCs)

As stated by the BIS, the central banks are in various stages of research and/or testing CBDCs, with over 80% involved. Countries such as China, Sweden, and the Bahamas have achieved significant developmental milestones on their way to CBDC deployments and have provided valuable information regarding how CBDCs could potentially be used.

Table 3: Comparative Analysis of the Digital Rupee with Global CBDCs

Feature	e-Rupee (India)	Sand Dollar (Bahamas)	e-Krona (Sweden)	DCEP (China)
Launch Date	Pilot launched on 1st December 2022	Oct-20	Still in development/testing	Trial began in April 2020
Technology	Centralized blockchain-based hybrid model	Centralized blockchain, two-tier model	Centralized blockchain, two-tier architecture	Centralized, permissioned blockchain, two-tier model
Payment Mechanism	Prepaid digital currency	Digital fiat currency	Digital fiat currency	Prepaid digital currency
Accessibility	Available to anyone with a smartphone	Only for Bahamas residents	Expected to be only for Swedish residents	Available to anyone with a smartphone
Interoperability	Not interoperable with other digital currencies	Designed for interoperability	Expected to be interoperable with blockchain-based currencies	Not interoperable with other digital currencies
Offline Capabilities	Expected to have an offline feature	Requires internet connectivity	Requires internet connectivity	Offline payment feature available
Privacy	Privacy evaluation in progress	Uses zero-knowledge proofs for privacy	Privacy evaluation in progress	Transactions traceable, raising privacy concerns

Geographic Coverage	Not known	Within the Bahamas	Limited to Sweden	Domestic & international use
Status	Testing phase	Fully operational	Testing phase	Rolled out in major cities like Shanghai, Chengdu, and Beijing

Source: Haque & Shoaib (2023)

4.5. Lessons from Global CBDC Experiences

Experience in Canada has proved that Central Bank Digital Currency (CBDC) initiatives like China's Digital Yuan, Sweden's e-Krona and the Bahamas' Sand Dollar serve to complement existing methods of making payments digitally (such as through commercial banks). In all three cases, there has been little change to either the banking system or how people make payments online. As such, global developments point to a similar probability that in India, CBDCs will simply provide another means by which to carry out transactions and will not eliminate the current means of transacting, including both banks and online payment systems.

5. Findings And Discussion

5.1. Summary of Trends

- The total number of UPI transactions processed in 2024 was more than 17k crore, or about 85% of all retail digital payment volume, which is indicative of both a significant network effect and strong consumer adoption of UPI as a legitimate form of payment to merchants (The Financial Express, 2025).
- The Reserve Bank of India (RBI) created its digital rupee pilot to coexist with current banking systems, using established channels and not meant to replace any current methods of payment.
- Throughout the world, there have been variations in how CBDC has been experienced, particularly in countries such as China, Sweden and the Bahamas; however, there is enough evidence that they have supplemented existing methods of making payments rather than taking over from them.

The Reserve Bank Of India (RBI) has focused on CBDCs being used for certain applications (i.e., programmable payments, government payments, cross-border payments, and high-value payments) and UPI being the primary tool used for day-to-day retail payments through the usage of digital payment systems such as the Digital Rupee by ensuring interoperability among a digital currency, the banking system and digital payment processors.

5.2. Thematic Findings

- **Theme 1 - Financial Inclusion:** The digital rupee provides great potential for increased levels of financial inclusion in rural and other underbanked communities, as well as in populations with insufficient access to the banking infrastructure due to the opportunity for direct access to central bank money and the ability to conduct cashless transactions even when the internet is unavailable.
- **Theme 2 - Payment Efficiency and Cost Reduction:** The design of CBDCs enables instantaneous finality, which reduces the need for an intermediary in a transaction and lowers the cost of completing a transaction, thereby significantly enhancing both wholesale and government payment efficiency.
- **Theme 3 - Monetary Policy and Regulatory Control:** The digital rupee provides the Reserve Bank of India with greater visibility and, therefore, greater capacity to utilise its monetary policy than the UPI payment system has provided. This increased visibility improves the ability to manage and regulate monetary policy and also assures the stability of the payment system.
- **Theme 4 - Innovation and Financial Stability:** Programmable currencies & smart payments through CBDCs (Digital Rupee) come with an inherent risk to the stability of our monetary system. Excessive withdrawals from bank accounts would disrupt the stability of our banking sector. Likewise, CBDC's will need phased implementation so that the financial sector remains stable during the transition to developing the new digital currency.
- **Theme 5 - Coexistence with Existing Payment Systems:** Pilot projects in CBDC's from other regions/countries, as well as from India, have shown that the vast majority of CBDC's will primarily be a complement to existing payment systems instead of replacing existing payment systems. Given the UPI's extensive existing infrastructure, large participant base of merchants accepting UPI payments, and familiarity of users with UPI, these existing payment systems will be very challenging to replace with CBDC's.

5.3. Policy Implications

- **For the Central Bank (RBI):** Sustain a phased, inclusive rollout of the Digital Rupee with pilots, risk controls and feedback loops. Safeguard interoperability standards so that Digital Rupee works flawlessly with UPI, bank accounts, wallets and offline modes. BIS highlights operational or technical risks in CBDC rollout and frames privacy and cybersecurity regulations (CGRM, 2023).
- **For Banks and Fintechs:** Learn how to incorporate the Digital Rupee into current payment platforms and merchant acceptance networks. Build a business model around additional value-added services for payment processing instead of just using the digital rupee as a means of completing a transaction. Support awareness campaigns that will help create familiarity and confidence in digital rupee users.
- **For Government & Public Policy:** Utilize the Digital Rupee to provide assistance via the government to redistribute transfers like direct cash payments and subsidies, i.e., welfare programs, by way of programmable/direct money flow. Increase digital literacy campaigns to support and ensure equitable inclusive adoption for the rural/low-income/older populations. The CBDC framework can be used to expand offline payment capabilities and facilitate digital inclusion/cross-border remittances.
- **For Consumers:** Be cognizant of what a digital rupee means: digital fiat backed by the central bank but still focused on security, usability considerations, and privacy. Use merchants and payment apps that are backing CBDC when rolled out to get assistance from convenience.

6. Conclusion

The analysis shows no evidence to date that the D-Rupee has any chance of changing the existing payment landscape in India in the foreseeable future. The results of the RBI's pilot programs, global experiences with CBDCs, and the mature state of India's UPI infrastructure indicate that the two will live in harmony with one other. UPI will continue to serve as the premier emerging payment network (due to network effects and ubiquity) for consumers, and while the D-Rupee will provide significant incremental value by way of programmable payments, government payments, financial inclusion, and international settlements, it is expected that the future of Indian digital payments will be additive rather than an alternative to existing methods. India is experiencing significant growth toward a digital economy with the introduction of the digital rupee; however, the digital rupee provides many positive features such as increasing financial

inclusion, improving security, and improving efficiency. The Digital Rupee will also create new issues/challenges related to its implementation and present new challenges. There are a number of issues, which will also be dealing with the technical aspects of the digital rupee as well as the regulatory aspects of the currency. Therefore, a critical contributing factor to the success of the digital rupee is going to be how well thought out the design of the currency itself will be in comparison to traditional forms of payments like cash, UPI, and bank accounts and how much support exists from the public in India for this currency. The Digital Rupee could potentially become a major source of financing for the economy of the country, provided that it is developed based on lessons learned from international experience and considers the unique circumstances that exist in India.

To be successful, the Digital Rupee will require a collective effort from thousands of individuals who perform numerous tasks. In addition to these efforts, the government should also develop a comprehensive regulatory framework that regulates the design of the Digital Rupee in a manner that balances security and opportunity; it is likely that the changes necessary to both improve regulation and introduce the Digital Rupee will have to include the incorporation of the Digital Rupee into existing systems such as UPI and banks. There will need to be campaigns launched to educate the public and build confidence in the digital rupee, particularly for underbanked communities who may not fully understand how to use it and what value it provides. Officials should facilitate the development of a smooth transition between the Digital Rupee and the existing financial system to ensure that the Digital Rupee enhances, rather than displaces, existing payment systems. Consumers will be more likely to adopt the digital rupee if they understand what the digital rupee is, the importance of digital literacy, and how to properly supervise online transactions.

7. Recommendations

- Highlight user education and literacy: Merchants and consumers need to understand the novel currency form, its benefits, and its risks.
- Emphasis on interoperability: Confirm Digital Rupee integrates with UPI, banks, wallets, and offline modes.
- Encourage research and open-data initiatives: Academics should track usage patterns, adoption, and macroimpacts of the Digital Rupee.
- Implement a phased rollout with pilots and response loops: This allows user trust building and risk mitigation.

8. Future Outlook

The digital rupee is expected to be used for specific kinds of transactions, and its adoption will possibly be gradual.

It may be used more often as public awareness and trust increase, especially for international payments, high-value transactions, and in areas with restricted access to financial services. The Future of Cash, Banks, and UPI in the Age of Digital Currency. It is expected that UPI will continue to be the most popular payment method in India, especially for everyday and low-value transactions. Nevertheless, by offering a more effective and safe payment choice for cross-border transfers and high-value transactions, the Digital Rupee may complement UPI. For cash, it is predicted that the use of currency will gradually weaken as the digital rupee gains grip. However, it is projected that cash will last to play an important role in the economy, especially in rural areas and for low-income individuals. For banks, by emerging novel services focused on the digital rupee, traditional banks will need to adjust to the varying financial landscape. The digital rupee offers opportunities for expansion and innovation, but it also poses a risk to banks due to deposit disintermediation.

Abbreviations

CBDC: Central Bank Digital Currency; UPI: Unified Payments Interface; RBI: Reserve Bank of India; BIS: Bank for International Settlements; DLT – Distributed Ledger Technology

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All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work, ensuring its accuracy and integrity.

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