



Empowering Inclusion through Sovereign Digital Innovation: The Role of e₹-R in India's Financial Landscape

Sunil Kumar Sharma¹ and Qamar Alam^{2*}

¹ Research Scholar, Department of Economics, Banasthali Vidyapith, Newai, Rajasthan, India
sunil.stushar007@gmail.com

² Associate professor, Department of Economics, Banasthali Vidyapith, Newai, Rajasthan, India

qamaralam@banasthali.in

Abstract. Central Bank Digital Currency (CBDC) appears to be a revolution in the realm of finance, and can be the answer to the perennial challenge of economic marginalisation. The Reserve Bank of India (RBI) also launched the pilot of digital rupee (e₹-R) as a sovereign tokenised currency in December 2022. It is viewed as a non-intermediated product, which thus forms a structural complement to the classical electronic payments architectures. Sovereign e₹-R has unique benefits, including the ability to transact offline, smooth integration with other platforms such as UPI, and the possibility of programmable and targeted delivery of welfare. The study suggests that e₹-R can be a solution that can address the infrastructural and systemic gaps that are quite prevalent in the under developed and remote areas, as it is an available, safe, and cost-effective monetary solution. The paper reviews the literature and secondary sources, revealing the multitude of economic and administrative advantages of moving to Central Bank Digital Currency, such as the cost savings on currency operations, the improvement in fiscal transparency and the non-intermediation of e-transactions. The results of our survey, however, indicate that e₹-R, which is in the pilot phase after launch, has immense potential to change the financial landscape of India's diversified socio-economic fabric if only it is aware of citizens.

Keywords: CBDC e₹-Retail, Financial Inclusion, Welfare Delivery, Unbanked Population, Currency Management, Digital Payment Systems

1. Introduction

Any central policy prioritises easy reach of finance for the public, as this drives economy and broadens financial participation. As Klapper et al. [2025] observe, “Financial inclusion is a cornerstone of development.” Figure 1 illustrates the financial inclusion status in India, reflecting a steady improvement. Financial inclusion entails ensuring that vulnerable groups, such as low-income households and marginalised communities, can access appropriate financial resources and support at optimum costs, provided transparently and fairly, through mainstream institutions [Chakrabarty, 2011]. Therefore, strengthening this access becomes a vital pillar of inclusive growth and sustainable development. It is recognised that payments are the backbone of all economic activity. To achieve enlarged financial participation, payments become a key for ensuring that economic benefits reach every segment of society [RBI, 2024]. In India, inexpensive smartphones, affordable data, and fintech innovations, most notably

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the Unified Payment Interface (UPI), have fundamentally shifted the way money is transferred digitally, as substantiated by the RBI’s biannual Digital Payment Index (see Figure 2). However, Auer and Böhme [2020] note, “The current electronic retail money represents a claim on an intermediary, rather than functioning as the digital equivalent of cash.” With these, the introduction of CBDCs is a monetary innovation a sovereign, digital currency that is not dependent on the payments and settlement systems that are already in place. Kiff et al. [2020] emphasise that “CBDC is a means to support financial digitisation, reduce costs associated with issuing and managing physical cash, and improve financial inclusion, especially in countries with underdeveloped financial systems and unbanked citizens.” The RBI says that e₹-Retail (e₹-R) is a digital version of cash that works with physical cash to provide a safe, efficient, and inclusive way to pay [RBI, 2022b].

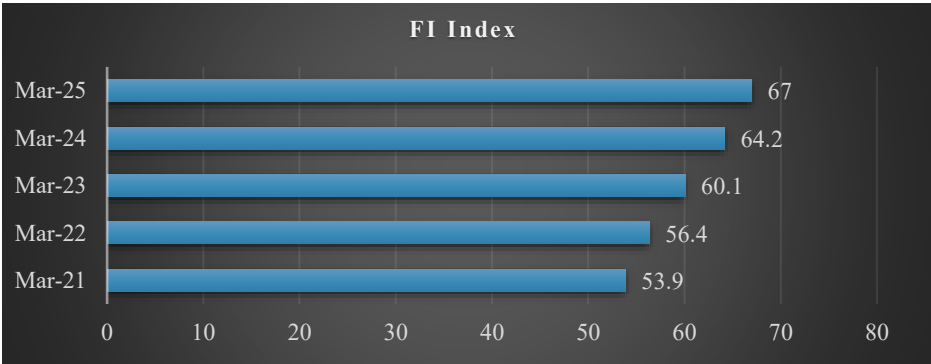


Fig. 1. Financial Inclusion Index in India, Source: RBI Press Release: 2025-2026/759

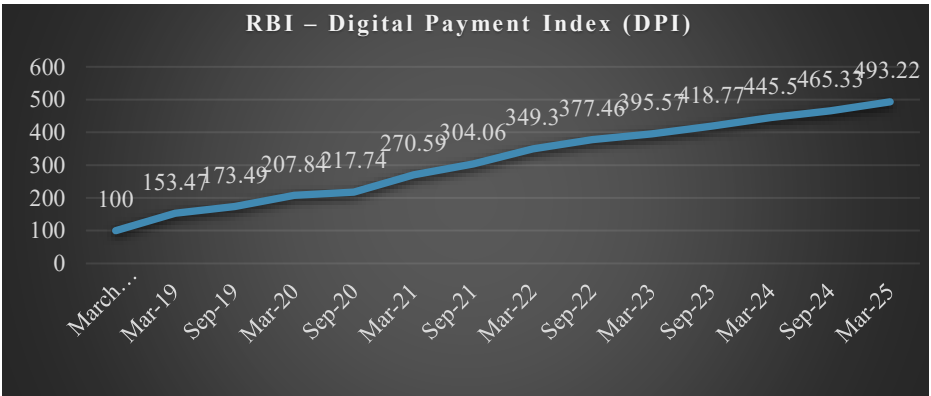


Fig. 2. RBI Digital Payment Index, Source: RBI Press Release: 2025-2026/797

While countries have established the technical infrastructure for CBDCs globally, they must still assess user perception and acceptance to ensure successful implementation. As, no matter how advanced the technology, its success ultimately depends on public opinion, which is the true deciding factor. Consequently, this study examines Mumbai, which has been part of India's CBDC e₹-R pilot programme since its first phase, to assess whether people are aware of e₹-R and willing to adopt it. The Mumbai

Metropolitan Region is urban with a variety in its population which offers a study area where the awareness and adoption of the digital rupee can be considered.

1.1 The objectives of this study.

- (a) Examining how Central Bank Digital Currency, specifically India's e₹-R, can play a useful role in enhancing financial inclusion.
- (b) The study aims to evaluate the levels of public awareness and prevailing perceptions regarding the e₹-R among the residents of Mumbai.

Beyond academic inquiry, this study provides valuable insights for stakeholders in India's digital currency ecosystem. Past studies have defined the lack of awareness and privacy issues as the main hindrances to the adoption of CBDCs, but there is a lack of empirical data regarding the experiences of users when using this technology in pilot stages. This study aims to address these gaps by examining users' awareness and acceptance of the CBDC e₹-R in Mumbai, thereby contributing to emerging research on CBDC user behaviour. The remainder of this paper is organised as follows: Section 2 reviews the relevant literature, and Section 3 describes the research methodology. Section 4 presents the data analysis and results of hypotheses that were tested in this study; Section 5 presents the discussion; Section 6 provides a conclusion with suggestions, followed by the references listed.

2. Literature Review

The evolving discourse on CBDC spans across diverse themes, from design considerations to socio-economic impacts. Kiff et al. [2020] outline foundational ideas for the general public, highlighting central banks' deliberations on CBDC design, retail issuance, policy, legal and governance frameworks, regulatory perspectives, cybersecurity, and related risks. Complementing this, Auer and Böhme [2020] introduce the "CBDC pyramid", a visual framework mapping the needs of users to CBDC design choices by central banks, where bottom positions show foundational conclusions influencing greater policy objectives. The article by Rabi Sankar [2021] makes CBDC the Future of Money, emphasising how it will help decrease the reliance on cash, improve seigniorage, and decrease the settlement risks. Similarly, a study by Narodowy Bank Polski [2021] underscores that CBDC development is shaped by country-specific socio-economic challenges. In developing economies, policymakers often lead efforts to achieve financial inclusion goals while mitigating concerns of tax evasion and money laundering. From India's perspective, Gandhi & Tafti [2022] evaluate the advantages of e₹ as an effortless, integrated, and confidential payment mode, while the RBI's [2022] concept note clarifies its objectives, design choices, and potential benefits, stressing a smooth acceptance of the digital rupee like physical currency. Lannquist and Tan [2023] provide more in-depth insights by suggesting that properly structured CBDCs have the potential to surmount obstacles to financial access by providing an on-ramp to regulated financial services among underserved communities. Klapper et al. [2025] conducted a global survey that offers updated, comparable data from 145,000 adults across 141 economies, emphasising emerging trends in banking accessibility and the integration of digital methods with security.

Finally, Yashwanth and Suresh [2024] highlight growing public curiosity about CBDCs but observe significant knowledge gaps, reinforcing the central bank's necessity to proactively outreach and educate the masses.

3. Research Methodology

In this study, to understand the important role that CBDC can play in an economy in terms of financial inclusion, targeted welfare delivery and optimisation of currency management, the acquisition of secondary data from various sources, including the Reserve Bank of India (RBI), the Ministry of Finance (Government of India), MeitY (Government of India), the Press Information Bureau (Government of India), the World Bank, the Geo-economics Centre of the Atlantic Council, and reputable newspapers was carried out. Recognising that the e₹-R's potential of enhancing financial inclusion depends on its public adoption, the authors conducted a study within the Mumbai metropolitan region to evaluate public awareness and attitudes toward the retail CBDC (e₹-R) through a survey.

3.1 Survey Instrument Development

Awareness, utility and impact of CBDC among smartphone users and digital bank users can be meaningfully measured. In the survey the sampling method employed was judgement and convenience sampling, which was non-probability sampling. The survey instrument has 10 distinct sections to capture a 360-degree view of the respondent's profile and interactions with digital currencies, resulting in the creation of individuals who have embraced the CBDC e₹-R. The instrument was designed to take the broad demographic profile of the General Awareness Cohort (N=249) to ascertain comfort levels with smartphone use and digital banking (UPI, Internet Banking, etc.) and the advanced filtered Deep Perceptual Cohort (n=90, 36.13%) that tracked participation in the RBI pilot, ascertained trust in government-backed digital currency, reasons for joining or not joining the e₹-R pilot, usage of the e₹-R wallet, perceived advantages of e₹-R regarding risk reduction, payment efficiency, financial inclusion and convenience, and friction barriers. Data gathering was conducted from June 17th to November 03rd, 2025, through the survey research instrument, which was distributed through Google Forms and physical questionnaires, with 249 valid responses from a diverse group of people, including professionals, retired public sector and private sector employees, students, homemakers, and merchants. Participants were informed about confidentiality and informed consent was secured. The respondents took about 3-5 minutes to fill out the questionnaire. Secondary data analysis was represented in the form of bar graphs and pie charts, while descriptive analysis was presented in terms of percentage distribution and mean score for the primary survey findings. The hypothesis testing was done with the Chi-Square test of independence and one-way Analysis of Variance (ANOVA) under inferential statistics. The mixed-methods approach enabled not only having a macro-level picture of financial inclusion in India but also a micro-level picture of the awareness of the public on e₹-R in Mumbai.

Development of Reliability and Validity. The survey instrument includes several questions naturally grouped into underlying themes, such as "Perceived Security" and "Perceived Utility", which are very suitable to capture user perceptions/ beliefs on e₹-R (trust in e₹-R, e₹-R makes payments easier, e₹-R is a risk-free digital payment option, e₹-R makes it easier to be financially included, and e₹-R eliminates hardship of cash). The internal consistency of the 5-point Likert scales was calculated with the covariance matrix of the awareness-filtered group (N=90). The internal reliability is confirmed by a Cronbach's alpha (α) of 0.884, indicating that the construct is reliable and valid in measuring perception. Content validity is achieved based on literature review. For construct validity & sampling adequacy, the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy yielded 0.812 (classified as $\chi^2=412.85$, $df=45$, $p<0.001$), proving that the sample matrix is highly suited for structured extraction and parametric analysis.

4. Data Analysis & Results

4.1 Secondary Data Analysis

This section examines the current landscape of financial inclusion, digital payments, targeted welfare disbursement, and cash management in India, followed by an overview of CBDC e₹-R issuance and CBDC exploration globally. The discussion also covers how e₹-R can hasten financial inclusion, promote welfare efficiency, and optimise cash management.

Financial Inclusion. For years, a steady priority in our national policy is universal financial inclusion. To this end, the Pradhan Mantri Jan Dhan Yojana (PMJDY), which commenced in August 2014, had, by August 2025, opened over 56.16 crore bank accounts, with ₹2.67 lakh crore in deposits. Notably, women hold 56% of these accounts, underscoring the scheme's contribution to gender equality in financial access [GOI, 2025]. The Aadhaar identification system has played a central role in making millions of people access formal financial support services. The Financial Inclusion Index (FI-Index) of the RBI stood at 67.0 for the year ending March 2025, up 2.8 since March 2024, indicating stronger financial literacy initiatives and broader use of financial services. The FI-Index has three sub-indices: access, usage, and quality, which reflect usage of banking, investing, insurance, postal services, and pensions by the general public. It has increased by 24.3% since its inception in 2021, highlighting steady progress [PIB, 2025]. Major gaps still exist in spite of these developments. According to the Global Findex Database 2025, entitled Connectivity and Financial Inclusion in the Digital Economy, 89% of Indian adults own a bank account; nonetheless, the country is still in the top five countries with the largest number of unbanked adults. There is also continuing inactivity of accounts, with 16% of the account holders having inactive accounts. In addition, formal savings and borrowing remain small, at 27 percent and 15 percent, respectively, and mobile phone ownership is 66 percent, indicating inequalities in financial inclusion. These findings underscore the strategic significance of innovative e₹-R as a driving force behind expanding financial access and hastening digital transformation.

E-Payments and Social Benefit. The convenience of online payments is playing a vital role in increasing financial inclusion in India. Several initiatives have been introduced to universalise digital payments while ensuring they are convenient, safe, secure, transparent, and affordable for all of society. As per DD News [2025], “The RBI Digital Payments Index (DP Index) quadrupled to 493.22 in March 2025, from its 2018 level.” This stellar rise reflects a broader transformation of digital payments, driven by programs like Digital India, rising smartphone ownership, and rapid fintech breakthroughs. The below pie chart (Figure 3) illustrates the mode-wise volume of digital payments for the financial year 2024-25, showcasing the growing magnitude and heterogeneity of transactions within the digital economy. The Digital India initiative leverages Jan Dhan accounts, Aadhaar identity, and mobile technology [the JAM Trinity] to deliver subsidies and aid directly to eligible beneficiaries in a timely, transparent, and targeted manner through the Direct Benefit Transfer [DBT] system, cutting out middlemen and thereby preventing fraud. According to MeitY [2025], the GOI has successfully transferred ₹34 lakh crore through DBT, generating savings of ₹2.7 lakh crore in leakages and improved efficiency.

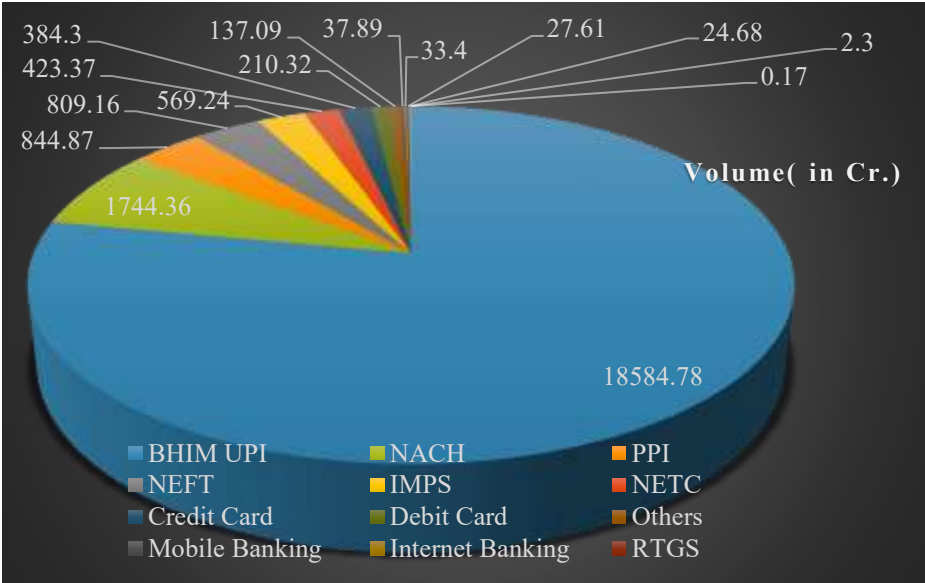


Fig 3. Volume of Digital Payments in India under Different Modes, 2024-25. *Source: DigiDhan Dashboard, Department of Financial Services, GOI*

Currency Management Scenario. Despite rapid advances in digital payments, cash continues to hold a dominant position in the Indian economy. The currency management infrastructure of RBI consists of 19 issue offices and 2,689 currency chests, which are responsible for issuing fresh currency and withdrawing soiled notes from circulation. The costs associated with its management remain substantial, as illustrated in the graphs below (see figures 4 & 5). However, some areas, especially with hard terrain or low connectivity, still experience logistics issues and periodic shortages of cash. CBDC e₹-R is anticipated to curtail the cost of issuing hard currency, along with addressing the logistical complexities of supplying physical currency to isolated regions.

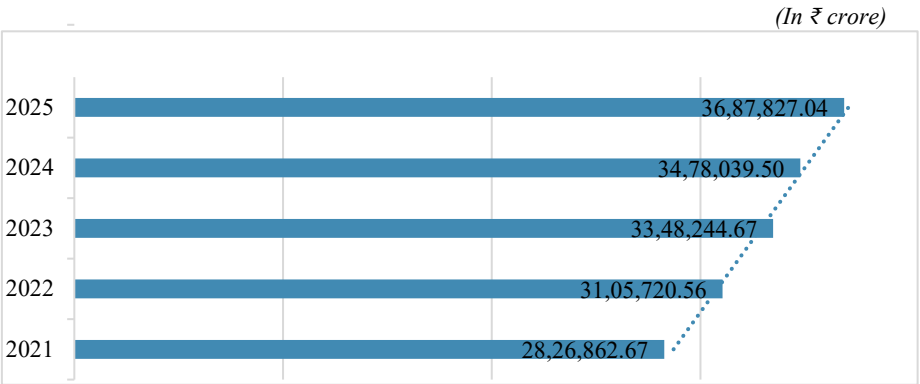


Fig. 4. Value of Total Notes Issued, Source: RBI Annual Report 2022, 2023, 2024, 2025.

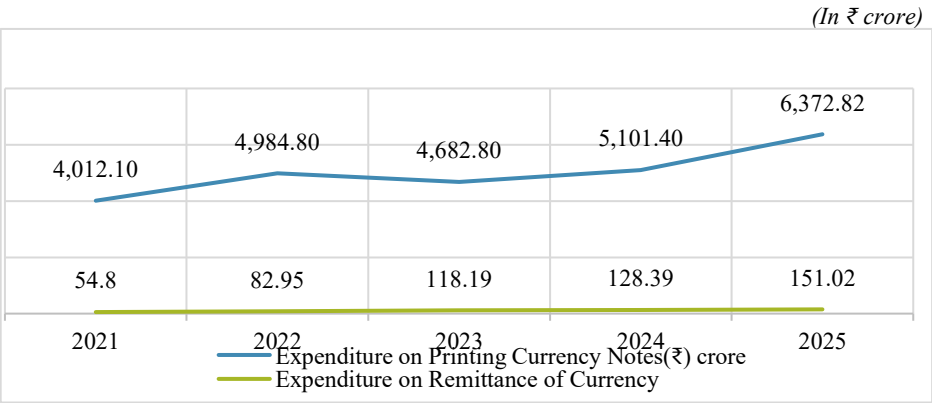


Fig. 5. Expenditure on Printing & Remittance Currency Notes, Source: RBI Annual Report 2022, 2023, 2024, 2025

CBDC Issuance in India. The formal announcement to introduce CBDC in India was made in the Union Budget of 2022–23. Then the RBI Act of 1934 was also amended by the Finance Bill of 2022 [Ojha, 2023]. The graph below demonstrates a rise in e₹-R circulation over time, highlighting its growth trajectory.

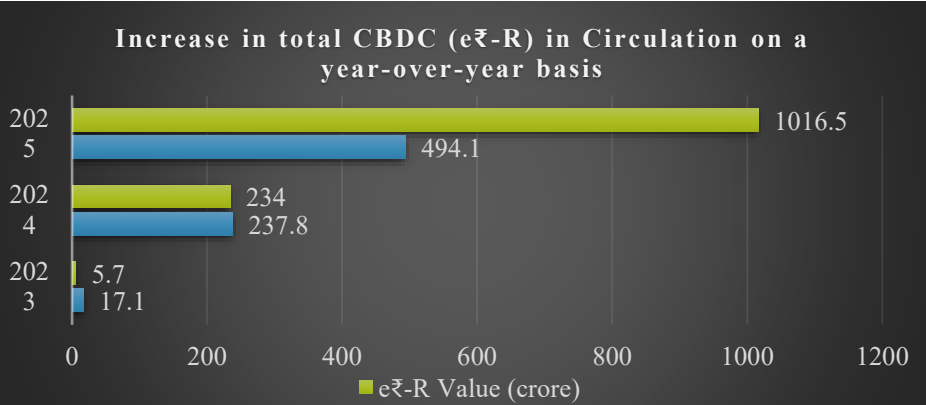


Fig 6. Increase in e₹-R circulation on a Y-o-Y basis, Source: RBI annual report 2024-25.

The CBDC design in India is in two forms: retail (e-R) and wholesale (e-W). In the indirect model, retail CBDC (e₹-R) is token-based and is a cash-like liability to the RBI. Users hold e₹-R digital wallets that are maintained by intermediaries such as banks or authorised token service providers. Providing e₹-R on demand is the responsibility of intermediaries, while wholesale balances of participating institutions are tracked by the RBI. The current CBDC e₹ pilot is testing how well the e₹ can be issued, allocated, and used, and by March 2025, the e₹-R pilot has grown to include 17 banks and 60 lakh users [RBI, 2025], showing rise in usage by the people. The non-bank payment platforms like Mobikwik, Cred have also been on boarded in the pilot ecosystem

CBDC Exploration Worldwide and Key Motivations. As of 2025, around 137 nations and monetary unions, which account for 98% of global GDP, are working on CBDCs. Of these, 72 countries have reached development, piloting, or full-scale launch of their CBDC [Geo-economics Centre of the Atlantic Council, 2025]. India's e₹-R initiative is now the second-largest CBDC pilot globally, following China's pioneering efforts in digital yuan (e-CNY). As the first major economy to pilot a CBDC in 2019, China has mainly used the digital yuan to make daily small-scale transactions, such as buying goods, government payments, salaries, and transportation fees [SCMP, 2025]. By June 2024, a total of 7 trillion yuan (\$986 billion) was processed in transactions using e-CNY across 17 provincial regions, with its application reaching into education, healthcare, and tourism. It is a fourfold increase from 1.8 trillion yuan (\$253 billion) in June 2023 [Geo-economics Centre of the Atlantic Council, 2025]. In a 2022 BIS survey, enhancing financial inclusion ranks as the second significant driver behind CBDC exploration and issuance, after strengthening payment system efficiency and resilience.

Anticipated role of e₹-R in enhancing financial inclusion, targeted welfare, and currency management in India. The anticipated role of CBDC e₹-R in India is multifaceted. Under the ongoing pilot, the RBI is testing programmability and offline functionality as key features. The e₹-R can be programmed, allowing sponsoring bodies, like government agencies or corporations, to specify and implement what specific purposes transferred e₹-R funds can be applied to. The conditional logic feature of e₹-R is currently being explored for DBT schemes, interest subvention schemes, lending, employee allowances for defined purposes, etc. [RBI, 2025]. Discussions with different central ministries and state governments are underway to implement this system of specified welfare transfers [RBI, 2024a, 2025a]. Offline functionality is being trialled in both proximity (NFC) and non-proximity modes [telecom but no internet], promising to extend the use of e₹-R to areas with limited and unreliable internet connectivity, thereby reaching underserved regions. In addition, wider adoption of e₹-R will lower cash management costs, ensuring efficient distribution of legal tender even in remote areas.

4.2 Primary Data Analysis

Descriptive Analysis. Initially the General Awareness Cohort was used for broad demographic profiling. A baseline empirical sample of $N = 249$ valid respondents

across the Mumbai metropolitan region were taken. The complete report conclusions are listed at the end in tabular format.

Table 1. Demographic Profile (N = 249)

Gender	Freq.	Percent	Age	Freq.	Percent
Male	192	77.11	18–25	30	12.05
Female	57	22.89	26–35	109	43.78
Education	Freq.	Percent	36–45	55	22.09
Bachelor's Degree	160	64.25	46–55	25	10.04
Master's Degree	68	27.30	56 and above	30	12.05
High School	9	3.61	Occupation	Freq.	Percent
PhD	5	2.00	Employee [private company]	135	54.21
Any diploma	5	2.00	Professional	39	15.66
Other	2	0.80	employee [Govt. or PSU]	21	8.43
Monthly Income	Freq.	Percent	Occupation	Freq.	Percent
Below 50,000	72	28.91	Retired	21	8.43
50,001-1,00,000	73	29.31	Homemaker	12	4.81
1,00,001- 2,00,000	40	16.06	Student	10	4.01
Above 2,00,000	48	19.27	Other	8	3.21
No Income	16	6.42	Merchant	3	1.20

Table 2. Digital Banking Profile and usage behavior (N = 249)

Digital banking or Payment methods	Freq.	Percent	Note	[N]	[249]		
UPI with other methods	234	93.97	Use of digital banking services or payment methods	Freq.	Percent		
UPI	211	84.73		Yes	234	93.97	
No Digital banking or Payments	15	6.02		No	15	6.02	
Smartphone Comfort for financial transactions	Rating	Freq.	Percent	Regularity of Digital payments	Rating	Freq.	Percent
Very comfortable	5	141	60.25	Daily	5	171	73.07
Somewhat comfortable	4	62	26.49	Weekly	4	41	17.52
Neutral	3	24	10.25	Monthly	3	14	5.98
Somewhat uncomfortable	2	0	0	Rarely	2	5	2.13
Very uncomfortable	1	7	2.99	Never	1	3	1.28

Digital banking was nearly universal, with 94% adoption, and UPI at 84.73% was the utmost embraced digital payment method. Respondents reported high comfort [86.75%], with a mean score of 4.41/5, indicating high savviness in using smartphones

for financial transactions. At 73.07%, daily was the most common frequency of making digital payments. To establish an authentic perceptual profile, a rigorous cognitive filter was deployed: only respondents demonstrating verified knowledge of central bank digital tokens (n = 90, 36.13%) were advanced to the structural perception matrix.

Table 3. Awareness about CBDC e₹-Retail (N = 249)

Have you heard of private virtual currencies (cryptocurrencies) as well as central bank digital currencies?	Freq.	Percent	Do you have some knowledge of private virtual currencies [cryptocurrencies] and Central Bank Digital Currency?	Freq.	Percent
Yes, I have heard of both	129	51.80	No, I do not know of either	129	51.80
I have only heard of cryptocurrencies.	51	20.48	Yes, I have some knowledge of both	67	26.90
No, I have not heard of either.	57	22.89	I know about private virtual currencies (cryptocurrencies) only.	30	12.04
I have only heard of Central Bank Digital Currency	12	4.81	I know about Central Bank Digital Currency (RBI e₹-R) only	23	9.23
Under filtered Deep Perceptual Cohort further questions were posed to only those respondents having some knowledge of CBDC e₹ (N = 90)					
Are you aware of the different types of Digital Rupees introduced by the RBI (e.g., e₹-R, e₹-W)	Freq.	Percent	Does your employer offer to pay any part of the monthly remuneration in e₹-R?	Freq.	Percent
Yes, I am aware of both.	53	58.88	No	60	66.66
I am aware of e₹- Retail.	35	38.88	Not Sure	24	26.66
I am aware of e₹-Wholesale.	2	2.22	Yes	6	6.66

The analysis of the 249 respondents' reveals varying levels of specific e₹ awareness. While over half of the respondents (51.80%) had heard of both central bank digital currencies and cryptocurrencies, a significant knowledge gap remains. Nearly half of the respondents (51.80%) reported having little knowledge of either digital asset. Only 90 (36.13%) respondents reported having some knowledge about CBDC e₹. Further questions on CBDC e₹ retail perception, adoption, and user experience were put to them only. Out of these, only six respondents were paid a part of their monthly emoluments in e₹-R by their employer.

Table 4. CBDC e₹-Retail perception, adoption, and user experience (N = 90)

Trust level in the e₹-R compared to traditional forms of money?	Rating	Freq.	Percent	Do you agree that e₹-R provides a risk-free digital alternative to private cryptocurrencies?	Rating	Freq.	Percent
Complete Trust	5	50	55.55	Strongly agree	5	35	38.88
High trust	4	18	20	Agree	4	26	28.88
Neutral	3	19	21.11	Neutral	3	22	24.44
Less trust	2	0	0	Disagree	2	1	1.11
No trust	1	3	3.33	Strongly disagree	1	6	6.66

Does e₹-R increase payment efficiency?	Rating	Freq.	Percent	Does e₹-R promote financial inclusion?	Rating	Freq.	Percent
Strongly agree	5	32	35.55	Strongly agree	5	33	36.66
Agree	4	32	35.55	Agree	4	27	30
Neutral	3	22	24.44	Neutral	3	26	28.88
Disagree	2	3	3.33	Disagree	2	2	2.22
Strongly disagree	1	1	1.11	Strongly disagree	2	2	2.22
e₹-R removes the hardship of withdrawing cash and carrying	Rating	Freq.	Percent	Are you willing to adopt CBDC e₹-Retail in the future?	Freq.	Percent	
Strongly agree	5	37	41.11	Yes	58	63.63	
Agree	4	30	33.33	Not sure	27	27.27	
Neutral	3	20	22.22	No	5	5.68	
Disagree	2	1	1.11	Adoption e₹-R for transactions	Freq.	Percent	
Strongly disagree	1	2	2.22	Yes	10	47.61	
Creation of e₹-R wallet	Freq.	Percent		No	11	52.38	
No	No	69	Did you face any challenges while using e₹-Retail?	Freq.	Percent		
Yes	Yes	21	No	8	80		
			Yes	2	20		
Rate your experience using e₹-Retail.	Excellent	Good	Average	Poor	Very Poor		
Rating	5	4	3	2	1		
Freq.	6	2	1	0	1		
Percent	60	20	10	0	10		

The average trust level was high (4.24/5), with a high degree of trust reported by 70% of respondents. They also felt that the CBDC e₹-R offers an alternative to private cryptocurrencies that does not carry the risk of loss (mean = 3.92/5). A mean score of 4.01/5, was obtained by the respondents when asked if e₹-R would make digital payments more efficient. Likewise, their mean score was 3.96/5, and they thought that e₹-R would help in promoting financial inclusion. The respondents further agreed that the CBDC e₹-R alleviates cash withdrawal and carrying burden (mean = 4.10/5). Only 58 of the respondents were willing to adopt e₹-R and recommend it to others. In reality, only 21 respondents had developed CBDC e₹-R mobile wallets, and of this group, only 10 had made any transactions with e₹-R. The individuals who were involved in transactions reported a very good experience, with a mean rating of 4.10/5.

Table 5. Primary Barriers to CBDC e₹-Retail Adoption

Barrier	Lack of awareness	Preference for existing methods [e.g., UPI]	Limited merchant acceptance	Uncertainty about benefits	Security or privacy concerns	Lack of technical understanding
Percent	24.19	20.16	16.94	14.52	12.10	8.06

When examining those 69 individuals who hesitate to adopt the retail digital rupee e₹-R despite having some knowledge of it, the data reveals a significant "perception-reality gap" where technical milestones are eclipsed by psychological and informational

hurdles. Although the RBI has achieved seamless UPI interoperability, the most striking finding is that nearly one-fourth (24.19%) of respondents familiar with e₹-R still cite a "lack of awareness" as their reason for not opening a wallet, indicating that functional understanding remains surprisingly shallow. Moreover, the fear of poor merchant acceptance [16.94%] is a sort of a spectral obstacle since interoperable QR codes, in theory, enable just about any merchant to accept the digital rupee. Finally, the status quo is the most significant competitive pressure on a sovereign digital token, as 20.16% of users are satisfied with the current procedures, such as UPI.

Inferential statistics. In order to find out the exact level of awareness about CBDC e₹-R, the respondents were placed in a binary category: Aware (N = 90) and Unaware (N = 159) based on the specific knowledge they had about e₹-R as compared to private virtual currencies, thus capturing the full sample size of N = 249. The inferential statistics are summarised below in a tabular format followed by results of the hypothesis testing.

Table 6. Chi-Square Test of Independence Results for Demographic Factors and e₹-R Awareness (N = 249)

Demographic Variable	Category	Aware (n)	Unaware (n)	Total (N)	χ^2	df	p
Gender					8.17	1	.004**
	Male	79	113	192			
	Female	11	46	57			
Age Group					3.49	4	.479
	18–25	7	23	30			
	26–35	43	66	109			
	36–45	22	33	55			
	46–55	9	16	25			
	56 and above	9	21	30			
Monthly Income (₹)					10.06	4	.039*
	Below 50,000	16	56	72			
	50,001– 1,00,000	29	44	73			
	1,00,001– 2,00,000	19	21	40			
	Above 2,00,000	21	27	48			
	No Income	5	11	16			
Education					1.13	5	.951
	High School	2	7	9			
	Any Diploma	2	3	5			
	Bachelor's Degree	57	103	160			
	Master's Degree	26	42	68			
	PhD	2	3	5			
	Other	1	1	2			

Note. * $p < .05$. Awareness status was determined based on respondents verifying specific knowledge filters for central bank digital tokens.

Hypothesis 1. H_0 : There is no significant difference in e₹ awareness across genders.

H_a : There is a significant difference in e₹ awareness across genders.

Results: The relations between gender and e₹-R awareness were examined using a chi-square test of independence. The relation between these variables was significant, $\chi^2(1, N = 249) = 8.17, p = .004$. As a result, $p < .05$ and we reject the null hypothesis. There is a statistically significant difference in e₹-R awareness across genders.

Hypothesis 2. H_0 : There is no significant difference in e₹ awareness across different age groups.

H_a : There is a significant difference in e₹ awareness across different age groups.

Results: A chi-square test of independence was used to test the relationship between age groups and e₹-R awareness. The relation between these variables was not significant: $\chi^2(4, N = 249) = 3.49, p = .479$. Since the result $p > 0.05$, the null hypothesis is not rejected, therefore, there is no significant difference between the different age groups in terms of e₹-R awareness.

Hypothesis 3. H_0 : There is no significant difference in e₹ awareness across monthly income levels.

H_a : There is a significant difference in e₹ awareness across monthly income levels.

Results: A chi-square test of independence was performed to examine the relation between monthly income and e₹-R awareness. The relation between these variables was significant: $\chi^2(4, N = 249) = 10.06, p = .039$. Because $p < .05$, we reject the null hypothesis. There is a statistically significant difference in e₹-R awareness across different monthly income levels.

Hypothesis 4. H_0 : There is no significant difference in e₹ awareness based on educational attainment.

H_a : There is a significant difference in e₹ awareness based on educational attainment.

Results: Chi-square test of independence was used to explore the relationship between educational level and awareness of e₹-R. The relation between these variables was not significant: $\chi^2(5, N = 249) = 1.13, p = .951$. Since $p > .05$, we do not reject

the null hypothesis. This indicates that there was no significant difference between the respondents' level of education and their awareness of the e₹-R.

Table 7. One-Way ANOVA and Descriptive Statistics for Trust Levels in the e₹-R Across Age Groups (N = 90)

Age Group	n	M	SD	Source of Variation	SS	df	MS	F	p
18–25	7	3.86	1.35	Between Groups	4.67	4	1.17	1.20	.317
26–35	43	4.37	0.82	Within Groups	82.89	85	0.98		
36–45	22	4.41	1.05	Total	87.56	89			
46–55	9	3.78	1.39						
56 and above	9	4.00	1.00						

Note. Trust levels were measured using a 5-point Likert scale, where higher scores represent higher trust in the e₹-R.

- Hypothesis 5.* H_0 : There is no significant variation in the level of trust in e₹-R across different age groups.
- H_a : There is significant variation in the level of trust in e₹-R across different age groups.

Results: A one-way ANOVA was carried out to determine the difference in level of trust in the government's e₹-R due to age. Only those who knew about the e₹-R and who responded with a trust score were considered in this analysis (N = 90). It was found that there was not a statistically significant difference in trust levels between at least two age groups, $F(4, 85) = 1.20, p = .317$. Since $p > .05$, the null hypothesis is not rejected. There is not much difference in the level of trust in the e₹-R, regardless of age.

5. Discussion

CBDC promises to play a versatile role in the future. Its offline functionality enables use even in regions with poor connectivity, thereby providing a means of financial inclusion for the unserved and excluded populace. Along with it, CBDC will bring fairness in welfare grants and reduce the currency printing and distribution costs. The programmability functionality of e₹-R will introduce precision in direct benefit transfers, allowing funds to be programmed for specific purposes or geographical areas. Although initial infrastructure investments for establishing and issuing e₹-R may be substantial, the subsequent marginal operating costs are expected to remain low [RBI, 2022]. However, presently the sheer dominance and trust created by UPI dissuades the public from seeking any alternative. Also, the current e₹-R pilot is small in design and is following a phased, regulated deployment strategy, which is essentially aimed at testing the technology, architecture, scalability, application, features, use cases, and acceptance of e₹-R [RBI, 2025].

6. Conclusion and Suggestions

6.1 Conclusion

Far beyond being a technological innovation, CBDCs represent a strategic tool for inclusive economic development, with the potential to bridge access gaps, empower underserved populations, and modernise welfare delivery systems. CBDC e₹-R is currently being opened against the KYC of a bank account or based on Aadhaar. The general public in the Mumbai region shows a significant lack of awareness about CBDC e₹-R. Though public curiosity and interest in CBDC e₹-R are evident, as demonstrated by empirical evidence indicating that a comfortable population (94% with digital banking) is largely uninformed of the Digital Rupee.

6.2 Suggestions

The "human factor" obstructs the path to universal adoption of e₹-R. The success of the digital rupee will not be determined by the sophistication of its "offline NFC" or "programmability" features but by public trust and understanding. To bridge the gap between awareness and adoption, the Reserve Bank of India, public authorities, and banks must prioritise public education. Future strategies must follow the "REDI" framework [Regulation, Education, Design, Incentives], focusing on educational campaigns that emphasise the unique safety, risk-free nature, and government backing of CBDCs, as well as the benefits of lower transaction costs and daily convenience. Deploy target literacy modules aimed at female demographics to flatten the awareness gap confirmed by the Chi-Square test. Drawing lessons from China's digital yuan, India could expand the e₹-R's use for government welfare disbursements, salary payments, and public transport fares, which will normalise its usage and build public confidence. Improve offline proximity validation methods to ensure that they offer better functional advantages over existing banking rails. Transition targeted state subventions and local employee allowances directly into programmed e₹-R wallets to generate organic traction. For improving uptake, policymakers should consider addressing trust and security concerns and clearly differentiating e₹-Retail from existing payment methods.

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