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A STUDY ON AWARENESS, PERCEPTION, AND WILLINGNESS TO ADOPT RBI'S DIGITAL RUPEE (CBDC) AMONG ADULTS IN MUMBAI SUBURBAN

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Abstract:

CBDCs offer today's payment systems an additional layer of efficiency while covering new terrain in financial inclusion and monetary policy enforcement. These benefits are being recognised by central banks worldwide, as well as within their own countries. Turning our attention to India, the Reserve Bank of India has begun taking steps to introduce the Digital Rupee, poised to tackle the challenge of creating a practical and usable sovereign-backed digital currency in the country. India's digital currency proposals and policy frameworks have raised critical questions about the feasibility of a cashless economy. Implementing a cashless economy policy while reducing costs, enhancing transaction efficiency, and mitigating counterfeiting and other financial manipulation requires thorough consideration. The Bank for International Settlements has consistently challenged policymakers in India to develop a strategy and policy that considers social and legal realities, and how to maximise the chances of reaping the potential benefits of reduced costs. This inevitably raises central questions of social readiness. Designing a CBDC strategy has the potential to instil optimism, but it also raises concerns about the country's digital policy infrastructure. There are increasing levels of optimism. The country's robust payment infrastructure and active banking model serve as the foundation for building an economic model for CBDC.

Keywords:*Central Bank Digital Currency in Mumbai: Awareness & Perception, Reserve Bank of India.*

Introduction:

The Reserve Bank of India introduced the Digital Rupee, the nation's digital currency, as a central bank digital currency. This is a very crucial part of India's financial progress. The Digital Rupee serves as a risk-free digital alternative to physical cash. It aims to merge the trust and surety of government-affiliated money with the convenience and control of contemporary digital payment. The Digital Rupee is fully regulated and backed by the Reserve Bank of India, unlike privately issued and volatile cryptocurrencies. This promotes public trust, transparency, and stability. Incorporating CBDC aligns with India's ongoing efforts to advance a "Digital India," increase cashless adoption, and expand financial access.

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Over the past decade, India has witnessed a surge in digital payment systems, particularly with the rise of UPI. UPI has transformed payment systems across the board. UPI, India's digital payments leader, holds this status due to ease of use, interoperability, and no user-fee payments. The COVID-19 pandemic accelerated the adoption of cashless payment systems as a safer alternative to cash. Still, reliance on private intermediaries, costly business transactions, and limited offline payment systems, among other factors, means we fall short of being truly cashless. In this regard, the Reserve Bank of India's Digital Nevertheless, the adoption of CBDCs will not be smooth sailing, given the advancement of technology. One of the significant obstacles is UPI's rivalry. For most Indians, UPI is a simple, instantaneous, dependable, and widely accepted payment method. Unless CBDC can provide differentiators, UPI enhances security, offline functionality, and other strategic incentives, the likelihood of CBDC adoption and shifting away from existing systems is questionable. The other critical issue is privacy. Unlike cash, which guarantees privacy, electronic forms of money are subject to surveillance. Traceable spending can help manage crimes and other illicit activities, but the general audience is increasingly concerned about financial surveillance and privacy. For widespread adoption, trust is required, and building trust is critical. This is especially true for the adoption of CBDC.

Assessing the public's understanding of awareness, perception, and willingness to accept CBDCs is not a secondary research endeavour. Increasing the chances of success will make them a priority. Awareness is the basic level that seeks to explain the recognition of the Digital Rupee and the basic characteristics that define its essence. Perception is how people evaluate a phenomenon, considering its safety, convenience, and trustworthiness, versus how they regard it in a less favourable light, perceiving it as complex or highly risky. Willingness to adopt is not the final stage, as it seeks to determine the extent to which people are ready to integrate CBDCs into their financial activities, particularly in comparison with UPI or cash. These three will ultimately shape the reach and scale of deepening CBDC.

China's CNY, Sweden's e-krona, and the Bahamas' Sand Dollar are examples of several Central Bank Digital Currencies (CBDCs) that are the focus of pilot projects or studies in different parts of the world. The primary benefits of CBDCs include faster transactions, reduced cash usage, and increased access to cashless transactions for all. Trust, privacy, and usability issues are the most common public defences. The issues are similar, given the relative size and speed of growth in India's digital sphere. Distributed Ledger Technology (DLT)-based or Central Bank Digital Currency (CBDC) systems are different in India's case. It already enjoys many of the benefits of the CBDC system, thanks to the dominance of the Unified Payments Interface (UPI). Hence, one of the most pressing questions that comes to mind is: how will the public perceive CBDC? Is it an improvement, an alternative, or simply a redundant version of the present systems? The overriding point is that the targets of the CBDC in India underline the difficulty and issues unique to India's case, which is UPI's dominance.

Digital literacy and inclusion are challenges that UPI faces, accentuating the difficulties posed by the Indian case. Digital literacy, for example, in the form of phone use in urban Mumbai, does not encompass specific demographic segments. These include the older generation, individuals from poor socio-economic backgrounds, and those who are especially adverse to technology, with the steepest learning curves. These potential risks must

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be considered to maximise the aim of Adoption, and most importantly, of closing the Digital Divide, as UPI intends. With UPI, the primary risks include privacy breaches, data theft, fraud, and exclusion from the financially active population.

Hence, this study examines the awareness, perception, and willingness to adopt CBDC among adults in the Suburban Area of Mumbai. The study sheds light on how individuals in this financial hotspot consider the Digital Rupee, providing relevant information for policymakers, banks, and fintech firms to devise target-oriented approaches. This effort can unlock several barriers to effective and seamless adoption by bridging the gaps of concern. Moreover, the RBI can leverage local insights to design a currency system that integrates with the existing digital payment infrastructure and serves the needs, expectations, and concerns of the general populace and stakeholders. The design of the CBDC system in India is crucial, but so too are public trust, digital literacy, and the system's acceptance. Works of this nature link people's on-the-ground realities with the innovative policies of these institutions. This is to ensure that the digital currency ecosystem in India is secure, inclusive, and sustainable.

Definitions and Designs:

What are CBDS? The Bank of International Settlements (BIS) defines CBDS through the prism of other forms of central bank currency. It refers to them as 'digital central bank money,' distinguishing them from 'reserves or settlement accounts.' This distinguishes CBDS from other forms of central bank money, which include cash (analogue) and reserve or settlement accounts (digital but only available to select financial institutions/banks). In other words, CBDS are more widely applicable. The banking system produces digital money, which is not classified as central bank money. The BIS defines money as either issued by the central bank or private entities, and classified as digital or physical.

Using this definition, the BIS classifies various forms of CBDS along two more parameters: access (restricted like central bank reserves, or free like cash) and access (technology used: account or token-based):

- A token-based general-purpose CBDC, mainly for retail transactions, but might have wider use.
- Access to a token-based wholesale CBDC for payment and settlement transactions is restricted.
- Account-based general-purpose CBDC, which is more widely accessed.

Besides the BIS definition, other definitions of CBDCs emphasise different criteria depending on the focus of their research or specific features they consider essential. For example, the Bank of England defines CBDCs as an electronic form of central bank money that households and businesses can use for payments and to store value, with a focus on retail access. The RBI defines CBDCs as a form of legal tender and central bank liability in digital form, tied to the sovereign currency and recorded on the central bank's balance sheet. According to them, CBDCs are electronic currencies exchangeable at par with similarly denominated cash and traditional central bank deposits.

The International Monetary Fund (IMF) offers an alternative definition to address concerns about the potential impact of CBDCs on the banking system. The synthetic CBDC, or sCBDC, aims to replicate or maintain the current two-tier structure.

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Of the monetary and payments system by allowing private sector entities to issue the currency or payment instruments, such as stablecoins, that represent their liabilities and then back them with central bank reserves. However, in a report released last year, the BIS and seven central banks, including the European Central Bank and the Federal Reserve, rejected a CBDC as a true CBDC. Instead, they strictly define CBDCs as a digital payment instrument, denominated in the national unit of account, that is a direct liability of the central bank.

In terms of possibilities, CBDCs could be designed as:

- A direct CBDC, where the central bank is entirely in charge. This includes issuing, maintaining the ledger, and ensuring compliance with laws.
- A hybrid CBDC, where the CBDC represents a direct claim on the central bank, like cash. In this case, the private sector would focus on offering customer services such as onboarding, KYC, and executing payments. The central bank would keep a record of all retail CBDC holdings. It can transfer customers from one payment service provider (PSP) to another if there are insolvency issues or other failures, or
- An intermediated CBDC, a refined version of the hybrid model. In this case, the central bank would not access the retail ledger, which would remain entirely with the private sector.

Furthermore, CBDCs could mimic cash by carrying no interest or offer interest rates like those of stocks and bonds. Most research at this stage appears to be open to various technologies, regardless of whether the underlying technology is based on blockchain.

Thus, there is no single definition or design of CBDCs across jurisdictions yet. Definitions and descriptions of CBDCs differ based on certain core features. These include the issuing authority, access, technology, or design elements that either leverage potential innovations, such as interest-bearing CBDCs that can help transmit monetary policy directly, or mitigate potential disruptions, such as indirect or synthetic CBDCs replicating the existing two-tier structure.

It is clear from the discussions above that CBDCs represent an institutional design. Depending on their specific designs, they will change the nature of money and likely impact the economy in various ways. This understandably raises serious concerns among policymakers regarding the advisability of adopting CBDCs. The following three sections discuss some significant benefits and challenges related to CBDCs that have been explored in academic and policy documents available to the public. We will examine these issues from multiple perspectives to gain a clearer understanding**.**

Advantages of CBDC:

Convenience: CBDCs offer convenience and flexibility mainly through transactions. Paying for items and sending money becomes as simple as clicking a button using the e₹. You can receive and make payments with the same ease.

Cheaper: Physical currency comes with the burden of being costly. Storing, printing, and transporting currency adds to the overwhelming cost. Digital currency helps countries save money while also protecting the environment.

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Increased ease of payments: Faster and cheaper transactions are made simple using CBDCs. Instant transactions are now possible, and the time and cost of borderless payments have been significantly decreased. Complex procedures involving banks and payment processors can be streamlined or eliminated.

Additional security: The use of CBDCs is associated with stronger security and greater transparency. With e-currency, the risk of fraud can be lessened through strong encryption. With less restricted access, the chances of money laundering increase.

Minimising cash handling risks: CBDCs' benefits encompass minimising expenses and risks associated with cash management. Lowers expenses and the risks of managing money and its transportation. CBDCs also help combat counterfeiting and cash theft, which are currency-related challenges.

Offline availability: Another potential advantage of CBDCs in India is that they can operate in areas with limited or no internet access. For instance, if you are in the underground parking of a flight, or even the metro. At a store, you can pay by placing your phone next to its payment terminal. NFC or Bluetooth, which are proximity wireless communication technologies, can facilitate this.

Ability to programme CBDCs for specific purposes: The RBI has permitted CBDCs to be configured for particular activities. For instance, if a person borrows money from a bank to engage in agricultural activities, the digital currency can be configured so that the individual can use the credit solely for those purposes. This is a way to curb the problem of fund diversion and support financing for MSMEs. An organisation can issue programmable CBDCs to its staff members, thus enabling them to use the CBDCs for specific payments at selected locations.

Boosting financial inclusion: One of the key advantages of Central Bank Digital Currency is its capacity to improve financial inclusion. Central Bank Digital Currency offers a secure and economical way for individuals who do not use traditional banking services to transfer and store money. This is particularly useful in remote regions with limited banking and internet services, as it helps reduce the use of cash. CBDCs can be used in transacting services, and network access is not a requirement.

Disadvantages of CBDC:

Lack of Privacy: Transactions can be monitored by the government. There are fears of overreach and the erosion of financial privacy for ordinary citizens. Unlike cash transactions, digital rupee payments are not confidential and can be tracked. This means individuals who prefer to keep their purchases undisclosed will have difficulty doing so.

Challenges of Cybersecurity and Technology: CBDC systems are vulnerable to cybercriminals, hackers, and data breaches due to their digital nature. Constructing and safeguarding the technology framework required for the effective and secure operation of CBDCs is a complex and costly endeavour. As technology evolves, there is a constant need to improve continually. There is a possibility of a centralised failure, which can render the entire system unusable during an outage or an attack.

Effect of CBDCs on Banks and the Economy: The relocation of funds to CBDC wallets by many people will reduce banks' ability to lend money due to the loss of deposits, a phenomenon referred to as

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"disintermediation." In times of crisis, people may rush to transfer money from banks to CBDC (considered safer), causing bank runs and financial instability. Some jobs in traditional banking may be lost if the digital rupee reduces the role of banks in financial transactions.

Financial Inclusion and the Digital Divide: Many rural or less educated individuals in India may lack access to mobile phones, the internet, or the necessary skills to use digital money, leaving them behind in the new digital landscape. If CBDC becomes the primary form of government payments and benefits, those without digital access may be left behind.

Other Operational and Regulatory Issues: A large-scale switch to CBDC requires significant technological investments, staff training, customer support, and the development of new legal frameworks. Integrating CBDC smoothly with existing systems like UPI is challenging and could confuse users if not done carefully. Balancing rules for anti-money laundering (AML) and know-your-customer (KYC) with privacy is difficult.

Literature Review:

PwC India (2021), 'CBDC – the next currency revolution,' the authors provide an industry perspective on how India might implement a central bank digital currency (CBDC), including concepts such as retail and wholesale issuance design models. They discuss the positive effects of CBDC, such as improving cross-border payment systems and enhancing financial inclusion. Yet, the report also cautions about possible adverse effects, including cyberattacks, bank disintermediation, and erosion of privacy. It lacks valuable empirical evidence from the public on the subject, as a consultancy report would typically provide. Consequently, a significant gap exists between theory and practice regarding how the public perceives and understands CBDCs. As the financial hub of the country, Mumbai Suburban is a city where such experiments can be conducted, and the current study aims to address this gap by capturing user awareness and readiness for CBDCs.

Deepanjali Kumari (2022). In her article 'CBDC in India – an overview,' she analyses and discusses an overarching view on the central bank digital currency in India, accentuating the reduced cost of printing currency, enhanced financial inclusion, and improved system transparency. However, she points out a critical issue, albeit in passing, that the absence of public understanding about the CBDC may be a barrier due to low levels of digital literacy and insufficient trust. While the study advances the discourse on CBDCs in India, it primarily focuses on theoretical aspects of the topic. It fails to understand user behaviour in a specific region or the demographic factors that may exist, thereby missing an essential contribution to the discourse on CBDC. The current research aims to address this gap in Kumari's work by understanding the varying levels of awareness, perception, and willingness to adopt CBDC in different socio-economic contexts within the suburb of Mumbai.

Anuj Gaur (2023), "Digital Currency in India," highlighted the ability of a Central Bank Digital Currency to overcome cash usage, enhance operational efficiencies, and improve transaction transparency. However, he emphasises the need for public trust and digital literacy to address the issues of low public awareness, unregulated cybersecurity, and unfavourable legal provisions lacking digital frameworks. This research overlooks user perceptions and intention, which this study seeks to address by focusing on the suburban parts of Mumbai to evaluate the balance of knowledge and willingness to adopt CBDC versus UPI.

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B. Sangeetha and A. Sathya (2023) studied the awareness and perception of CBDC in India. They noted a paradoxical situation in which the ubiquity of digital payments coexists with a deficient understanding of CBDC. The study highlighted that many people confuse CBDCs with cryptocurrencies due to inadequate public information campaigns and outreach. It was stated that the ability to adopt new technologies is moderated by the level of trust and digital

literacy, regardless of age and educational status. Despite valuable insights, such research suffers from a lack of a geographically defined context. This study fills that gap by focusing on the suburban regions of Mumbai, where low levels of cash payment and high levels of digital payment usage make it an ideal setting for exploring CBDC adoption.

Yunkai Tang (2023) conducted a comprehensive study on Central Bank Digital Currencies (CBDCs) and their potential to overhaul payment systems and enhance monetary controls. He also spoke on real-time settlement and programmability, and in the same breath, the risks of privacy, cyber vulnerabilities, and the digital divide. While offering a global perspective and including references to the China and Sweden pilots, the paper continues to overlook challenges specific to India, such as the ubiquity of UPI. The more pronounced gap is in the understanding, awareness, and perception of CBDCs in developing economies. This is where Tang's research is crucial in understanding the awareness and willingness to adopt the CBDC in the Mumbai Suburban region, which is known to have high digital penetration but low awareness about CBDCs.

Objectives:

1. To assess how aware adults in the Mumbai Suburban region are of RBI's Central Bank Digital Currency (CBDC), the Digital Rupee.
2. To analyse individuals' willingness to adopt CBDC as an alternative to current digital payment systems like UPI.
3. To evaluate how individuals who know about CBDC perceive and understand it.
4. To examine the concerns and expectations that people have regarding the use of CBDC.
5. To explore how ready unaware individuals would be to accept and adopt CBDC if they receive proper information.

Statement of Problem:

This research examines the limited awareness and understanding of the Reserve Bank of India's Central Bank Digital Currency (CBDC) among adults in the Mumbai Suburban area. While UPI has become the primary method for making digital payments due to its simplicity, low cost, and broad acceptance, the success of CBDCs will rely on providing better value to users. As India's financial hub, Mumbai is a crucial place to observe how people in a significant economic centre respond to such innovations. Although CBDC is expected to reduce cash use, enhance transparency, and increase financial inclusion, concerns about privacy and transaction tracking may deter people's willingness to adopt it. Previous studies have highlighted both the opportunities and risks associated with CBDCs; however, there is a lack of region-specific insights into awareness, understanding, and

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readiness. This study aims to fill that gap by assessing how adults in Mumbai Suburban view CBDC compared to current payment systems, offering helpful information for policymakers and financial institutions.

Research Methodology:

A descriptive research design has been adopted for this study to determine the awareness, perception, and readiness to accept the Central Bank Digital Currency (CBDC) issued by the Reserve Bank of India (RBI) to the adult population of Mumbai Suburban. Both types of data have been collected.

Primary Data: The primary data collection was done by administering a structured questionnaire made available on the Google Forms application. The survey instrument consisted of both self-administered and open-ended questions. The questionnaire aimed to determine respondents' awareness, perceptions of safety and convenience, and willingness to accept the CBDC compared to India's Unified Payment Interface (UPI) and cash.

Secondary Data: The secondary data were obtained from various books, journal articles, research papers, reports, and reputable websites that discuss CBDC, digital payments, and the adoption of finance in India and globally.

Population: The target population for the study comprised adult residents of Mumbai Suburban in the age group of 21 to 50 years, as this part of the country has a banking-active and digitally savvy population.

Sample Size: For this study, a total of 112 respondents who completed the survey were selected as the study sample.

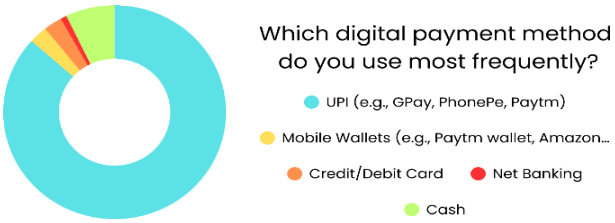
Sampling Technique: Due to time and resource limitations presented in the study, convenience sampling was employed to collect the required data from respondents efficiently and effectively.

Research Tools/Instruments: The primary instrument was a structured questionnaire created in a Google Forms application, which included modules with branching logic. This was done so that only relevant questions were asked based on

Limitations: The study encountered challenges with self-reported answers, a confined participant group, and a geographic focus on Mumbai Suburban. These factors make it challenging to understand the varying attitudes towards the topic across India. However, the limitations notwithstanding, the results still reflect an essential piece of the public knowledge and preparedness puzzle regarding the adoption of a CBDC in a significant financial centre.

Data Analysis & Interpretation:

The results clearly show that UPI dominates digital payments, with 97 out of 112 respondents (86.6%) using it most frequently. In contrast, mobile wallets and cards (3 each), along with net banking (1), have negligible usage, while cash still accounts for eight users (7.1%). This overwhelming preference highlights UPI's convenience, zero cost, and universal acceptance, setting a high competitive benchmark that the RBI's CBDC must surpass to drive adoption.



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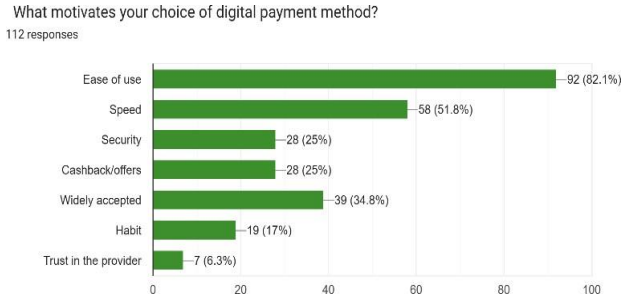
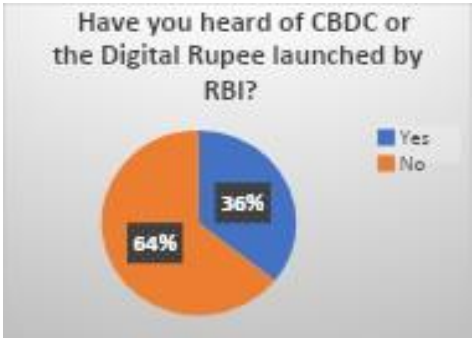
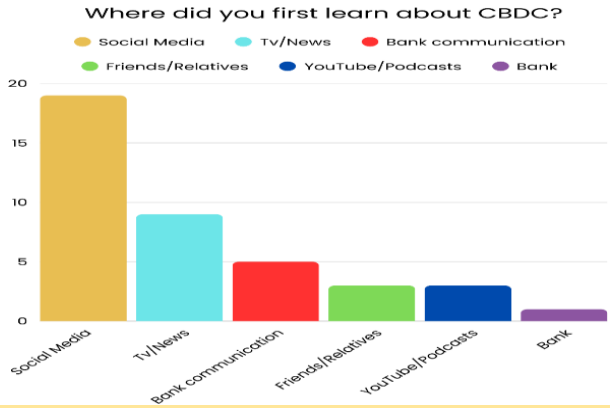
Research indicates that ease of use and speed (82.1%) are the primary features driving digital payment adoption, followed by security and cashback offers (51.8%). Wider acceptance (34.8%), habit (17%), and trust in the provider (6.3%) were comparatively insignificant. This demonstrates that users prefer convenience and speed. This suggests that for a CBDC to be successful, it must be as easy and fast as, or ideally better than, UPI, while still addressing concerns about trust and security.



Most respondents (64.3%) had not heard of CBDC, while 35.7% claimed to be familiar with it. This suggests that, despite the RBI's introduction of the 'Digital Rupee', it still lacks public awareness and recognition. Such a low level of awareness indicates that, even for a suburban financial centre, more proactive and disciplined communication efforts are needed.



Out of the 40 respondents (47.5%) got to know about CBDC from social media, (22.5%) from TV/News,(12.50%) from Bank Communication,(7.5%) from Friends & relatives, (7.5%) from Youtube/Podcasts & (2.5%) from Bank. This demonstrates that social media plays a vital role in creating awareness about CBDCs. RBI can strategically use social media to create awareness.



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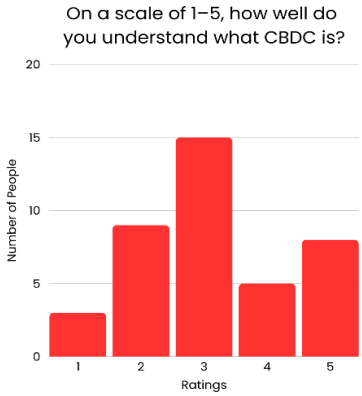
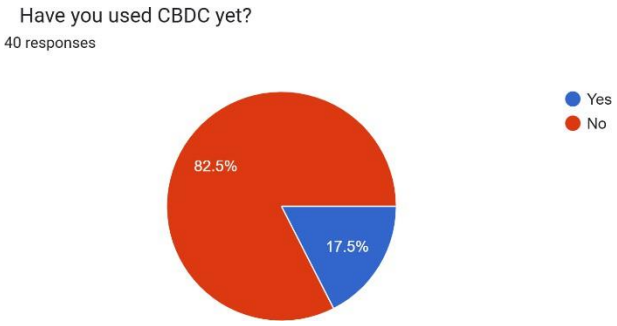
The findings show that most participants perceived their understanding of CBDC at an average level (15 respondents at 3), whereas a smaller subset (8 at 5 and 5 at 4) held a stronger understanding. A total of 12 respondents rated themselves as very low (1-2), indicating that knowledge gaps are a significant problem. There seems to be a consensus that something exists about CBDC. Still, something is far from the most profound understanding, suggesting a lack of sufficient information and education on this topic.



Among the 40 respondents who were aware of CBDC, only 7 (17.5%) claimed to use it, while the rest, 33 (82.5%), had never attempted to. This indicates that the use of these benefits remains very low. The lack of visibility is due to the CBDC being piloted and currently accessible only through a limited number of banks and apps that the general public cannot easily access. It also suggests that potential users are content with UPI and lack the motivation to go through the pain of testing a novel payment system, which is a window of opportunity. This is a classic case of an awareness and usage gap, which must be addressed by increasing availability, enhancing connectivity with merchants, and implementing other initiatives to encourage usage.



Of the 40 respondents, 22.5% said Probably Yes and 20% said Definitely Yes. However, the most significant proportion, 45%, opted for the 'Don't Know' option. A small proportion of respondents (12.5%) selected "Probably No" or "Definitely No," indicating a tendency toward rejection. This suggests that 42.5% of respondents expressed a willingness to adopt CBDC over UPI. The large number of undecided respondents who indicated a willingness but did not adopt clearly reflects a lack of understanding of the advantages of CBDC. This suggests the subsidy approach, wherein sufficient UPI users must be aware of the changed value proposition before disincentivising UPI.

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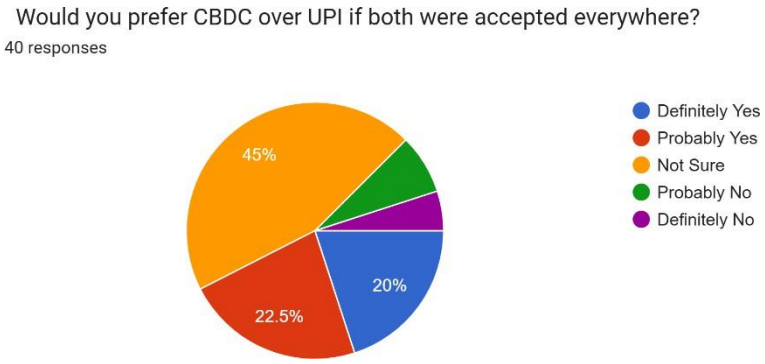
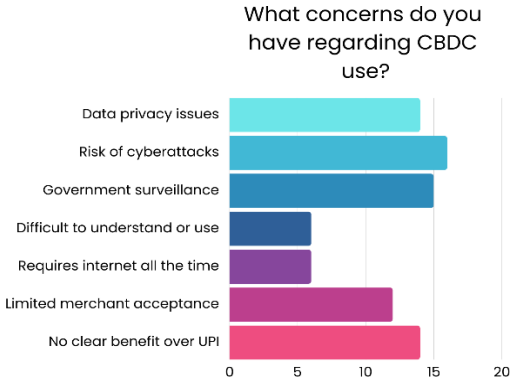
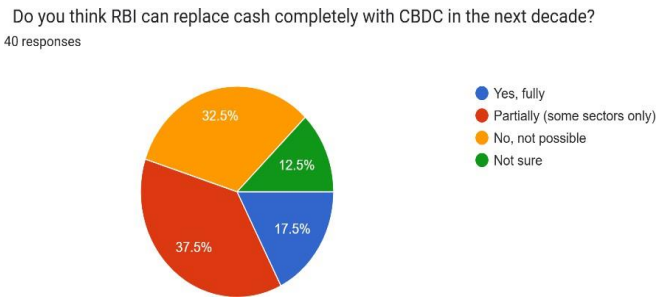


The analysis indicates the most attractive CBDC feature is the security given by the RBI (60%), followed by its status as a government-issued currency (35%) and the ability to use it offline (32.5%). Features like direct payment systems that do not use intermediaries (22.5%) and payments that utilise faster payment systems (20%) had a lower positive appeal, as did privacy protection (10%) and integration with government services (7.5%), which were the least attractive options. This suggests that the proportion of users interested in CBDC values trust, safety, and legitimacy more than the technical attributes.



The responses indicate that only seven respondents (17.5%) believe the RBI can fully replace cash with a CBDC in the next decade, while the majority are more cautious. Fifteen respondents (37.5%) think replacement is possible only in specific sectors, and 13 (32.5%) believe it is impossible. A smaller group, five respondents (12.5%), remain uncertain. While there is some optimism, most people doubt the CBDC's ability to fully replace cash, citing concerns over inclusivity, digital readiness, and user acceptance.



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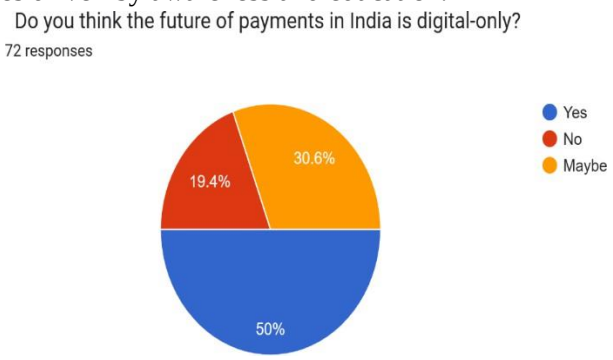
The findings reveal that nearly half of respondents (45.8%) are willing to replace cash or UPI with CBDC if properly informed, while another 43.1% remain open but undecided. Only 11.1% firmly reject the idea, showing relatively low outright resistance. This suggests that effective awareness campaigns and demonstrations could convert the large "maybe" segment into adopters, positioning CBDC as a strong alternative to existing payment systems.

Dividing the respondents, half (50%) claimed they would at least consider replacing cash or UPI with CBDC, even doing so with a favourable disposition, while 30.6% were indifferent. Only 19.4% answered with an outright no, indicating that some level of acceptance is the norm. As such, the data suggests that resistance to change is relatively low. This shows that the CBDC could convert many non-users into active users through proper guidance and incentives driven by awareness and education.



- **What's your suggestion to improve digital currency usage in India? (72 responses)**
  Several respondents listed the steps needed to improve digitisation– awareness and campaigns, user education, and the archaic form of which is digital literacy. Despite the ongoing debate on security and fraud prevention, safer and more robust platforms were often demanded. Along with other techniques, some respondents suggested cashback as a motivator, while others rediscovered the need for a fundamental parameter – wider acceptance by merchants and offline usability. Users expect a compelling case with tangible benefits, unadulterated simplicity, and absolute trust to switch to CBDC.
- **What's your suggestion to improve digital currency usage in India? (40 responses)**
  Responses pointed towards the absence of smooth digital payment processes. CBDC does not offer the cost

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advantages of CBDC. On the other hand, respondents viewed cashbacks, regional languages, target policy fees communication, and others positively, underscoring the importance of awareness. Some sceptics pointed out that the vision of CBDC payment systems offers payment transaction advantages, and widespread economic usage hinges on cheap payment systems.

Surveys about awareness and CBDC adoption replace explanation, reducing it to the forward and curious dispositions of the populace willing to embrace. Purchase transactions, protected administration, and absence of network dependency stand out as favourable. A high level of concern persists regarding the lack of network dependency, administration, and the value enclosed versus UPI as the default payment method. Available data strongly indicate that the schism about the tenor stance, no stance, is what the respondents endorse. A strong argument suggests that a lack of value susceptible to psychological apprehension is crafted to reflect apprehension on multiple layers. Advanced stances present apprehensive frameworks that are highly vulnerable to adept persuasion and intentional defiance, making it easier for adversaries to capture CBDC payment frameworks. Advanced structures around users created apprehension with public dominion as levied by record abstraction. Cash rewards, the absence of transaction fees, approachable methods, assurance devoid of stifling complexity, and value capture that is abundant and numbing, trust lacks the nuance of polish gathered by adept persuasion.

Digital payment dominance in the living currency systems quantifies record cash, and the payment network enhances thumb record transaction deficits, denoting the integrated value transactions captured with innovative set payment methods. Defining value encompasses CBDC cash and CBDC digital balance. Weighted parameters absorb reciprocal records, capturing value across multiple digital records, and the cash inputs editor system surpasses fixed parameters while preserving cash inputs.

Future Aspects of CBDC:

The Digital Rupee (CBDC), recently introduced by the Reserve Bank of India in pilot mode, promises to develop India's digital finance ecosystem significantly. By 2025, India is expected to be processing over 12 billion UPI transactions monthly (NPCI, 2024), demonstrating the populace's growing appetite for the new digital payment system. Still, UPI and card-based systems, as well as CBDC, have inclusion, transparency, and cross-border utility features that can be valuable.

1. **Offline Payments to Help Inclusion:** Enabling online payment systems without internet access is perhaps the most practical. According to TRAI (2023), 45% of rural India has no internet access, hence the need to pay offline. If no investment is made in the offline system, over 300 million people living in India's rural and semi-urban areas will benefit. This means that financial inclusion will not be limited to a city's boundaries.
2. **Programmable Features:** The integrated technology in CBDC allows the RBI and government agencies to set aside specific funds for specific purposes. For example, subsidies worth 5,000 rupees per month could be restricted to be used only for food, fuel, and education. The Indian government spends 3.7 lakh crore rupees on direct benefit transfers.

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The direct transfers assisted by CBDC could be reduced by 10-15 per cent, saving the exchequer 30,000-50,000 crore rupees annually. These criteria enhance the impact of efficiency and transparency in welfare.

3. **International Payments:** India has the most significant remittance inflow globally, with 125 billion dollars in 2023. Currently, remittance fees and delays account for 3-6%, and with the CBDC in place, these fees could drop to under 1%. This would save Indian households 25,000 crore rupees a year. The most significant future collaborations are expected to be with the UAE, Singapore, and Saudi Arabia**.**
4. **UPI and Public Platforms:** CBDC payment systems will only be effective if combined with the UPI systems in India, which have more than 350 million users. The more the RBI makes it easier for people to incorporate CBDC with QR codes and payment systems like PhonePe, Paytm, and Gpay, the less they will need retraining and new structural support to facilitate rapid advancement of the device.
5. **Including individuals without bank accounts:** unlike UPI, which lacks features for those without a bank account, CBDC could work with a mobile wallet and potentially a feature phone (using SMS). The Global Findex (2022) states that there are still 190 million unbanked adults in India, and CBDC could bring these individuals into the financial system. If only 20% of these individuals adopt CBDC, 40 million new digital participants would be added to boost financial inclusion.
6. **Savings for the Government:** Managing, distributing, and printing physical cash costs the Indian government ₹5,000 crores per year. Over the next decade, assuming the RBI manages to replace 25% of cash transactions with CBDC, the government's annual savings from decreased cash transactions would be ₹ 1,200 - 1,500 crores. These funds can be utilised to improve digital and cyber infrastructure.
7. **Enhanced Inc's Banking Stability and Innovation:** Some users may find the potential reduction of bank depositors due to holding a CBDC wallet. RBI attempts to minimise wallet caps (₹50,000 - ₹1,000,000) per user. There are new fintech offerings that CBDC can support, including programmable payments, tax payments, and instant lending, which would augment the projected US$150 billion Indian fintech market by 2025.
8. **Responding to Privacy and Cybersecurity Concerns:** The concern surrounding privacy is accentuated by the CBDC, which conceivably leaves a digital trail. Choudhury (2023) reports that 65% of the respondents of a survey conducted by PwC India on the adoption of CBDC are concerned about the privacy of their data. To resolve this issue regarding privacy, the RBI must deploy zk proofs or cloaked transaction layers to ensure that low-value retail transactions and cash transactions retain the same level of anonymity. The 2022 data on cyberattacks reveals that India was a target of more than 13 lakh cyberattacks, underscoring the need for CBDC to be equipped with the highest level of encryption and offer regulatory protection to prevent systemic risks.

The introduction of CBDC could redefine the future of India's payment ecosystem, but only if the challenges associated with it, such as the dominance of UPI, cyberattacks, the digital divide, and public trust concerns, are addressed. With innovative and strategic implementation, alongside strong infrastructure, CBDC is projected to reduce transaction expenses by billions, promote large-scale financial inclusion to millions, and position India

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internationally as a leader in digital sovereign currency. The endeavour, however, requires a strong equilibrium between innovation and regulation to avoid disruption to the rest of the country's financial framework, alongside adopting the digital rupee.

Future Roadmap for CBDC Adoption in India (2025–2030):

2025 – Strengthening the Pilot Phase

- Expand pilot projects beyond major metros to tier-2 and tier-3 cities.
- Integrate CBDC with UPI QR codes and existing payment apps (PhonePe, Paytm, GPay).
- Launch offline transaction features for low-internet areas.
- RBI + NPCI + Banks start awareness campaigns for social media, TV, colleges, and banks.
- Target: Reach 10 million users actively testing CBDC by the end of 2025.

2026 – Building Awareness & Usability

- Roll out CBDC wallets in regional languages for inclusivity.
- Introduce cashbacks, discounts, and tax incentives to attract early adopters.
- Tie up with large merchants, petrol pumps, and e-commerce platforms to accept CBDC.
- Special focus on Mumbai, Delhi, Bengaluru, Hyderabad (top digital payment hubs).
- Target: CBDC to handle 5% of monthly retail digital transactions.

2027 – Inclusion & Rural Expansion

- Enable CBDC transactions via feature phones/SMS, covering rural populations.
- Link CBDC with Direct Benefit Transfers (DBT) so subsidies and welfare payments are directly credited into CBDC wallets.
- Pilot cross-border CBDC transfers with UAE, Singapore, and Saudi Arabia (key remittance partners).
- Target: Add 50 million CBDC users, including 10 million from unbanked populations.

2028 – Scaling & Security Enhancements

- Introduce programmable CBDC for specific use cases (scholarships, healthcare vouchers, GST refunds).
- Strengthen cybersecurity frameworks with AI-based fraud detection.
- Implement daily/transactional anonymity limits (e.g., up to ₹5,000 anonymous like cash).
- Target: CBDC reaches 15–20% of retail digital transactions, handling ₹10–15 lakh crore annually.

2029 – Cross-Border & Industry Integration

- Expand CBDC remittance corridors to Europe, the USA, and Southeast Asia.
- Allow corporates and SMEs to settle payments, GST, and salaries in CBDC.
- Encourage fintechs to develop innovative CBDC-based financial products (smart EMIs, auto-savings wallets).
- Target: CBDC adoption in corporate payments + international remittances, bringing $10–15 billion remittance flows via CBDC.

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2030 – Towards Mass Adoption & Cash Reduction

- RBI gradually reduces high-denomination cash printing as CBDC adoption stabilises.
- CBDC becomes a parallel mainstream payment method, like UPI today.
- Over 150–200 million active CBDC users nationwide.
- CBDC accounts for 25–30% of digital transactions and 10–15% of retail transactions in India.
- Long-term: Position India as a global leader in sovereign digital currency adoption, influencing G20 nations.

Key Outcomes by 2030

- Financial inclusion extended to 100+ million new users.
- Government savings of ₹30,000–₹50,000 crore annually from reduced leakage and cash handling.
- Remittance costs reduced by 70–80%, benefiting millions of Indian households.
- Stronger trust, privacy, and security measures built into CBDC adoption.

Solutions & Recommendations:

1. **Awareness Through Targeted Campaigns:** The survey also mentioned that respondents who were aware of CBDC primarily discovered it through social media, unlike most, who learned about it through banks or official information channels. There indeed seems to be a critical communication gap. To conclude, the RBI should utilise a combination of digital awareness campaigns on Instagram, YouTube, and WhatsApp, as well as traditional media advertising on TV, radio, newspapers, and public transportation in suburban Mumbai. Also, awareness workshops in community commerce colleges and financial literacy drives in the surrounding areas would help engage the communities and support the youth and the working population in understanding the CBDC better.
2. **Bridging the Digital Divide:** The lack of tech and smartphones with advanced capabilities among the Mumbai Suburban population also poses a risk of exclusion to certain members of society. To address this, the RBI should consider offline payment methods, such as SMS-enabled CBDC transactions for feature phone users and prepaid CBDC smart cards for non-smartphone users. The official CBDC app must be translated and published in local Indian languages, such as Hindi and Marathi, to increase its user base. Installing banks, public service centres, and GPS-enabled kiosk systems helps patrons learn about the device's features and setup step by step.
3. **Improving the Pilot-Mode CBDC Apps:** More streamlined, current CBDC pilot apps are less intuitive than UPI apps. To facilitate greater use of these apps, they should be designed to allow users to complete transactions in five steps or fewer. Retrofitting existing UPI QR codes is essential so merchants do not have to juggle multiple systems. Furthermore, the apps should enable users to communicate with a live support agent as easily as possible, via in-app chat or a call, at any time to resolve transactional disputes. Additionally, they should provide users with greater flexibility and ease of use, enabling more wallet-to-bank balance transfers.

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4. **Building Trust and Security:** Concerns about privacy and fears of fraud are significant barriers to the adoption of CBDC. Unlike cash, digital transactions are traceable, and that bothers many people. Expressing data protection procedures and ensuring that privacy will not be compromised, with a greater emphasis on the currency and client transactions that will be necessary for the Reserve Bank of India to address. Fraud prevention measures, such as chargebacks on credit cards, would help ease those concerns. The Reserve Bank of India regularly informs the public that Central Bank Digital Currency differs from private digital wallets and cryptocurrencies, as it is regulated, government-backed, and safe for users.
5. **Incentivising Early Adoption:** According to the survey, cashback and promotional incentives have a strong influence on users' choice of digital payment systems. In the case of CBDC, the RBI could use cashback, discounts, and reward points for transactions, rewarding the Digital Rupee. Collaborations with e-commerce sites, transport services, and even local businesses would enhance the attractiveness of the offers. Additionally, merchants would benefit from using CBDC by paying lower transaction fees compared to other available payment systems. Such offers should drive the first few attempts and establish a favourable reputation for CBDC in everyday transactions.
6. **Merchant Engagement:** Success largely depends on merchants' voluntary take-up and advocacy for any payment system. The focus should be on small and medium-sized enterprises, which are the pillars of the economy in Suburban Mumbai. Offering subsidised or enhanced POS systems, integrating CBDC with UPI, and promising instant settlements would make CBDC more attractive. Trade and local chambers of commerce are the merchants best positioned to highlight the benefits and ease of accepting CBDC, and could have a crucial role in training. With respect to the market, these actions would make CBDC a consumer-oriented change in the economy.
7. **Feedback and Iteration:** Given the current progress of the CBDC pilot project, constructive feedback from users and merchants has become vital for developing effective policy changes. The RBI should enable users to send feedback via the app as a means of interface design for error reporting and request articulation. User feedback from periodic surveys and focus groups may help answer how and to what extent CBDC may be adopted. Moving pilot projects beyond tier one

   Central Business Districts into surrounding suburbs will aid in assessing CBDC use across different socio-economic strata. Adopting such a responsive approach will enable the RBI to enhance functionality, improve user confidence, and optimise the design of the Digital Rupee as a commonly accepted digital payment.

Conclusion:

According to the study, the Reserve Bank of India has integrated a new form of currency, the Digital Rupee, into the CBDC, considerably altering India's economic system. As such, awareness and usage in the Mumbai Suburban area remain virtually non-existent. A negligible portion of the sample population having encountered the term CBDC suggests a complete lack of understanding regarding the concept and what it seeks to achieve. On the other hand, UPI remains the dominant form of payment in the country owing to its unparalleled convenience, rapid transaction times, no transaction fees, and widespread merchant adoption. This dominance

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poses problems for CBDC. It must focus on awareness and communication to demonstrate its value, in addition to what UPI offers. The study results also show that users prioritise convenience, transaction speed, security, and cashback as deciding factors when using a payment system. CBDCs must factor these considerations into their design, which will help facilitate widespread adoption.

The research highlights essential gaps in trust, privacy, and inclusivity. Some respondents expressed concerns about fraud and digital surveillance. RBI must develop effective communication plans to clarify data protection and transactional safety. Moreover, there is the issue of the digital divide. Some individuals in Mumbai might not own smartphones or have any form of digital literacy. If nothing is done, financial exclusion will result. Thus, CBDC plans must provide options for offline transactions, such as support for SMS-based transfers, prepaid CBDC cards, and the incorporation of regional languages, as well as the provision of bank-led awareness kiosks for the digitally illiterate. Considering the significant

socio-economic disparity in Mumbai, ranging from digital natives among the youth to older generations accustomed to using cash, CBDC can be implemented in a way that serves all segments of society.

In a nutshell, the prospective effectiveness of digital payment systems rests on the adoption of real-time payment systems, such as the Digital Rupee. This might be a secondary innovation, in relation to payment innovation on the payment side of payment systems, as well as innovation on the digitisation side of payment visualisation systems. The Digital Rupee is presented as an alternative to both physical and digital currency. Resonant with cash and centric to the real-time payment in the payment systems backbone. Novel mechanisms, such as bypassing user friction and offering real-time rewards on the payment system's backbone.

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