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WORKING PAPER

DIGITISING INDIA

Towards an Inclusive Growth of the Ecosystem

I. Executive Summary

Financial Inclusion is a cornerstone of any progressive country that aims to bring its citizenry from different strata of society onto an equitable platform. As a policy measure, financial inclusion is often the focus of government in developing countries, and the same holds true for India. India's journey towards digital financial inclusion is characterised by a series of transformative initiatives to address long-standing barriers and empower citizens through digital technologies. These initiatives, driven by a combination of government vision and industry collaboration, have laid the foundation for a more inclusive and accessible financial ecosystem.

The emergence of digital payment methods, digital public infrastructures and an overarching push towards digitalisation has provided adequate impetus to stakeholders such as governments, regulators and leading financial and technological institutions to partner in this endeavour, leading to fruitful outcomes and a systemic upliftment of *digital nagriks* from underserved and unserved segments of our society. While this endeavour has borne fruit, challenges in reaching all corners of the country still remain. Inadequate infrastructure, low digital literacy, and affordability concerns persist, hindering widespread adoption and equitable access to digital financial services.

As India marches forward towards increasing financial inclusion, assessing the state of infrastructure and the efficacy of policy measures in force is key. As the regulatory framework for digital payments evolves with time and technological advancements, there is also a need to present proportionate and innovation-friendly regulations to formulate an incubative digital payments ecosystem that can enable the industry to contribute to financial inclusion efforts. In our study, we find that, as per reports, India is at a fairly high level in terms of human capital development and online services provision but is held back by relatively lower levels of infrastructure development. Similar concerns are observed in India’s fiberisation efforts, where the cables being laid provide 3G internet access in the age of 5G, presenting material incongruence between state aims and actions. It is imperative to note that the lack of affordability and accessibility of solutions for the underserved and unserved segments of Indian society further aggravates these challenges. Our research notes that solutions must not just be contextual to Indian sociocultural realities but must also focus on certain key principles for them to be adopted en masse.

We find that financial inclusion through digital payments needs individuals' capacity building to adopt such solutions. There is a need to build financial and digital literacy across rural India, enabling them to transact digitally with comfort and trust in the digital payment format. In light of these challenges, across our stakeholder consultation with experts, we were intimated of ground realities and the challenges they pose for digital financial inclusion. We note that a rehashing of digital financial solutions cannot pass as adequate for underserved and unserved segments of society and that there is a need for such solutions to be made contextual to the

needs of these groups through the adoption of vernacular languages to bridge the digital divide, inculcating structural changes such as the inclusion of banking correspondents to ease new customers into the digital payment ecosystem and through providing guidance to users wherever needed for trust in digital payments to develop. In light of these challenges, positive steps in the form of government initiatives such as Bhashini and industry-led solutions such as vernacular language integration in applications and voice commands are slowly but steadily bridging the language divide in rural India, priming the rural citizenry to adopt digital means of transacting comfortably.

A principle-based approach towards this endeavour may foster greater resilience while contextualising the solution to address the target group's needs better. As the regulatory and operational frameworks of digital payment evolve with time, a principled foundation can enable efficient and effective implementation of policies and solutions. Below are the principles we believe are crucial in our financial inclusion efforts:-

Figure 1: Principles for Digital Financial Inclusion

The next phase of digital inclusion will be paced through digital public infrastructures and emerging use cases, which will play a pivotal role in achieving the objectives of digital financial inclusion. In the spirit of this vision, we have critically assessed the benefits and gaps in eight Indian DPIs and Digital Public Goods ('DPGs') while also analysing their adherence to the aforementioned principles. Following are the use cases that has been analysed in this paper:

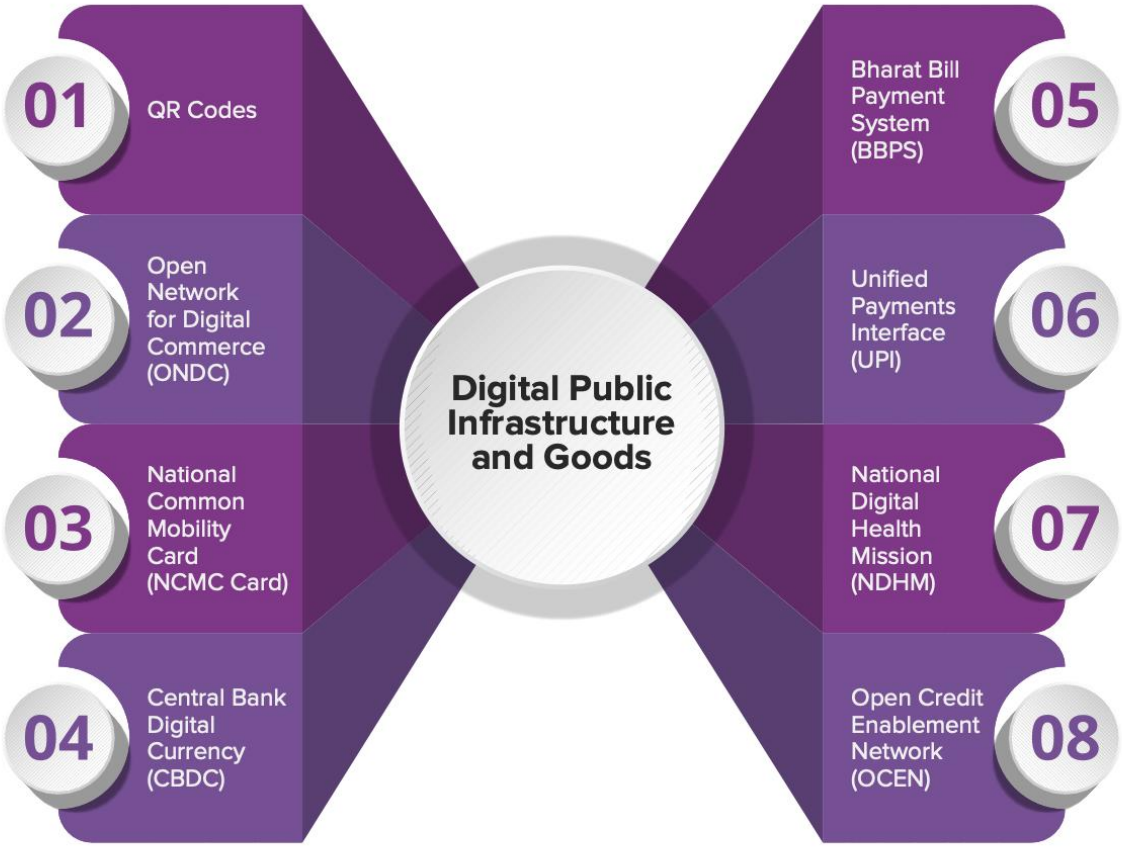

Figure 2: Digital Public Infrastructure and Goods

In this endeavour, we find that while DPIs have definitely increased access to financial services in an affordable manner, challenges in building cybersecurity resilience and scale still persist. It is imperative to address these challenges as they are intertwined with user trust in the system and may affect adoption if technology providers cannot provide customers peace of mind for the security of their digital transactions. Embracing and contextualising emerging technologies and structures, such as artificial intelligence-based financial services and open banking models, respectively, are likely to determine how digital financial inclusion efforts are received and adopted. In this endeavour, we, as stakeholders of the digital financial ecosystem, must cautiously and collectively move towards greater financial inclusion in a principled manner.

1. Introduction

Achieving greater digital financial inclusion has been one of the key objectives of the Indian government. India has approximately 806 million internet users[1], of which 350 million use digital payment methods.[2] India's digital payments sector is poised for rapid expansion, with transaction volumes set to triple from 159 billion in FY24 to 481 billion by FY29. During the same period, the total market value is expected to almost double, rising from US$ 3.16 trillion (₹265 trillion) to US$ 7.06 trillion (₹593 trillion).[3] There is no doubt that India's digital payments ecosystem has progressed significantly with one of the key reasons for this growth being the government drive for digitising the country. The Indian government through its Digital India mission is promoting digitisation across sectors and use cases, which has led to increased adoption of digital payments in India**.**

Digital India mission envisions digital infrastructure as a core utility as well as a digital empowerment tool for every citizen. Through this mission several initiatives have been taken to bridge the digital divide across India's rural and urban population. The Indian government's one of a kind initiative of Digital India is a success mantra which could be followed by other countries as well. One of the key objectives of this mission is to achieve a "*faceless, paperless and cashless"* status.[4] With estimates placing the digital economy at roughly $175–200 billion in FY 2022-23, India's ambition of reaching a $1 trillion digital economy by 2030 underscores the critical and ongoing need for robust digital payment systems like UPI.[5] As per a study conducted by Boston Consulting Group and Phone Pe, India's digital payment market will be tripled to reach US$ 10 trillion and digital payment will constitute 65% of all payments by 2026.[6] This shows the potential of the digital payments ecosystem to be a key enabler in the vision of becoming a trillion dollar digital economy.

There is an opportunity in this **Techade** for the country to achieve greater good for a greater number of citizens by progressive policymaking and enhancing digitisation. An inclusive

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[1] DataReportal, "Digital 2025: India," February 25, 2025, https://datareportal.com/reports/digital-2025-india.

[2] Business Standard, "India has 350 mn digital payment users, count set to double by 2030: Report," December 14, 2022, https://www.business-standard.com/article/economy-policy/india-s-online-transacting-user-base-to-double-to-300-mn-by-2030-122122701108_1.html.

[3] IBEF, "Digital payments in India to grow threefold from 159 billion in FY24 to 481 billion by FY29: PwC," September 6, 2024, https://www.ibef.org/news/digital-payments-in-india-to-grow-threefold-from-159-billion-in-fy24-to-481-billion-by-fy29-pwc.

[4] Ministry of Finance. (2022, October 3). *Transforming India's digital payment landscape*. Press Information Bureau. Retrieved November 10, 2023, from https://pib.gov.in/FeaturesDeatils.aspx?NoteId=151163&ModuleId%20=%202#:~:text=One%20of%20the%20major%20objectives,fold%20of%20digital%20payment%20services

[5] Ask Capital report, cited in Mint, "India's digital economy set to exceed $1 trillion by 2028, suggests report," October 2, 2024, https://www.livemint.com/technology/indias-digital-economy-set-to-exceed-1-trillion-by-2028-suggests-report-11727768705497.html.

[6] BCG, & PhonePe. (2022). *Digital Payments in India: A US$10 Trillion Opportunity.* PhonePe. Retrieved November 4, 2023, from https://www.phonepe.com/pulse-static-api/v1/static/docs/PhonePe_Pulse_BCG_report.pdf

growth of the ecosystem would go a long way in enabling the vision of a trillion dollar digital economy. The reliance on payments systems has increased multifold and it has been integrated into daily aspects of our lives such as shopping, commuting, lending etc.

There is a need for inclusive growth on both demand (consumers) and supply (businesses and government) sides. Taking everyone, government, citizens and businesses, hand in hand will help in the overall growth of digital infrastructure. Emerging use cases such as Quick Response Codes ('QR codes'), National Common Mobility Card, Central Bank Digital Currency ('NCMC'), Open Network for Digital Commerce ('ONDC') and Bharat Bill Payment System ('BBPS') etc are playing a huge role in enhancing digital financial inclusion and bringing more and more individuals into the net. The same would be crucial in **fulfilling the purpose of Amrit Kaal**, that is to improve the lives of the citizens, lessen the divide in development between villages and cities, and take emerging technology to the citizens.

Towards this, the report focuses on bringing out key principles that can be implemented in order to ensure that the existing and future interventions and technologies are equipped with the broader goal of digital financial inclusion.

1.1. Methodology

The methodology deployed for this paper is grounded in a comprehensive approach that combines focused group discussion and one-on-one interviews with relevant stakeholders and extensive secondary research. The primary sources of information were derived from direct interactions with key stakeholders, including industry experts, civil society organisations, and professionals from the FinTech sector. These one-on-one engagements provided invaluable insights into the practical nuances and challenges associated with digital and financial inclusion faced by the citizens and the way forward for the next phase of digitisation in the country. Complementing the firsthand information, extensive secondary research was conducted to ensure a robust and well-rounded understanding of existing guidelines, regulatory frameworks, and best practices.

2. Becoming a Digital Financially Inclusive Society

The efforts of greater financial inclusion can be traced back to at least five decades ago around 1969, when banks were nationalised with an aim to provide services to rural regions. It was only in 2005 that our financial regulator, the Reserve Bank of India ('RBI'), began creating the environment for incentivising banks to increase financial inclusion by providing basic checking account services with low or no minimum balance requirements.[7] The widespread adoption of digital technologies not only has the potential to boost the economy but also provide opportunities to the underserved population to become a part of the formal economy.[8] The importance of digitisation has also been accorded legal backing by the fact that access to the internet is now legally protected as a fundamental right in India.[9]

With the launch of the Digital India Mission in 2015, the government announced a vision for inclusive growth in areas of electronic services, products, manufacturing, and job opportunities through digitalisation. This mission lists 9 pillars from broadband highways, universal access to mobile connectivity, e-governance, e-kranti, to public internet access programme, IT for jobs, electronics manufacturing, information for all and early harvest programme.[10] Through this mission, the government aims to provide a much needed thrust to the identified growth areas cutting across multiple Ministries and Departments.

Several other initiatives were undertaken by the government, including the promotion of a digital economy and the provision of mobile phones and internet connectivity, which have paved the way for the emergence of digital financial services accessible to all, including individuals residing in remote areas. With the introduction of the digital ID (Aadhaar) along with the proliferation of mobile phones, the government has aimed to address challenges of access and usage to a large extent. Introduction of Pradhan Mantri Jan-Dhan Yojana ('PMJDY') accounts has enabled access to financial services for millions of Indians. Similar other initiatives were taken over the last decade to enable digital financial inclusion.

Additionally, the government focus on building vernacular language support should also be taken into cognisance. In India, out of 700 million internet users, 500 million prefer native languages over english. In the form of Bhasini project, government aims to provide internet

[7] Kumar, S. (2023, August 17). *Financial Inclusion of Women: Current Evidence from India*. ORF. Retrieved November 16, 2023, from https://www.orfonline.org/public/uploads/posts/pdf/20230817225741.pdf

[8] Andreasson, K. (2021). *Digital inclusion: The policy journey towards greater opportunities*. Economist Impact. Retrieved October 29, 2023, from https://impact.economist.com/perspectives/sites/default/files/eco135_aic_report_revised_march.pdf

[9] Supreme Court of India. (2020, January 10). *Anuradha Bhasin vs Union Of India*. Indiankanoon. Retrieved November 7, 2023, from https://indiankanoon.org/doc/82461587/

[10] Ministry of Electronics & IT. (2023). *How Digital India will be Realised: Pillars of Digital India*. Digital India. Retrieved November 3, 2023, from https://digitalindia.gov.in/programme-pillars/

content in 22 major vernacular languages[11]. Further, many start-ups have also increasingly started offering services in regional languages.

Another key factor for the massive adoption of digital payments can also be attributed to policy measures such as the demonetisation of 500 and 1000 rupee notes (roughly 86% of currency in circulation at the time) in 2016 which created an incubative vacuum for digital payment solutions to build a foundation in the country. Both merchants and consumers were incentivised to move towards digital modes of payment.[12] The intersection of the demonetisation policy along with the rapid expansion of the internet at affordable rates during this time-period, created the necessary conditions for the adoption of digital payment modes in India.

Following are some of the flagship initiatives taken by the government towards building digital and financially inclusive society:

2.1. Digital India Programme

The Digital India Programme is the government's flagship umbrella initiative towards building a digital ready knowledge society. The programme creates impetus for all government services and processes to sequentially digitise and provide greater access to the people by leveraging the range of the internet. It functions upon three key pillars, namely;-

1. Digital infrastructure as a core utility to every citizen
2. Digital Governance and services on demand
3. Digital empowerment of Citizens

In furtherance of achieving these three pillars, the programme brings under its liege, all initiatives for increasing digitisation and acts as an umbrella initiative, guiding the digitisation process across the country holistically. The initiative has brought to the fore major digital governance initiatives such as Aadhaar, MyGov, the Open Government Data platform ('OGDP') and Unified Payments Interface ('UPI') amongst a plethora of others that have made significant progress in digitising multiple facets of the Indian citizen's life.

2.1.1 Digital Public Infrastructure

Building Digital Public Infrastructure (DPI) has been one of the key objectives of the Indian government. DPI essentially refers to a set of shared digital building blocks enabled by

[11] Bhasini, National Language Translation Mission, MeitY, Retrieved November 24, 2023 at https://bhashini.gov.in

[12] Nandi,S. (2019 November 8) *Demonetization 3rd anniversary: How digital payments picked up post note ban.* Live Mint. Retrieved November 4, 2023 from https://www.livemint.com/politics/policy/demonetization-3rd-anniversary-how-digital-payments-picked-up-post-note-ban-11573199358135.html

interoperable open standards or specifications.[13] India has become the first country to build all three foundational building blocks of digital public infrastructure namely - digital identity i.e. Aadhar, real time payments i.e. UPI and a data exchange i.e. Account aggregator framework through the Digital Empowerment Protection Architecture ('DEPA') and DigiLocker.[14] These DPIs constitute the backbone of digital infrastructure which then enables seamless delivery of public services. These DPIs collectively known as 'India Stack' have been used to foster innovation and competition, fill the existing gaps in digital financial inclusion, expand the market and help the government for targeted delivery of benefits.[15] Several nations including Philippines, Morocco and Ethiopia are already using India Stack platforms.[16] Following are some of the digital public infrastructure which have become a pillar for digital financial inclusion.

Aadhaar

As per reports there are 138.4 crore Aadhar cardholders in the country[17] making Aadhar the world's largest biometric identification program which was launched in 2009 and is handled by the Unique Identification Authority of India ('UIDAI'), a statutory body. Through the Aadhaar (Targeted Delivery of Financial and other Subsidies, benefits and services) Act, 2016, this system was operationalised in identification programmes across government programmes and later made the basis for targeted direct benefit transfers under government schemes to beneficiaries.

The identification scheme assisted the government to cut out middlemen and directly transfer the benefits to beneficiaries. As time passed, more integrations of the ID system have been mainstreamed, most importantly, Aadhaar enabled Payment Systems ('AePS') along with an Aadhaar enabled Banking Account ('AeBA') that enable an individual to access the formal banking system without having to identify themselves at all levels. This is particularly important in the case of the underserved and unserved citizenry that often don't have the financial and digital literacy to remember passwords and or use smartphones with comfort. By

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[13] Alonso, C. Bhojwani, T. Hanedar, E. Prihardini, D. Uña, G. & Zhabska, K. (2023, March 31). *Stacking up the Benefits: Lessons from India's Digital Journey International monetary Fund*. International Monetary Fund. Retrieved November 4, 2023 from https://www.imf.org/en/Publications/WP/Issues/2023/03/31/Stacking-up-the-Benefits-Lessons-from-Indias-Digital-Journey-531692

[14] Saran, S. & Sharma, S. (2023 February 7). *Digital Public Infrastructure - lessons from India.* ORF. Retrieved on November 7, 2023, from https://www.orfonline.org/research/digital-public-infrastructure-lessons-from-india/#_edn4

[15] Alonso, C. Bhojwani, T. Hanedar, E. Prihardini, D. Uña, G. & Zhabska, K. (2023, March 31). *Stacking up the Benefits: Lessons from India's Digital Journey International monetary Fund*. International Monetary Fund. Retrived November 4, 2023 from https://www.imf.org/en/Publications/WP/Issues/2023/03/31/Stacking-up-the-Benefits-Lessons-from-Indias-Digital-Journey-531692

[16] Bain & Company ((2023) E-Conomy India 2023: The Economy of a Billion connected Indians. Google. Retrieved on November 4, 2023 from https://services.google.com/fh/files/blogs/india_economy_report_2023.pdf

[17] Id.

May 2025, AePS recorded 105 million transactions worth ₹28,703 crore in a single month, signifying its impact in enabling financial inclusion through last-mile banking and micro-ATMs..[18]

Unified Payments Interface (UPI)

In March 2011, an RBI document revealed that non-cash transactions per individual stood at a mere 6 per annum.[19] Only a minuscule fraction of approximately 10 million retailers in India accepted card payments, whereas by 2025, over 340 million merchant QR codes facilitate UPI payments nationwide.[20] The vast disparity in the numbers of people who used digital payments versus those who didn't was worrisome, especially in light of financial nuisances such as black money and corruption.

The government had set up the National Payments Corporation of India ('NPCI') in April 2009 with the core objective of consolidating as well as integrating various systems with different service levels, into a country-wide, uniform process for all retail payment systems. Since the launch of UPI in 2016, India has improved financial inclusion, with the RBI's Financial Inclusion Index rising from 53.9 in 2021 to 64.2 in 2024, and payment digitization has more than doubled, driven by 185 billion UPI transactions in FY 2024-25. [21]

The traditionally cash-driven Indian economy has responded well to the UPI revolution, and it has become a household payment option across the country. The technology has provided a boost to small businesses as it enables fast and secure bank-to-bank transactions, even for small amounts. To make this digital payment revolution more inclusive, the NCPI rolled out two new modes of offline payments for users- USSD code *99#[22] and UPI's 123Pay.[23]

By dialling *99#, users can send and receive interbank account-to-account funds, enquire about balance, and set/ change UPI PIN, amongst a host of other services. Further, UPI123Pay was launched to enhance the diversity, utility and transformational power of digital innovations in

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[18] India Brand Equity Found., Unified Payments Interface (UPI) Numbers Hit All-Time High in May (June 5, 2025), https://www.ibef.org/news/unified-payments-interface-upi-numbers-hit-all-time-high-in-may-cross-rs-25-00-000-crore-us-292-57-billion-for-the-first-time (last visited July 23, 2025).

[19] Reserve Bank of India. (2012, October 1). *Payment Systems in India Vision 2012-2015*. RBI. Retrieved October 29, 2023, from https://www.rbi.org.in/Scripts/PublicationVisionDocuments.aspx?Id=678.

[20] Ritesh Shukla, UPI: Revolutionising Real-Time Digital Payments in India, European Payments Council (June 26, 2024), https://www.europeanpaymentscouncil.eu/news-insights/insight/upi-revolutionising-real-time-digital-payments-india (last visited July 23, 2025).

[21] Reserve Bank of India, Financial Inclusion Index for 2024 (2024), https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=58570 (last visited July 23, 2025); Moneycontrol, UPI Transactions for FY25 Fall Short of Govt's 200-Bn Target, Record 185-Bn Transactions (Apr. 29, 2025), https://www.moneycontrol.com/technology/upi-transactions-for-fy25-fall-short-of-govt-s-200-bn-target-record-185-bn-transactions-article-12982036.html (last visited July 23, 2025)..

[22] NPCI. (2023). *A USSD based mobile banking service*. Retrieved November 22, 2023, from https://www.npci.org.in/what-we-do/99/product-overview

[23] NPCI. (2023). *UPI 123PAY: Call karo. Pay Karo*. Retrieved November 22, 2023, from https://www.npci.org.in/what-we-do/upi-123pay/product-overview.

the country. It acted as an instant payment system for feature phone users to use UPI safely and securely. The feature allows feature phone users to undertake transactions based on four technology alternatives. They include calling an interactive voice response ('IVR') number, app functionality in feature phones, missed call-based approach and proximity sound-based payments.

With the huge success of UPI and other DPIs, India is now aiming to become a major exporter of its DPI. The intent to promote the DPI was evident during the G20 summit where UPI was showcased through the One World framework, which provided Prepaid Payment Instruments to foreigners from G20 countries.[24] India's DPI further gained recognition through the G20 Endorsement, paving the way for wider acceptance on the global stage. Furthermore, India also launched the Global Digital Public Infrastructure Repository (GDPIR), a comprehensive resource hub on DPIs deployed by member nations.[25] India is now targeting Africa and Asia as prime regions for exporting DPIs. Towards this, India has entered into MoUs with several countries. For instance, India and Colombia signed a Memorandum of Understanding (MoU) which intends to promote digital transformation via India Stack in both the countries through initiatives like knowledge sharing and capacity building.[26] Additionally, India has also signed MoUs with Armenia, Sierra Leone, Suriname, Antigua, Barbados, Trinidad and Tobago, Papua New Guinea and Mauritius offering them the India Stack and DPI at no cost and with open-source access. As of now, 12 countries have deployed India's DPI.[27]

While the efforts to deepen digitalisation and financial inclusion are commendable, offline UPI solutions have not taken off compared to the internet-enabled, app-based UPI, and their scalability is yet to be tested. Further, there also exist concerns surrounding the mushrooming of financial frauds that have piggybacked the adoption of digital payments in India with UPI becoming the primary target, constituting 56–60% of all digital payment frauds in FY 2023-24, necessitating stronger security measures. The number of frauds has only increased with almost 13.42 lakh incidents of UPI fraud being reported in FY 2023-24 compared to the 7.25

[24] Moneycontrol. (2023, October 18). UPI: The world needs India's Digital Public Infrastructure, but can't see the benefit. Moneycontrol. Retrieved on March 5, 2024, from https://www.moneycontrol.com/news/opinion/upi-the-world-needs-indias-digital-public-infrastructure-but-cant-see-the-benefit-11551891.html

[25] G20 GDPIR. Global Digital Public Infrastructure Repository. Retrieved on March 5, 2024 from https://www.dpi.global/

[26] Economic Times. (2024, February 17). India to share its open-sourced DPIs with Colombia: MoU signed between the two nations. ET Government. Retrieved on March 5, 2023 from https://government.economictimes.indiatimes.com/news/digital-india/india-to-share-its-dpi-open-sourced-dpis-with-colombia-mou-signed-between-the-two-nations/107767512

[27] **ET Telecom**, *12 Countries Deploy India's Digital Public Infrastructure: Official*, ECON. TIMES (Oct. 10, 2024), https://telecom.economictimes.indiatimes.com/news/policy/20-countries-express-interest-in-indias-digital-public-infrastructure-mea-official/114113783.

lakh in previous financial year.[28] With internet penetration projected to reach 70% by 2027 and digital payment transactions expected to grow by 100–120% from 2022 to 2027, addressing UPI fraud through enhanced security measures like UPI 4.0 is critical to sustaining India's digital economy growth.[29] Fraudsters have also modified their modus operandi, targeting individuals through social engineering methods that can perhaps only be addressed through increasing financial literacy amongst the citizenry.

Rising financial frauds and disruptions also have consequences beyond immediate monetary losses. They impact the faith that consumers place in the integrity of such systems, which is a crucial factor for a country like India which is looking to onboard a significant number of first-time users into the digital financial landscape. The government, aware of rising UPI fraud concerns, has implemented multiple interventions, including the recent UPI 4.0 enhancements with AI-powered fraud detection to ensure secure digital payments and sustain the digital economy's growth. The proposed moves are likely to reduce financial frauds on UPI.

2.2. Pradhan Mantri Jan Dhan Yojana

The PMJD Yojana is the government's flagship inclusion initiative launched on the 28th of August, 2014 with the objective of *banking the unbanked, securing the unsecured and funding the unfunded*. This scheme aims to provide universal access to banking systems with no minimum balance requirements with participants also earning interest on their accounts. This scheme the citizens to get Direct Benefit Transfers ('DBT') under numerous DBT schemes such as Pradhan Mantri Jeevan Jyoti Bima Yojana ('PMJJBY'), Pradhan Mantri Suraksha Bima Yojana ('PMSBY'), Atal Pension Yojana ('APY'), Micro Units Development & Refinance Agency Bank ('MUDRA') schemes.[30]

The initiative was quick to make an impact and was quick to make a Guinness world record for *'The most bank accounts opened in one week'* in January 2015.[31] In the time since its launch, the Pradhan Mantri Jan Dhan Yojana has provided financial inclusion services such as zero balance deposits, with a total deposit balance of ₹263,064.90 crore, 38.48 crore RuPay debit cards, and accidental insurance up to ₹2 lakh for accounts opened after August 28, 2018, to 55.83 crore beneficiaries across the country as of July 9, 2025.[32]

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[28] Pankaj Chaudhary, Minister of State for Finance, Statement in Lok Sabha (Nov. 25, 2024), as reported in Fortune India, UPI Frauds: 6.3 Lakh Cases Worth ₹485 Cr Reported in FY25 So Far (Nov. 25, 2024), https://www.fortuneindia.com/macro/upi-frauds-63-lakh-cases-worth-485-cr-reported-in-fy25-so-far/119275 (last visited July 23, 2025).

[29] Usage Statistics: Internet and Mobile Users in India (2025), MuftInternet (Dec. 30, 2024), https://muftinternet.com/blog/usage-statistics-internet-and-mobile-users-in-india-2025/.

[30] Department of Financial Services. (2023). *Pradhan Mantri Jan Dhan Yojna Scheme Details*. Ministry of Finance. Retrieved on November 22, 2023, from https://pmjdy.gov.in/scheme.

[31] Department of Financial Services. (2015, January 20). *Pradhan Mantri Jan Dhan Yojna*. Ministry of Finance. Retrieved on November 22, 2023, from https://pmjdy.gov.in/guinness-world-record.

[32] Pradhan Mantri Jan-Dhan Yojana, Account Statistics (2025), https://www.pmjdy.gov.in/account-statistics-country.aspx (last visited July 23, 2025); Press Info. Bureau, Nationwide Financial Inclusion Saturation

The initiative has been lauded as a progressive step towards efficient and pinpoint delivery of DBTs. It has also increased the uptake of other DBT schemes amongst the poor and has assisted in a holistic upliftment of rural women by increasing access to benefit delivery and through a systemic inclusion of women in the formal financial system.[33] The Pradhan Mantri Jan Dhan Yojana has expanded banking coverage to 66.6% of rural and semi-urban areas as of August 2024, a significant increase from pre-2014 levels, with women constituting 55.6% of account holders.[34]

Initially, during the four years between 2014-2018, the yojana's focus was on including at least one member from each household in the financial inclusion scheme. Since 2018, however, owing to the success of the first phase, the yojna has focussed on including all adults in the country in their financial inclusion efforts and has achieved an admirable adoption rate in the unbanked, unserved and underserved segments of society. There is no doubt that further incremental interventions and policy tweaks in the yojana may assist in further actualising its goals and significantly boost access to digital financial services while uplifting the underserved and unserved segments of society.

2.3. BharatNet

The push for digitalisation globally has seen governments across the board invest heavily into building resilient and accessible digital infrastructure across their territories. India is no stranger to such developments and recognised early on that digital infrastructure was needed to enable its *digital nagriks* to reap the benefits that the digital revolution may bring to our shores.

In 2012, the National Optical Fiber Network ('NOFN') was launched and later renamed 'BharatNet' with a renewed mission. The project aims to provide high-speed connectivity to 2,50,000 gram panchayats (GPs), with a target to connect all 6.55 lakh villages by 2028 under Phase III.[35] To actualise these goals, the government formulated a special purpose vehicle

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Campaign Sees Significant Progress (July 15, 2025), https://www.pib.gov.in/PressReleasePage.aspx?PRID=2036417 (last visited July 23, 2025).

[33] Sridhar, N. (2022, September 11). *Jan Dhan@8: A game-changer for the unbanked*. The Hindu Business Line. Retrieved November 27, 2023, from https://www.thehindubusinessline.com/money-and-banking/jan-dhan8-a-game-changer-for-the-unbanked/article65879981.ece.

[34] The Economic Times, 10 Years of Jan Dhan Yojana: PM Modi, FM Sitharaman Laud Financial Inclusion Scheme (Aug. 28, 2024), https://economictimes.indiatimes.com/news/economy/policy/10-years-of-jan-dhan-yojana-pm-modi-fm-sitharaman-lauds-financial-inclusion-scheme/articleshow/112836803.cms (last visited July 23, 2025).

[35] Bharat Broadband Network Ltd., BharatNet Project Status (2025), https://bbnl.nic.in/ (last visited July 23, 2025);.

('SPV') named the Bharat Broadband Networks Limited ('BBNL'), which was entrusted with fiberising the country.

Till date, BBNL has laid 693303 KMs of fibre across the country, covering 2,14,325 Gram Panchayats.[36] Some of the challenges delaying completion include complex terrain, logistical difficulties, and coordination issues with village-level entrepreneurs. The GatiShakti Sanchar Portal, launched in 2022, has streamlined Right of Way (RoW) applications, reducing approval times by 30% as of 2025, boosting BharatNet's progress.[37]

BharatNet and other initiatives funded by Universal Service Obligation Fund ('USOF') have shown great progress in increasing coverage, however, they often provide unreliable and slow connections to these regions such that it does not benefit them in the long run as most sites are fundamentally non-functional with 2G mobile network speeds or less. The revised BharatNet scope, expanded to connect 6.55 lakh villages by 2028 under Phase III, aims to reach the unreached with high-speed broadband.[38]

2.4. Digital Banking Units

The RBI in April 2022 taking impetus from the Finance Minister's speech for the 2022-23 budget released preliminary guidelines for establishing Digital banking Units ('DBUs) by scheduled commercial banks for furthering financial inclusion. The Prime Minister in October 2022, announced the expansion of DBUs to 75 districts across the country to nationalise the promising initiative and promote access to digital banking services, in 2023 alone 84 DBUs were operational.[39] The DBUs was announced to be a part of 'Door-step banking' initiatives to increase access to previously unbanked segments of society. [40]

DBUs are essentially physical spaces with minimal technology infrastructure to enable customers to have cost-effective/ convenient access and enhanced digital experience to/ of such products and services in an efficient, paperless, secured and connected environment with most services being available in self-service mode at any time, all year round. DBUs allow for activities such as savings account opening, balance inquiries, passbook printing, fund transfers,

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[36] Press Info. Bureau, BharatNet: Bridging the Digital Divide (Dec. 21, 2024), https://www.pib.gov.in/PressReleasePage.aspx?PRID=2083738 (last visited July 23, 2025).

[37] OpenGov Asia, India's Efforts to Enhance Rural Digital Connectivity and Literacy (Apr. 3, 2025), https://opengovasia.com/indias-efforts-to-enhance-rural-digital-connectivity-and-literacy/ (last visited July 23, 2025)

[38] Press Info. Bureau, BharatNet: Bridging the Digital Divide (Dec. 21, 2024), https://www.pib.gov.in/PressReleasePage.aspx?PRID=2083738 (last visited July 23, 2025)

[39] Press Info. Bureau, Gov't of India, Press Release, (July 20, 2025), https://www.pib.gov.in/PressReleasePage.aspx?PRID=1896726.

[40] Ministry of Finance. (2022, October 16). *PM dedicates 75 Digital Banking Units across 75 districts to the nation.* Press Information Bureau. Retrieved November 21, 2023, from https://pib.gov.in/PressReleasePage.aspx?PRID=1868239.

fixed deposit investments, loan applications, check stop-payment instructions, credit and debit card applications, tax and bill payments, and nominations.

They also have Cash Deposit Machine ('CDM'), Multi-Functional Kiosk ('MFK'), Video Know your customer (video 'KYC') assistance and also act as digital financial literacy centres. [41] Due to their nascent rollout, it is currently not possible to assess their impact on increasing financial inclusion beyond the theoretical advantages they present. Regardless, DBUs are a progressive initiative to increase interaction with digital financial services for the disadvantaged and at the very least, will increase the level of comfort the addressed segments will have in interacting with digital alternatives. The initiative has the potential to acclimatise the underserved and unserved segments of society with digital financial solutions and can act as a bridge in onboarding citizens into the formal banking sector. Owing to the breadth of its services, DBUs may also enable digital financial literacy amongst new populations if they are tailored to provide such services through government policies.

There is no doubt that the government has been working towards enhancing digitisation through various schemes and initiatives as discussed above. Digital public infrastructure is playing a crucial role in the larger scheme of things and encouraging businesses to take digitisation to the next level where they can develop consumer centric products which is evident in the case of UPI. While the initiatives and the government efforts must be appreciated, there is still a lot of ground that has to be covered. There are several existing challenges which need to be addressed in order for these initiatives to realise their full potential. In the upcoming chapter, we will assess the gaps and challenges that we encounter in our financial inclusion efforts from a demand and supply side lens.

[41] Srivats, K.R. (2022, October 28). *BL Explainer. DBUs — Next big step in India's digital banking march*. The Hindu Business Line. Retrieved March 27, 2023, from https://www.thehindubusinessline.com/blexplainer/digital-banking-units-next-big-step-in-indias-digital-banking-march/article66021287.ece.

3. Existing Gaps and Challenges to the Financial Society

There is no doubt that significant efforts have been made to enable digital financial inclusion in the country. As evident by the preceding chapter, several initiatives have been taken to ensure that more people board on the digital bandwagon. However, despite such efforts on part of the government as well as the private sector, there are still considerable challenges that remain and should be addressed in the times to come.

To realise the goals of transforming India into a digitally empowered society and knowledge economy, it is important to identify the challenges of digital inclusion from different viewpoints and address the same. To be inclusive, there is a need to foster the emergence of services and conditions that improve people's lives with respect to education, health, public services, and employment and financially enable them to access technologies in order to enhance ease of living.

There are certain prerequisites that will need to be fulfilled if digital is to become a key factor for inclusion for all. From infrastructure, telecommunications to development of digital skills and expertise, all factors need to be taken into account. This chapter aims to list the key challenges around digital inclusion from both supply-side and demand-side for a comprehensive take on what are the main barriers to such inclusion.

3.1. Supply side barriers

Supply side barriers refer to the systemic structural and socio-economic obstacles which act as a barrier for the ecosystem including government and private sector to offer its services. For the purposes of this study we have limited supply side barriers to encompass infrastructure, user interface with financial services, the socio-economic concerns leading to the digital divide and the regulatory norms in place, determining how financial services are provided to consumers in India.

3.1.1 Infrastructure as a barrier

Though technology aims to provide broadband coverage to nearly the entire world, the economics of deployment often hinders coverage expansion and laying fiber in unfavourable terrain and remote regions are often unprofitable for the fiber company. For those in rural, remote, and underdeveloped areas, this lack of infrastructure has made broadband adoption strenuous. In terms of the E-Government Development Index, India ranks 97 out of 193 nations.[42] India is at a fairly high level in terms of human capital development and online services provision, but is held back by **relatively lower levels of infrastructure development.**[43]

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[42] United Nations. (2024). *UN E-Government Knowledgebase*. from: https://publicadministration.un.org/egovkb/en-us/Data/Country-Information/id/77-India

[43] United Nations Department of Economic and Social Affairs. (2022). *E-Government Survey 2022: The Future of Digital Government.* United Nations DESA Publications. Retrieved on November 17, 2023 from https://desapublications.un.org/sites/default/files/publications/2022-09/Report%20without%20annexes.pdf.

For digital inclusion to happen, digital technology must be made available to the widest possible population in order to become a reality and actual development must be supported by facilitating exchanges and the creation of businesses and jobs. Income generating economic activities with monetary transactions must be promoted through the country along with providing better internet. Better infrastructure must be accompanied by better facilities for integration with the digital economy.

Since BharatNet was operationalized in 2011, its completion has faced multiple postponements, with the target now set for 2028. As of December 2024, approximately 25,000 inhabited villages lack mobile network coverage, a significant obstacle to India's digital future.[44] Out of 1,04,574 Wi-Fi hotspots in gram panchayats enabled under BharatNet, only 10,000 are active as of May 2025, highlighting issues with sustaining internet access.[45]

The BharatNet initiative's impact is dulled further by having a linear architecture (Single cable connects the villages. This impacts the ability to provide 99% downtime which is a primary bar to clear for internet service providers), and the usage of Fiber Point of Interconnect ('FPOI') that use established telecom fibre cables, causing longer restoration timelines when an error occurs. Thus, while the intention of the project was admirable, its rollout hasn't been able to meet its initial objectives. Since digital financial inclusion is dependent on reliable access to the internet, the fiberisation of the country must be given due priority.

Another important aspect in a country like ours where mobile phones remain the leading mode of internet access is that broadband connectivity offers must be affordable for all. In an increasingly digitised society, the access to consistent and affordable internet underpins the access to government services that have been steadily moved online over the last decade. A lack of affordable access to the internet may also deepen the chasm of the digital divide, stalling years of progress in getting citizens from rural and remote areas online.[46] There is a need to facilitate community broadband networks that focus on public service priorities. Additionally, mobile devices should be distributed at lower price points so that more people can get access to them. In 2025, the cheapest smartphone in India costs approximately 150% of the average monthly income of an Indian citizen.[47] In rural and remote areas, internet availability is either

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[44] The Wire, Why BharatNet Remains an Unfinished Dream (Feb. 15, 2025), https://m.thewire.in/article/tech/why-bharatnet-remains-an-unfinished-dream (last visited July 23, 2025)

[45] Universal Service Obligation Fund, BharatNet Progress (2025), https://usof.gov.in/ (last visited July 23, 2025); @USOF_India, Posted on X (May 30, 2025, 14:30 IST), https://t.co/4kX9m2pLqZ (last visited July 23, 2025)

[46] Mihindukulasuriya, R. (2023, February 3). *Internet much more affordable now, but Indians still pay too much for speeds they get, says study.* The Print. Retrieved on November 7, 2023, from https://theprint.in/tech/internet-much-more-affordable-now-but-indians-still-pay-too-much-for-speeds-they-get-says-study/1349951/, also see: Surfsahrk. (2023, January 20). *Which countries are overpaying for the internet in 2022?* Surfshark. Retrieved on November 7, 2023, from https://surfshark.com/blog/global-internet-value-index-2022.

[47] Counterpoint Research, India Smartphone Market Report Q1 2025 (Apr. 2025), https://www.counterpointresearch.com/insights/india-smartphone-market-q1-2025/ (last visited July 23, 2025).

intermittent, poor or non-existent.[48] Service providers need to ensure its availability through community networks and public WiFi/ internet access points. Such networks should also provide good-quality upload and download speeds to cater to the local needs of internet users.

3.1.2 Lack of user interface

While technology has disrupted the digital financial space, there are still existing gaps in terms of achieving last mile delivery. An important aspect here is how digital tools can be made user friendly, boosting material adoption of these technologies once they are operationalised in remote and rural India. During our interaction with the stakeholders, they called attention to vital issues such as prevalent language barriers that create additional hindrances, and impressed upon the importance of grass-root level engagement in financial literacy. For most people that face such language barriers, access is limited simply by their incapacity to get past terms of agreement. What makes it worse is that these barriers make such people susceptible to debt cycles, economic exploitation, and predacious lending practices. Reportedly, 60% of active internet users found language as the biggest obstacle to adoption of online services.[49]

While we talk about financial inclusivity, it isn't just limited to a language barrier. Getting well-versed with financial services entails understanding complex jargons and confusing terms/clauses. This becomes problematic for non-english speaking customers to crack these intricacies and instil trust in the overall process. For instance, in a survey based in a village in Odisha, most of the surveyed households reported the inability to understand English, and thus the failure to comprehend text communications sent by the banks.[50] Herein it becomes important to push for vernacular verbal communications to be incorporated in a manner that is easy to comprehend, providing simplified steps of action and incorporating local examples to create comfort for the newly onboarded digital nagriks.

3.1.3 Digital Divide

While there are significant efforts made in terms of bridging the digital divide, there are still gaps which need to be addressed. As of 2025, 60.6% of the rural population uses the internet compared to 80% of India's urban population, highlighting a persistent digital divide.[51] This digital divide exists intersectionality between urban and rural areas, between men and women, between elevated and marginalised communities, between low income groups and high income

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[48] Mahendru, A. Dutta, M. & Misra P.R. (2022, December 5). *India Inequality Report 2022: Digital Divide.* OXFAM India. Retrieved October 27, 2023, from https://www.oxfamindia.org/knowledgehub/workingpaper/india-inequality-report-2022-digital-divide.

[49] Sharma, C. (2022, July 17). *Breaking language barrier to financial inclusion through technology*. The Times of India. Retrieved On November 7, 2023, from https://timesofindia.indiatimes.com/blogs/voices/breaking-language-barrier-to-financial-inclusion-through-technology/.

[50] Panda, S. (2021, February 25). *Data Systems in Welfare: Impact of the JAM Trinity on Pension & PDS in Odisha during COVID-19*. The Centre for Internet and Society. Retrieved On November 17, 2023, from https://cis-india.org/raw/sameet-panda-impact-of-the-jam-trinity-on-pension-pds-in-odisha-during-covid-19

[51] DataReportal, Digital 2025: India (Jan. 2025), https://datareportal.com/reports/digital-2025-india (last visited July 23, 2025).

groups, and between young people and older populations and among different caste as well[52]. It is due to the intersectionality of the digital divide that a blanket policy towards enabling digital literacy may not be effective. A nuanced, intersectional approach towards this issue is the need of the hour.

Several government initiatives are oriented towards bridging this digital divide, however, there is still a long way to go in terms of actualising the results. For instance - pilot projects such as the Jan Dhan Plus initiative have brought to the fore multiple solutions to better women's active engagement in financial inclusion schemes. Estimates suggest that women from semi-urban and rural India could add ₹27,000 crore in deposits and disburse ₹10,500 crore in overdrafts to 20 million beneficiaries if scaled.[53] Under the pilot project, the Bank of Baroda and Women's World Banking mobilised women business correspondents in contrast to general practices and noticed that rural women were more likely to invest and save monthly due to this change. However, women and more particularly, rural women in India have to overcome additional barriers in the form of lack of financial independence, lack of access to formal financial services and overall scepticism of digital alternatives owing to socio-economic contexts. As of July 2025, 66.7% (37.26 crore) of all Jan Dhan customers live in rural or semi-urban areas, making rural women a significant consumer base for the PMJDY.[54] Studies have also shown that the uptake of financial services is skewed in the favour of men, highlighting the gender gap in financial inclusion, warranting correction through policy intervention.[55]

Most women use their Jan Dhan accounts solely for accessing direct benefit transfers and do not deposit money into their accounts or access other facilities under the yojana. Reportedly, 65% of urban women PMJDY account holders do not use their accounts for savings, and only 25% received cash transfers in FY 2024-25.[56] They also do not have a say in how the DBT monies are used in most circumstances.[57] Thus while at present, on paper women seem to have been financially included under the Jan Dhan Yojana, in reality, multiple operational and cultural barriers stop them from engaging meaningfully with financial inclusion schemes. A

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[52] Vaidehi, R., Reddy A, B & Banerjee, S. (2020). *Explaining Caste-Based Digital Divide in India*. arXiv. Retrieved On November 7, 2023, from https://arxiv.org/pdf/2106.15917.pdf

[53] Women's World Banking, Jan Dhan Plus: Unlocking Women's Financial Potential (2024), https://www.womensworldbanking.org/insights/jan-dhan-plus-report-2024/ (last visited July 23, 2025).

[54] Pradhan Mantri Jan-Dhan Yojana, Account Statistics (2025), https://www.pmjdy.gov.in/account-statistics-country.aspx (last visited July 23, 2025).

[55] Kumar, P. & Kandikuppa, S. (2023, January 19). *Financial inclusion plan may need a gender push*. The Hindustan Times. Retrieved November 24, 2023, from https://www.hindustantimes.com/opinion/financial-inclusion-plan-may-need-a-gender-push-101674051086806.html

[56] Women's World Banking, Jan Dhan Plus: Unlocking Women's Financial Potential (2024), https://www.womensworldbanking.org/insights/jan-dhan-plus-report-2024/ (last visited July 23, 2025); @WomensWorldBank, Posted on X (Mar. 15, 2025, 09:15 IST), https://t.co/9mPq3kXy7Z (last visited July 23, 2025).

[57] Women's World Banking. (2022, November). *Making Jan Dhan Work for Rural Women: A Practitioner's Guide to Expanding Financial Inclusion for Women in Rural India*. Women's World Banking. retrieved on October 29, 2023 from https://www.womensworldbanking.org/wp-content/uploads/2022/11/Making-Jan-Dhan-Work-for-Rural-Women-2022-Report.pdf

2024 survey found that 95% of women were unaware of the overdraft facility coupled with their Jan Dhan accounts, highlighting persistent awareness barriers[58] The report also found that nudging women to save up to INR 500 a month created enough impetus for saving habits to form, thereby making them more inclined to use their accounts more meaningfully, signifying the potential for positive change, should government policies create similar impetus.

In terms of rural-urban divide as well, the role of PMJDY assumes importance.[59] While the scheme enhanced financial access for various marginalised groups in the society, the existence of dormant accounts remained to be a major drawback. It would be noteworthy that the percentage of dormant accounts with zero balance was the highest in the case of regional rural banks. Reportedly, 18.2% of PMJDY accounts remain zero-balance, despite efforts by banks like Bank of Baroda and Bank of India to reduce such accounts through nominal deposits[60].
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Further, operational issues such as onerous KYC requirements, unnecessary levies when coupled with UPI[61] and the increasing number of inoperative accounts under the yojna act as a barrier for the rural areas.[62] Such operational obstacles have significantly impacted the continued use of the yojna and have resulted in 4.8 crore beneficiaries not renewing their RuPay cards.[63] It is important to acknowledge the significant difference in socio-economic background of people living in India and the need for flexibility in financial schemes designed for different segments of the unbanked population. If the goal of digitisation is to be accessible to most people, it needs to ensure that the schemes are holistic and caters to the issues at hand. The government needs to identify and address the gaps in the penetration of internet services so as to ensure that its benefits are not limited in the hands of a few.

Furthermore it is imperative to understand the fallout consequences of policies that do not approach the adoption of technologies in an nuanced manner. A lack of faith in digital technologies or a lack of capacity whether through the lack of affordable entry points such as phones or through a lack of digital literacy, have consequences for citizens in rural and remote India, holding them back from utilising not just financial technology solutions, but also critical

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[58] Women's World Banking, Jan Dhan Plus: Unlocking Women's Financial Potential (2024), https://www.womensworldbanking.org/insights/jan-dhan-plus-report-2024/ (last visited July 23, 2025).

[59] Draboo, S. (2020, April 25). *Financial Inclusion and Digital India: A Critical Assessment*. EPW engage. Retrieved on November 23, 2023, from https://epw.in/engage/article/financial-inclusion-and-digital-india-critical

[60] The Indian Express, PMJDY: Zero-Balance Accounts Drop to 18.2% (Apr. 10, 2025), https://indianexpress.com/article/business/banking-and-finance/pmjdy-zero-balance-accounts-drop-18-2-9245763/ (last visited July 23, 2025).

[61] Raghavan, S. (2023, January 17). *Bank harassment, hidden charges undoing gains of Modi's PMJDY and financial inclusion*. The Print. Retrieved on November 22, 2023, from https://theprint.in/opinion/standard-deviation/bank-harassment-hidden-charges-undoing-gains-of-modis-pmjdy-and-financial-inclusion/1318631/

[62] Minister of State in The Ministry of Finance. (2022 ,December 13). *Rajya Sabha Unstarred Question* No. 679. Rajya Sabha. Retrieved on November 25, 2023, from https://pqars.nic.in/annex/258/AU679.pdf

[63] Pradhan Mantri Jan-Dhan Yojana, Account Statistics (2025), https://www.pmjdy.gov.in/account-statistics-country.aspx (last visited July 23, 2025); @PMJDY_Official, Posted on X (July 10, 2025, 11:00 IST), https://t.co/5jQw9rZp8m (last visited July 23, 2025).

access to healthcare solutions enabled through technology. During the implementation of the Ayushman Bharat Digital Mission which was launched during the COVID-19 pandemic, with tools like e-Sanjeeveni and the maintenance of electronic health records. The policy did not fare so well in rural areas due to lack of access to a smartphone or a computer and the internet. Poor or no connectivity to digital services for approximately 70% of the population in the country has hindered access to digital public health services in the way it was intended to through the scheme.[64] Studies show that the lack of access to digital technology among different marginalised groups can further increase health inequalities.[65]

Another example is the very apparent digital divide in the case of accessing public services and entitlements through the digital medium which remains a challenge for the marginalised like the deployed system of the biometric-authenticated Public Distribution System ('PDS'). While the well-off can use technology to order food/ groceries at home without any hassle, citizens from lower economic statuses find it hard to avail the benefits they may be entitled to as they are either unable or unaware of how to interface with the technology platform. For instance, under a survey conducted in rural parts of Odisha, most respondents reported biometric authentication failure while accessing benefits under PDS.[66]

3.1.4. Creating an Enabling Environment for Innovation

From a supply side perspective, there is a need to focus on creating an enabling environment which supports products and innovations made for digital and financial inclusion in a representative fashion. Currently, there does not seem to be enough incentives or encouragement in the form of policies and schemes for the companies to even venture into targeted products which can fill the gaps identified in the current chapter.

It is important to highlight that the onus of creating this environment relies on the whole ecosystem including government and private sector. As per the NITI Aayog India Innovation Index 2024, India's gross expenditure on R&D ('GERD') is 0.76% of GDP, lower than Brazil and South Africa.[67] A lack of initiative in the form of incentives or schemes R&D holds back the industry and private-public partnerships from building innovative solutions for regional problems, limiting the scaling of solutions for the most needy. The government and private sector have to work together to invest more in R&D to build products and infrastructure which caters to the needs of the public.

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[64] India Development Review. (2023, February 16). *India's digital divide: From bad to worse?* IDR. Retrieved on November 25, 2023, from https://idronline.org/article/inequality/indias-digital-divide-from-bad-to-worse/

[65] Vaidehi, R., Reddy A, B & Banerjee, S. (2020). *Explaining Caste-Based Digital Divide in India*. arXiv. Retrieved On November 7, 2023, from https://arxiv.org/pdf/2106.15917.pdf

[66] Panda, S. (2021, February 25). *Data Systems in Welfare: Impact of the JAM Trinity on Pension & PDS in Odisha during COVID-19*. The Centre for Internet and Society. Retrieved On November 17, 2023, from https://cis-india.org/raw/sameet-panda-impact-of-the-jam-trinity-on-pension-pds-in-odisha-during-covid-19

[67] NITI Aayog, India Innovation Index 2024 (2024), https://www.niti.gov.in/sites/default/files/2024-India-Innovation-Index.pdf (last visited July 23, 2025).

Further, while digital innovation is generating various business opportunities, what kind of values are being created is determined by those involved in the process. Here also, the responsibility of the ecosystem has to be highlighted. The industry has to be cognisant that lack of diversity in perspective and experience can have a diverse impact on the type of digital innovation that gets explored. It can also directly influence the representativeness of the products and services created. The inclusion of more diversity, with respect to age, gender, nationality, ethnicity, race, sexual orientation, socioeconomic status and disability can minimise mistakes during innovation. For example concerns around facial recognition techniques that have difficulty with darker skin colours, AI-enabled speech recognition that has difficulty identifying female voices, etc.[68] There is a need to recognize a working awareness of inclusion and diversity in relation to digital technologies. There is a growing need to develop accessible digital products that cater to diverse sensory, cognitive and physical abilities.

Creating an enabling regulatory environment is also necessary to give space to the companies to innovate. Excessive regulatory interventions and corresponding changes without a participatory process for all the stakeholders discourages the industry to invest and innovate further in the technology. Because of excessive regulation, there are other unintended consequences such as increased prices for consumers[69], reduced incentives for companies[70] to onboard new customers and reduced incentives[71] to build more innovative solutions.

An enabling environment which encourages product innovation targeted for solving the issues of digital inclusion should be created by the government and industry alike. An enabling regulatory environment with a light touch approach and consultative process is needed for the betterment of the ecosystem. These collaborative efforts towards lowering the barriers for digital inclusion would go a long way in creating a truly Digital India.

3.2 Demand side barriers

In addition to the supply side barriers as discussed above, the goal of digital inclusion is also hindered by demand side challenges that act as a roadblock in the penetration of digitalization in the country. In this part, we trace some of these barriers.

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[68] Yokoi, T. (2021, August 3). *What Does Inclusive Digital Innovation Look Like?* Retrieved on November 17, 2023, from https://www.forbes.com/sites/tomokoyokoi/2021/08/03/what-does-inclusive-digital-innovation-look-like/?sh=1398cb9e7959.

[69] Aghion, P. Bergeaud, A. & Reenen, J.V. (2021, January). *The Impact of Regulation on Innovation*. National Bureau of Economic Research. Retrieved on November 14, 2023, from https://www.nber.org/system/files/working_papers/w28381/w28381.pdf

[70] Aghion, P. Bergeaud, A. & Reenen, J.V. (2021, January). *The Impact of Regulation on Innovation*. National Bureau of Economic Research. Retrieved on November 14, 2023, from https://www.nber.org/system/files/working_papers/w28381/w28381.pdf

[71] Janßen, R. Kesler, R. Kummer, E.M. & Waldfogel, J. (May 2022). *GDPR and the Lost Generation of Innovative Apps.* National Bureau of Economic Research. Retrieved on November 16, 2023, from https://www.nber.org/system/files/working_papers/w30028/w30028.pdf

3.2.1. Lack of Digital Literacy

One of the main barriers that hinders digital inclusion is the lack of digital literacy in India. It is pertinent to note here that many people choose not to be included because they do not recognize the benefits nor do they have an urgent need for an electronic solution to their problems. In 2023, approximately 62% of India's population lacks digital literacy, despite ongoing advancements in digital infrastructure and literacy initiatives.[72] This statistic signifies the need for government and private led initiatives to increase digital literacy across the country, especially within the larger context of digitisation. There is a need to explore a variety of ways and resources that can help build a solid foundation for how to address the unique needs of citizens, and the need for approaching digitally-driven solutions. This means that people with different socio-economic backgrounds, age, education and ethnicity need to have educational programmes tailored for them.

There is a need to incentivise and train people about the benefits of digital literacy so as to ensure that the benefits of digital inclusion percolate to the grassroots of the country.[73] For instance, during the COVID-19 pandemic, India took recourse to contact tracing apps to salvage the situation without educating the people on the need to have an understanding of how to use them. While the strategy proved successful in metropolitan cities, in the rural lands of the country, it yielded no specific benefits since the people were not aware of the means to use such a digitally driven solution or the benefits attached therewith. If a digital solution adds value to people's lives through improved livelihoods, communication or through entertainment, citizens' should first be incentivised about the same to increase their motivation to learn and adopt such skills. Digital needs to be advocated as a medium that provides economically valuable information/services.

The issue does not seem to be the lack of schemes or measures towards enabling digital inclusion but the effectiveness of such programmes. For example - as highlighted above, schemes such as PMJDY, BharatNet etc are focused towards achieving larger goals of digital inclusion, but the fact that people are not aware of these programs is the issue. While the government has been working towards bringing out these measures, it has not been able to translate into actual results. There is a need for constant monitoring of these schemes and creating awareness in order to actualise the intended impact.

3.2.2 Lower purchasing power and concerns around affordability

Global pandemic has adversely impacted purchasing power of middle to low income groups across the world. India has also suffered fluctuations in its economy as a consequence. The purchasing power of middle to lower income groups has been adversely impacted due to the

[72] The CSR Journal, "Digital literacy in India, a pressing priority" https://thecsrjournal.in/world-computer-literacy-day-digital-literacy-india/

[73] UNDESA. (2021, February 18). *Leveraging digital technologies for social inclusion.* United Nations. Retrieved on November 19, 2023, from https://www.un.org/development/desa/dspd/2021/02/digital-technologies-for-social-inclusion/.

inflation's impact on household budgets. A survey found that 52% of respondents expect their savings to decline due to inflation.[74] This, in turn, has negatively impacted the access of internet services by the rural population. *During our primary research, stakeholders also identified social barriers as a critical factor that the market will have to contemplate, especially when considering the ownership and individual autonomy in owning an electronic device.* Further, 45% of Indian women surveyed were borrowers of phones rather than owners.[75] While the government aims to bring affordable data plans that suit the needs of all types of users, there still is a lot of income disparity which necessitates bringing those in the scope of digitalisation that are not able to fulfil even their basic necessities. It would require increasing the job opportunities in the rural areas for the marginalised class so that they are also able to afford digital services. To de-escalate prices, the government must invest in digital infrastructure to not only make the internet affordable, but also push for greater accessibility of smartphones for rural and remote communities.

3.2.3. Mistrust

Trust in the financial ecosystem is an established integral factor in determining the adoption and consistent use of any financial service. As an extension, the same stands true for the FinTech solutions. Given the fact that the lifeblood of digital inclusion is data, digital trust becomes its heart as a consequence. Loss of this trust results in worries about the role technology plays in the lives of individuals currently.[76] The financial inclusion initiatives undertaken in the past have also further established this understanding as was evidenced through the success in inclusion achieved through banking sakhis (also known as banking correspondents) promoted by the National Rural Livelihood Mission (NRLM) from 2015 across rural and remote India.[77] During our stakeholder discussions, experts also emphasised the need for consumer trust for financial services and instruments to be adopted and relied upon by the unserved and underserved communities in India. They highlighted that at a very basic level, for example in a household setting, there is a peculiar dynamic that plays out where the males in the family may end up gatekeeping smart devices from women. Resultantly, even when women know how to operate smart devices such as smart mobile phones, they may not want to remit money via smartphones because of either trust deficit in the family settings or in the intermediaries.

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[74] Reserve Bank of India, Consumer Confidence Survey Q1 2025 (Apr. 2025), https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=59782 (last visited July 23, 2025).

[75] Business Standard, Women and Digital Access in India (Mar. 8, 2025), https://www.business-standard.com/article/technology/women-digital-access-india-2025-125030800234_1.html (last visited July 23, 2025).

[76] Roseth, B. (2022, August 11). *Trust: An Obstacle and an Opportunity for Digital Transformation*. IDB. Retrieved on November 27, 2023, from https://blogs.iadb.org/ideas-matter/en/trust-an-obstacle-and-an-opportunity-for-digital-transformation/

[77] Vaid, R. & George, A. (2023 September 25) *Bank Sakhis: Pushing digital payments in rural India.* Forbes India. Retrieved on November 22, 2023 from https://www.forbesindia.com/blog/finance/bank-sakhis-pushing-digital-payments-in-rural-india/

In these contexts, there is a positive obligation upon financial service providers to present solutions to mitigate mistrust. This can be achieved through simplified redressal mechanisms, assistance in vernacular languages or even through boosting the banking correspondent presence across rural and remote areas of the country. At a macro level, it is also important to mention here that such policies require conducive regulatory norms that enable companies to bridge this divide and onboard more consumers in a trusted manner. Regulations that mandate higher data protections may be reasoned to be necessitated owing to the rising financial frauds in the country. However, regulations that are in tune with the industry's compliance capacity, may elicit greater compliance and move the industry towards greater trust and security. In the subsequent chapter, we aim to address these concerns through a principle-based regulatory approach, balancing industry's ability to innovate alongside the need for greater consumer security online.

The above identified challenges are remediable, however, there is a need for targeted policy interventions and joint effort on part of the public and private sector to remove these barriers. This can be done through a principle-based approach which has to be kept at the core of every policy and infrastructural interventions. In the next chapter, we have identified ten such principles that should be kept at the core of the decision making process of the government and private sector which if followed could be the key to enhancing digital financial inclusion.

4. Principles of Digital Financial Inclusion

There is no doubt that the government in the past has taken initiatives towards bringing more and more people on to the digital bandwagon, however gaps have still persisted which have hindered the pace of digital inclusion. One of the primary reasons for such gaps seems to be the lack of guiding principles that should be looked into while coming up with the initiatives and technology. The next phase of digital inclusion will be paced through digital public infrastructures and emerging use cases which will play a pivotal role in achieving the objectives of digital financial inclusion.

These guiding principles will help in establishing certain ground rules that the government and companies should keep in mind while developing the technologies which will serve the public. In 2016, G20 came out with 8 high level principles for digital financial inclusion.[78] As we move forward, the government and private sector have to take collective responsibility to reach the unreached.

Therefore, following are some of the key principles that have come by our primary and secondary research that should be applicable on the technologies while they are being implemented and providing services:

Principle 1: Interoperability

Interoperability simply means the technology should be able to work with other products and systems. It enables consumers to transact outside of the network created by their own banks or financial service provider. Interoperability can increase the financial viability of services by reducing costs and unlocking economies of scale.[79] Further, it also increases competition in the market and creates a network effect which will benefit businesses as well as consumers.[80] Interoperability goes beyond entities and enables all stakeholders to interact with each other. It basically integrates different ecosystems including the data ecosystem, financial ecosystem and regulatory ecosystem. All the technologies mentioned in chapter 5 relies on interoperability at the core of its operation.

One of the biggest examples of interoperability could be seen from the steps taken by the National Highway Authority of India ('NHAI'). NHAI has proposed to move from a system of closed loop FastTag, towards a system of Global Navigation Satellite System ('GNSS') to

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[78] Global Partnership for Financial Inclusion. (2016). *G20 High-Level Principles for Digital Financial Inclusion*. G20. Retrieved on November 12, 2023, from http://www.g20.utoronto.ca/2016/high-level-principles-for-digital-financial-inclusion.pdf

[79] Lammerkate, T. & Lauerolga T. (2016, July 27). *Championing interoperability for financial inclusion: carrot or stick?.* World Bank Blogs. Retrieved on November 22, 2023, from https://blogs.worldbank.org/psd/championing-interoperability-financial-inclusion-carrot-or-stick.

[80] Dargahwala, T. & Riedl E. (March, 2021). *How interoperability can solve and scale financial inclusion*. Master Card. Retrived on November 22, 2023, from https://www.mastercard.com/news/media/vrhj0cxo/how-interoperability-can-solve-and-scale-financial-inclusion.pdf

collect toll taxes.[81] This system will accept all form factors of payments and will reduce the congestion at the toll booths ensuring smooth travelling. Similarly, every technology that is introduced henceforth should be platform agnostic and interoperable which would help in reaching a wider audience.

Principle 2: Inclusiveness

An inclusive financial ecosystem means *"embedding inclusion in the design of all policies, regulations, supervisory practices, products, services, security procedures, technologies and infrastructure."*[82] In order to create an inclusive ecosystem, participants need to create products and services that aim to remove barriers of access and level of ability required to use that particular product and services. The principle of inclusiveness should be ingrained in the emerging technologies so that it can reach maximum people and people's inability does not act as a barrier. For example - the account aggregator framework is expected to have a huge impact on the loans for Micro, Small and Medium Enterprises ('MSMEs'). Although MSMEs are being provided by collateral free loan-CGTMSE, the reach of such initiatives remains limited. With an account aggregator framework, a bank can assess the business based on the cash flows, past Goods and Services Tax ('GST') records and other informational collateral. The true purpose of inclusiveness and digital financial inclusion would be achieved if technology bridges the divide between the served and underserved, utilising innovative metrics to enable inclusion.

Principle 3: Scalability

The technological system should be easily scalable and be able to reach every corner of the country. Reliance on digital payments and other technologies is now unprecedented as it is easy to use, materially quickens the process and integrates in an interoperable fashion across technologies. Therefore, any new technology should be made keeping in mind that it can be easily scalable. For example - QR code is successful because it scaled quickly with minimal cost and people at mass were using it with minimum failure rate. Similarly, other technology such as the NCMC or Central Bank Digital Currency ('CBDC') should also be designed in such a way that it can be scaled easily to parts of the country with minimal cost.

Principle 4: Enabling Regulatory Environment

An emerging technology should be supported by an enabling regulatory environment. New regulations being devised to regulate emerging technology should come through a participatory process where all relevant stakeholders are engaged actively. Digital public infrastructure should be open to every industry player to use and provide their services. Furthermore, efforts should be towards inculcating greater certainty and transparency into the functioning of the

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[81] Ministry of Road Transport & Highways (2022 August 25) *NHAI Organises Workshop on Global Navigation Satellite System Based Tolling*. PIB. Retrieved on May 5, 2023 from https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1854426

[82] World Economic Forum. (August, 2021). *Shared Principles for an Inclusive Financial System.* WEF. Retrived on November 12, 2023, from https://www3.weforum.org/docs/WEF_Shared_Principles_for_an_Inclusive_Financial_System_2021.pdf

regulator to incentivise the growth of innovative business models. An enabling regulatory environment should further be encouraged by creating harmonisation across different regulators.

Principle 5: Usability

The User interface of the new technologies should be designed in such a way that it crosses linguistic and disability barriers. Since digital financial inclusion involves the deployment of cost-saving digital means to reach currently financially excluded and underserved populations with a range of formal financial services, the process towards utilising such technology must be simple and comprehensible as per the needs and convenience of the population the concept intends to benefit. Inclusion of vernacular languages, easy access to human representatives and a simplified design language in the application or website, instil confidence in a first time consumer to learn and use the presented technology more often. For example - voice recognition has played a key role in bringing those people into using technology who are specially abled. Therefore, usage of such technologies should be easy and accessible.

Principle 6: Accountability

Building digital financial systems that are accountable and transparent is integral to building trust in the financial system. There is a need to avoid any concentration risk and resultant single point of failure. Accountability to both the regulatory process and consumers need to be ensured. One way to ensure accountability systems would be to conduct regular audits encompassing not only the financial resources and management of the company but also the algorithm and other technical tools being deployed by the organisation. The RBI's Guidelines on Digital Lending, for instance, require regulated entities to collect data with distinct audit trails. The accountability factor becomes more pertinent in regards to the digital public goods including the ONDC and CDBC considering the vast impact these systems can pose.

Principle 7: Last mile Delivery

Last mile delivery has always been one of the key barriers for any new technology or government initiatives. It has acted as a roadblock for the rural areas for a long time. For example - people from rural areas are not able to access the direct benefits transfers by the government as these benefits are transferred to their bank accounts that can only be accessed from ATMs or bank branches that are currently sparsely located across rural and remote India. A lack of ready access to ATMs or other cash-out points, materially degrades the ability of a beneficiary to access the benefits they are entitled to, undermining the objective of the scheme. Several government initiatives such as wages from Mahatma Gandhi National Rural Employment Guarantee Act ('MGNREGA'), maternity entitlements, student scholarships come under the ambit of direct benefit transfers which in rural areas remain inaccessible. Financial services technology has an opportunity here to tap in the market and enable last mile delivery to the consumers. Every technology company has to consider before rolling out their services as to how it will ensure that benefits reach the end customers.

Principle 8: Affordability

A major segment of the population that is sought to be brought within the circle of financial and digital inclusion often lacks adequate financial resources to afford the technology itself. Several government policies and corporate social responsibility ('CSR') initiatives have been introduced that aim to reduce the costs of adopting these technologies. Approaching this novel challenge of reducing obstacles between the service and adoption formulate a pivotal principle that service providers must solve for. Regulations must also provide room for the industry to provide affordable solutions as was done in the case of UPI where the regulator and banks incurred losses initially to boost adoption of the digital payment technology amongst the masses. Therefore, technologies built towards increasing inclusion should foremost be affordable.

Principle 9: Consumer Centricity and Trust based Approach

Every consumer oriented product company should keep consumers at the core of their technological innovation. A consumer oriented product and service will help in scaling the business as well as gain trust of the ecosystem. There is a need for deep understanding of consumer needs, behaviours and preferences.[83] Further, It is also imperative to build trust in the digital finance ecosystem. A major segment of the population lacks financial literacy and is wary of adopting new technologies. Therefore, to boost the adoption and effectiveness of any new technology aimed towards increasing financial inclusion, trust should be implicitly built into the design. One way to build trust would be to have an adequate grievance redressal system in place, instilling faith in the consumers and reducing the scepticism with which they approach new technologies with redressal mechanisms being readily available at their disposal.

Principle 10: Participatory Process

One of the core principles for an efficient and effective regulation is a participatory and consultative process. Any proposed regulation should first be put out for public consultation in order to get different perspectives and make a regulation which caters to all the stakeholders. At present, regulatory processes are not adequately consultative or transparent, which has caused friction with industry players and impacted consumer trust in the system. For instance, the Telecom Regulatory Authority of India ('TRAI') model of stakeholder consultation can be adopted by the other regulators. A consultative and participatory process as a core principle would help in devising a more robust regulation which helps innovation and growth.

At the minimum, these ten principles should be kept at the heart of policy and decision making and also while building digital infrastructure which seeks to enhance financial inclusion. The next phase of digitisation and digital financial infrastructure should be built on these principles. Towards this, in the next chapter, we have identified certain emerging use cases in the space of

[83] Kilara, T. & Rhyne E. (2014, June). *Customer-Centricity for Financial Inclusion* . CGAP. Retrieved on November 9, 2023, from https://www.findevgateway.org/sites/default/files/publications/files/customer-centricity_for_financial_inclusion.pdf

digital financial infrastructure and juxtapose them with these principles in order to understand where we are in building the next phase of digital financial infrastructure.

5. Emerging Use Cases – Moving Towards the Next Phase of Digital Financial Inclusion

The next phase of digital financial inclusion will be driven by certain use cases which includes digital public infrastructure and other emerging technologies. These use cases will have the onus to fill the gaps identified in the previous chapters and operate alongside the government schemes to foster an enabling ecosystem and take the initiatives of digital inclusion to the next phase. However, these use cases will only be able to fulfil the objectives of digital inclusion if the above identified principles are kept at the core of the development process. Towards this, the report identifies certain use cases which might play a crucial role for the next phase of digital inclusion and their interaction with the above identified principles.

5.1. QR Codes

The origin of QR codes can be traced back to 1994 when Japan first started using QR codes in their automobile industry.[84] The use of QR codes stayed majorly restricted to tracking and shipping of products until recently when the pandemic forced societies across the globe to adopt contactless alternatives to traditional processes resulting in the ubiquitousness of QR codes. From accessing academic textbooks to increasing brand outreach, QR codes are being utilised for multifarious purposes, streamlining and facilitating even mundane parts of our everyday lives.[85]

One of the major sectors that have seen the adoption of QR codes on a massive scale is the payments industry. A QR code enables the user to make payments with a simple scan without undergoing the hassles of a cash-related transaction. For instance, payments through QR codes allow users to transfer the exact amount thus avoiding the hassle of coming up with changes, thus, consequently resulting in shorter queues at stores. Whereas on the merchant's side, a payment QR code entails lower costs as compared to traditional payment methods like credit cards which may have higher associated fees. A QR code designed for the purpose of mobile payment services can be of two types: static QR codes, which cannot change and require the consumer to enter the payment amount after scanning, and dynamic QR codes, which are digitally created and can include additional pre-stored data fields such as the payment amount.[86] In dynamic QR code, a unique payment code is generated for each transaction thus making it harder for fraudsters to intercept transactions and leading to increased security. Furthermore,

[84] Aktaş, C. (2017). *The Evolution and Emergence of QR Codes*. Cambridge Scholars Publishing. Retrieved on November 12, 2023, from https://www.cambridgescholars.com/resources/pdfs/978-1-4438-5065-0-sample.pdf

[85] Baker, P. & Lo. (2019, September). *Digital Technology for Inclusion: The India Story.* Asia Business Council. Retrieved on November 12, 2023, from https://asiabusinesscouncil.org/wp-content/uploads/2020/07/DigitalTechnology.pdf

[86] Reserve Bank of India. (2020, July 10). *Report of the Committee on the Analysis of QR (Quick Response) Code.* RBI. Retrieved on November 12, 2023, from https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/ANALYSISQRCODED11971A9B9874EAFA1A61478F461E238.PDF.

dynamic QR codes are easy to use and can be customised to display relevant information such as transaction details, loyalty rewards, and promotional offers. This can improve the overall customer experience and increase customer loyalty. In addition to providing a seamless payment experience, dynamic QR codes also provide valuable insights into customer behaviour and payment trends, allowing businesses to optimise their payment processes and improve ROI.[87]

Bharat QR and UPI QR are two widely-used QR codes in India that have become integral to people's daily lives. Driven by demonetization in 2016, both systems have achieved a considerable foot in overcoming traditional barriers associated with achieving digital and financial inclusion. UPI processes over 18 billion transactions every month in India, and serves 491 million individuals and 65 million merchants in total.[88] Further, Until March 2025, there were a total of 6.7 million Bharat QR users in India.[89] Their unique interoperability feature further allows customers to make QR code transactions through any payment app thus making them one-of-a-kind payment systems across the globe. In 2020, the interoperable QR codes got a significant boost when the RBI in a notable step directed Payment System Operators using proprietary QR codes to shift to the existing interoperable QR codes i.e. BharatQR and UPI QR. Interoperable codes have not only resulted in increased convenience for consumers but have also led to reduced infrastructural costs. Instead of installing several QR code terminals, merchants can now receive payments through a single QR code system.

The payment sector's adoption of QR codes has been further encouraged by support from the government and the RBI through regulatory and policy measures. Earlier, the RBI in light of the G20 summit announced the extension of the UPI facility for international delegates and tourists from any of the G20 countries,[90] and had allowed credit card holders to link their credit cards to the UPI.[91]

However, despite the progress made, there are still some obstacles to overcome to achieve the highest level of financial inclusion through QR codes. Some of these challenges include:

- **Lack of Trust:** The lack of trust when making payments using QR codes is a major obstacle for people who are considering transitioning to digital payments. Statistically, the number of frauds in UPI transactions has risen steadily over the past few years,

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[87] Chatterjee, B. (2022, August 19). *How dynamic QR codes are driving digital payments across businesses*. Times of India Blog. Retrieved on November 12, 2023, from https://timesofindia.indiatimes.com/blogs/voices/how-dynamic-qr-codes-are-driving-digital-payments-across-businesses/?frmapp=yes

[88] PIB. *India's UPI Revolution Over 18 billion Transactions Every Month, A Global Leader in Fast Payments,* Press Release, Retrieved on July 22, 2025 from https://static.pib.gov.in/WriteReadData/specificdocs/documents/2025/jul/doc2025720589601.pdf

[89] CEIC Data, *India Number of Bharat QR,* Retrieved on July 22, 2025 from https://www.ceicdata.com/en/india/payment-system-infrastructures/number-of-bharat-qr

[90] RBI. (2023, February 10). *Index to RBI Circulars*. Reserve Bank of India. Retrieved on November 18, 2023, from https://rbi.org.in/Scripts/BS_CircularIndexDisplay.aspx?Id=12452

[91] RBI. (2022, June 8). *Statement on Developmental and Regulatory Policies.* Reserve Bank of India. Retrieved on November 23, 2023, from https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=53831

reaching over 13.42 lakh fraud cases in FY24 amounting ₹1,087 crore. RBI's annual report of FY 24-25 notes that digital frauds made up 56.5% of all banking fraud cases, amounting to ₹520 crores.[92] Further, limited guidance on preventing frauds and innovative methods on the part of fraudsters makes it particularly challenging to build trust in the digital payment system.[93]

To combat these threats and UPI frauds,[94] several initiatives have been undertaken. For instance, the Ministry of Home Affairs (MHA) has set up the Indian Cyber Crime Coordination Centre (I4C) to help law enforcement tackle cybercrime in a structured and coordinated way. In December 2024, the RBI introduced MuleHunter.AI, an AI-based tool to detect and track money mule accounts. Moreover, security features such as device binding, two-factor authentication (PIN based), and daily transaction limits have been introduced. However, despite these initiatives, the number of fraud cases continue to spike in the country.

- **Insufficient Capacity:** On the supply side, the insufficient number of QR systems and limited infrastructural capacity have made it difficult for systems like UPI to smoothly process the bulk volume of transactions. According to the latest data, UPI processes over 18 billion transactions monthly. This leads to frequent downtimes and outages resulting in inconvenience for both consumers and merchants.[95] Additionally, the government's order for Payment System Providers ('PSPs') to provide UPI services free of cost leaves PSPs with little incentive to innovate and a huge financial dent in their pockets.[96]

Furthermore, the key to achieving seamless and convenient digital inclusion lies in creating innovative solutions that maximise the utilisation of existing payment systems like QR codes rather than developing new systems. For instance, developing a system that generates a QR code for commuters to enter their destination and use for transit system access could be an

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[92] Fortune India (2025, June 26). *UPI fraud has hit 1 in 5 Indian families; majority don't report it, survey finds.* Retrieved on July 22, 2025 from https://www.fortuneindia.com/personal-finance/upi-fraud-has-hit-1-in-5-indian-families-majority-dont-report-it-survey-finds/124409

[93] ETOnline. (2022, November 10). *Online fraud: Do you often use QR codes to pay? Check these tips to avoid getting duped.* The Economic Times. Retreived on November 27, 2023, from https://economictimes.indiatimes.com/wealth/save/online-fraud-do-you-often-use-qr-codes-to-pay-check-these-tips-to-avoid-getting-duped/how-do-scammers-use-the-qr-code-to-dupe-people/slideshow/95425539.cms

[94] Ministry of Finance Press Release (2025, March 18). *Various measures have been taken by the government to strengthen cyber security in the financial sector.* Ministry of Finance. Retrieved on July 22, 2025 from https://www.pib.gov.in/PressReleasePage.aspx?PRID=2112323

[95] Mukul, P. (2022, March 29). *Glitches may spoil UPI's 5-bn monthly payments milestone.* The Indian Express. Retrieved on November 16, 2023 from https://indianexpress.com/article/business/glitches-may-spoil-upis-5-bn-monthly-payments-milestone-7841738/.

[96] Economic Times. (2022, September 7). *UPI transactions are rising, but who will foot the bill?* ETBFSI.com. Retrieved on November 27, 2023, from https://bfsi.economictimes.indiatimes.com/news/fintech/upi-transactions-are-rising-but-who-will-foot-the-bill/94032077.

option.[97] Another innovative solution could be generating a QR code on printed bills thus allowing citizens to pay directly.[98]

Interaction with Principles expounded above

	Bharat QR
Interoperability	• Bharat QR is inherently interoperable as it allows consumers to use one QR code to make payments via various other payment applications.[99] • It is integrated with major banks as well,making the adoption of Bharat QR interoperable and seamless.[100]
Inclusiveness	• The ease of use and the simplicity with which Bharat QR can be integrated across financial services, allows for the technology to boost adoption in previously unserved and underserved areas. • Until March 2025, Bharat QR had about 6.7 million registered users. • As Bharat QR is a Person to Merchant ('P2M') based payment system, efforts have been made to educate the merchants about the existence and use of this payment system. • Earlier, BharatQR has partnered with Visa and BillDesk to include over 300 million users in the digital payment ecosystem, broadening the reach of merchants and service providers accepting QR code payments.[101]
Scalability	• The RBI data suggests that there are 3.2 million Bharat QR deployed by banks.

[97] Mastercard. (2021, May). *Connected Commerce: Creating a roadmap for a digitally inclusive Bharat.* Mastercard & Niti Aayog. Retrieved on November 27, 2023, from https://www.mastercard.com/content/dam/public/mastercardcom/pcde/us/en/files/Connected%20Commerce%20Report.pdf

[98] RBI. (2019, May). *Report of the High-Level Committee on Deepening of Digital Payments.* Reserve Bank of India. Retrieved on November 17, 2023, from https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/CDDP03062019634B0EEF3F7144C3B65360B280E420AC.PDF

[99] VisaInc. (2017, February 20). *BharatQR - world's first interoperable QR code acceptance solution launches in India.* Visa. Retrieved on November 27, 2023, from: https://www.visa.co.in/about-visa/newsroom/press-releases/bharatqr-worlds-first-interoperable-qr-code-acceptance-solution-launches-in-india.html.

[100] Vikaspedia. (2023). *Bharat QR Code: Features, benefits and all you need to know.* Vikaspedia. Retrieved on November 7, 2023, from https://vikaspedia.in/e-governance/digital-payment/cards-for-digital-payments/bharat-qr

[101] BNN. (2024, February 16). *BharatQR's Milestone: Visa and BillDesk Join Forces to Expand Digital Payments in India*. BNN. Retrieved on March 5, 2024 from https://bnnbreaking.com/tech/bharatqrs-milestone-visa-and-billdesk-join-forces-to-expand-digital-payments-in-india

	• Its interoperable nature and simplistic design allow for it to be integrated across financial services making it truly scalable.
Enabling Regulatory Environment	• Since the NPCI owns and operates the Bharat QR, it also issues rules and guidelines with which it has to be compliant.[102] • Bharat QR also has to comply with the RBI issued guidelines as well.[103]
Usability	• Bharat QR has been seamlessly integrated into the country's digital economy via various applications. For instance, the Bharat QR in Paytm can be used along with the soundbox which provides instant audio payment confirmation.[104] • It eliminates the need for a debit/credit card for the consumer while making payments, promoting digital payments and reducing friction in transactions between persons and merchants[105] • It also enables the money payment directly into the bank account.[106]
Accountability	• NPCI along with the RBI issues regular notices detailing QR code related frauds and the measures being taken by them to resolve the same • As Bharat QR comes under a similar level of scrutiny as its technology counterparts (Under the purview of the RBI and NPCI) the accountability is integrated through design. • Accountability mechanisms could be enhanced in the sector with easier methods of redressal mechanisms being explored alongside other avenues
Last mile Delivery	• Bharat QR requires a smartphone and an internet connection. Thus, unlike UPI it cannot be used on feature phones. However,

[102] NPCI. (2023). *UPI BHIM Guidelines.* NPCI. Retrieved on November 7, 2023, from https://www.bhimupi.org.in/files/bhim/BHIM-UPI-Guidelines.pdf

[103] Economic Times. (2020, October 27). *RBI set to change India's payments picture with new QR code rules.* The Economic Times. Retrieved on November 17, 2023, from https://economictimes.indiatimes.com/industry/banking/finance/banking/rbi-set-to-change-indias-payment-picture-with-new-qr-code-rules/to-enhance-ease-of-use/slideshow/78888337.cms

[104] PaytmBusiness. (2023). *Paytm Soundbox*. Paytm. Retrieved on November 17, 2023, from https://business.paytm.com/soundbox

[105] Vikaspedia. (2023). *Bharat QR Code: Features, benefits and all you need to know.* Vikaspedia. Retrieved on November 7, 2023, from https://vikaspedia.in/e-governance/digital-payment/cards-for-digital-payments/bharat-qr

[106] Razorpayblog. (2017, June 29). *What is BharatQR and How Does it Power Digital Transactions?* RazorPay Blog. Retrieved on November 29, 2023, from https://razorpay.com/blog/what-is-bharatqr-code-and-how-does-it-power-digital-transactions/

	owing to the rapid adoption of smartphones across rural and remote India, Bharat QR can be deployed in these regions in the years to come.
Affordability	• Building a QR code is relatively very cheap, therefore it can be accessed by any small business and making it affordable.
Consumer Centricity and Trust-based Approach	• The interface of BharatQR by itself helps build the consumer's trust as it incorporates multiple data elements including consumer helpline, thereby making it possible for it to be widely used.[107] • To further help build consumers' trust, the platform has even developed grievance redressal mechanisms to ensure safer and reliable transactions.[108]
Participatory Process	• The RBI released the 'Report of the Committee for Analysis of QR Code' which provided an analysis of the use of QR codes. Public comments were also sought for this Report to understand the stakeholders' stance.[109]

5.2. Open Network for Digital Commerce

Open Network for Digital Commerce is another flagship project of the central government to push e-retail penetration to its maximum potential by enabling e-commerce through an open protocol based on open source specifications.[110] The aim of this network is to bring sellers small or large into an interoperable system where they can access a wide range of consumers without redistricting to any platform. One of the fundamental nature of ONDC is an interoperable network wherein a buyer or seller need not be on the same platform to do business with each other. Once the seller is on any platform which is ONDC integrated, the seller becomes discoverable on all the platforms and anyone present on the network.

The network aims to unbundle different services under the e-commerce ecosystem by separating the sellers, buyers, platforms and logistics partners. ONDC is conceptualised on the basis of UPI and it seeks to create a similar environment for buyers and sellers. From buyers

[107] Department of Consumer Affairs (2023). *Bharat QR FAQs.* INGRAM. Retrieved on October 29, 2023, from https://consumerhelpline.gov.in/faq-details.php?fid=Bharat%20QR

[108] Kumar, H. (2022, December 8). *Sent Money To A Wrong UPI ID? Here's How You Can Retrieve it.* Outlook. Retrieved on November 17, 2023, from https://www.outlookindia.com/business/sent-money-to-a-wrong-upi-id-here-s-how-you-can-retrieve-it-news-243206

[109] Reserve Bank of India. (2020, July 22). *Report of the Committee on the Analysis of QR (Quick Response) Code.* Retrieved on November 29, 2023, from https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=1142

[110] ONDC. (2023). *Creating an inclusive ecosystem for e-commerce.* Open Network for Digital commerce. Retrieved on November 7, 2023, from https://ondc.org/about-ondc/

perspective, this network would help them to access a wide range of consumers available on different platforms and from consumer perspective, they will be able to browse and purchase using a single platform regardless of sellers platform.

Interaction with Principles expounded above

	Open Network for Digital Commerce (ONDC)
Interoperability	• ONDC allows for all buyers, sellers, logistics partners and consumers to interact with each other having to be registered only once.
Inclusiveness	• ONDC aims to empower small businesses, and encourage local culture by providing fair opportunities for all stakeholders.[111] • It provides an open platform for local artisans and rural businesses to provide their products to different parts of the country enabling an inclusive promotion of MSMEs through e-commerce.
Scalability	• While the pilot phase of the ONDC project was launched in 5 metro cities[112], today it has its footprints in over 616 cities.[113] Within a few years of its launch, ONDC has completed more than 20.4 crore cumulative orders and now consists of 7.6 lakhs sellers and service providers.[114] • Ekart [Flipkart's logistic arm] has now onboarded ONDC network; this integration brings greater access, efficiency and growth opportunities for MSME traders.[115]

[111] Garg, K. (2023, April 26). *ONDC: Empowering India's Digital Marketplace for All.* CA Club. Retrieved on November 7, 2023, from https://caclub.in/ondc-empowering-indias-digital-marketplace-for-all/

[112] Suraksha, P. (2022, July 11). *ONDC set to go live in 4 more cities this week.* The Economic Times. Retrieved on November 21, 2023 from https://economictimes.indiatimes.com/tech/technology/ondc-set-to-go-live-in-4-more-cities-this-week/articleshow/92788614.cms

[113] PIB (2025, January 4). *Revolutionizing Digital Commerce: The ONDC Initiative Digital commerce reimagined for inclusivity and innovation.* Ministry of Commerce and Industry. Retrieved on July 22, 2025 from https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=2090097

[114] The Economic Times. (2025, April 15). *ONDC crosses 20.4 cr transactions in March 2025.* The Economic Times. Retrieved on July 22, 2025 from https://retail.economictimes.indiatimes.com/news/e-commerce/e-tailing/ondc-crosses-20-4-cr-transactions-in-march-2025/120308007

[115] The Economic Times (2025, June 03). *Ekart goes live on ONDC Network for ecommerce logistics.* The Economic Times. Retrieved on July 22, 2025 from https://economictimes.indiatimes.com/news/company/corporate-trends/shloka-ambani-on-the-masoom-minawala-show-empowering-structured-and-scalable-volunteering-opportunities-with-connectfor/articleshow/122786297.cms

Enabling Regulatory Environment	• There is need for more clarity as to how and what laws shall govern the functioning of ONDC. The Ministry seems to have suggested that ONDC shall have a self-governing regime.[116] The ONDC Network Policy is further being developed that also details the obligations of sellers around protection of personal information and grievance redressal.[117]
Usability	• Different platforms are adopting several measures to increase usability. ONDC Guide App for sellers and buyers have made the platform accessible in more than 10 languages other than Hindi and English.[118] • The platform is actively considering partnerships for text-to-audio, translators and visual-focussed solutions.[119]
Accountability	• Since ONDC does not have a regulatory framework in place, the extent and manner in which it can be held accountable is not very clear.[120] • ONDC has launched its Online Dispute Resolution (ODR) integrated into their Issue & Grievance Management framework.[121]
Last mile Delivery	• ONDC is committed to making sure that all rural areas are able to use the application and is not cut off from any part of the country. • ONDC also has reduced commissions for the services available on its platform, reducing the monetary entry barriers present on other private e-commerce platforms. • It has partnered with applications as well as entities like NABARD to be able to cover all rural and urban populations of the country.[122]

[116] Panjiar, T. & Waghre, P. (2023, March 10). *Open Network for Digital Commerce (ONDC): An Explainer.* Internet Freedom Foundation. Retrieved on June 7, 2023 from https://internetfreedom.in/ondc-an-explainer/

[117] ONDC. (2023). *Introduction to ONDC Network Policy.* Open Network for Digital commerce. Retrieved on November 7, 2023, from https://resources.ondc.org/ondc-network-policy

[118] Times of India (2023, November 1). *ONDC launches the 'ONDC Guide App' for sellers, buyers and more.* Times of India. Retrieved on July 22, 2025 from https://timesofindia.indiatimes.com/gadgets-news/ondc-launches-the-ondc-guide-app-for-sellers-buyers-and-more/articleshow/104895419.cms?ref=ondc.org

[119] Mundhra, L. (2022, October 8). *ONDC Looks To Enable Regional Languages On Its Network.* Inc 42. Retrieved on November 12, 2023 from https://inc42.com/buzz/ondc-looks-to-enable-regional-languages-on-its-platform/

[120] Panjiar, T. & Waghre, P. (2023, March 10). *Open Network for Digital Commerce (ONDC): An Explainer.* Internet Freedom Foundation. Retrieved on June 7, 2023 from https://internetfreedom.in/ondc-an-explainer/

[121] ONDC Website. Retrieved on July 22, 2025 from https://ondc.org/blog/enabling-fair-commerce-ondcs-issue-grievance-management-igm-goes-live/

[122] Kar, A. (2023, April 15). *Nearly 400 farmer organisations in various stages of integration with ONDC: T Koshy.* The Hindu. Retrieved on November 7, 2023 from https://www.thehindubusinessline.com/info-tech/nearly-400-farmer-organisations-in-various-stages-of-integration-with-ondc-t-koshy/article66737932.ece

Affordability	• One can access it through various platforms including Paytm, Craftvilla, Meesho, PhonePe, Mystore, IDFC First, Spice Money and Namma Yatri etc., without paying any additional fees.[123]
Consumer Centricity and Trust-based Approach	• ONDC has launched an Online Dispute Resolution ('ODR') mechanism to protect consumer rights in case of any issues.[124] ONCD's model ensures that issues are resolved through the apps where they originated: buyer apps for customers, seller apps for merchants. The party best placed to address the issue is tasked with resolution but if that doesn't happen in time or to the complainant's satisfaction, escalation mechanisms come into play. When a grievance can't be resolved informally, it moves into structured ODR: first conciliation, then mediation, and if needed arbitration.
Participatory Process	• A consultation paper was first released and floated to the public to get an understanding of all key issues and problems.[125]

Additionally, cybersecurity measures have been put in place to strengthen the security and protect consumer data. This aligns with the growing significance of cybersecurity in the digital landscape, especially in contexts where sensitive information is processed and transmitted. The ONDC Network Policy mandates that all network participants adhere to robust security standards to protect the end user data processed or transmitted through the ONDC Network.[126] This would complement the compliance with obligations under the DPDP Act. The Policy further specifies "Reasonable Security Practices and Procedures" to be implemented by network participants. This indicates a proactive approach towards cybersecurity, emphasising the need for practical and effective security measures.

The Policy further requires network participants to report cybersecurity incidents within prescribed timeframes. This aligns with global standards where prompt reporting of incidents is vital for mitigating potential risks and ensuring a coordinated response. However, the

[123] Protentech Blogs by Kakoli Laha. *How to Login and Place Order on ONDC: A Step-by-Step Guide.* Retrieved on July 22, 2025 from https://proteantech.in/articles/how-to-login-place-order-ondc/

[124] ONDC. (2022). *Issue and Grievance Management Policy (IGMP).* ONDC. Retrieved November 5, 2023, from https://ondc-static-website-media.s3.ap-south-1.amazonaws.com/ondc-website-media/downloads/governance-and-policies/CHAPTER%2B%5B6%5D%2BIssue%2Band%2BGrievance%2BManagement%2BPolicy.pdf

[125] The Hindu. (2022, October 3). *ONDC seeks public comments on 24 issues to strengthen its network.* The Hindu. Retrieved on November 7, 2023 from https://www.thehindu.com/news/national/ondc-seeks-public-comments-on-24-issues-to-strengthen-its-network/article65963136.ece

[126] ONDC. (2022). *Network Technology Governance, Certification and Audit.* ONDC. Retrieved November 5, 2023, from https://ondc-static-website-media.s3.ap-south-1.amazonaws.com/ondc-website-media/downloads/governance-and-policies/CHAPTER+%5B8%5D+Network+Technology+Governance%2C+Certification+and+Audit.pdf

stipulated 6-hour timeframe for reporting a data breach can be a potential challenge. The brevity of this period may be deemed onerous for participants, as responding to and assessing the extent of a cybersecurity incident within such a short time frame can be challenging. Continuous evaluation and refinement of these measures in response to evolving cybersecurity challenges will be essential to maintaining the integrity and security of the ONDC space.

5.3. National Common Mobility Card (NCMC)

Public Transport plays a key role as an economical and convenient mode of travelling and commuting across all classes of society. While cash is used as the preferred mode of payment, there are several challenges associated with this mode of payment including its handling, unorganised collection, reconciliation of the cash etc. In order to address these issues, several initiatives were taken such as closed loop cards issued by public transport operators which helped digitise the mechanisms for fare collection. However, because of the restrictive application of these cards, it limits the digital adoption by the users.

Towards this, under the vision of *One Nation One Card,* the Ministry of Housing and Urban Affairs came out with the National Common Mobility Card (NCMC) standards and guidelines which envisaged an interoperable card that can be used for transport, as well as other retail and e-commerce services. Essentially, this card apart from allowing regular transactions like Point of Sale, e-commerce & ATM would enable people to pay different transport charges including metro service, toll, bus service, parking charge, shopping etc. NCMC is an offering on top of the India stack and uses the inputs of digital public infrastructure. While it is not part of the infrastructure itself, it is an innovation made by using the elements of India Stack.

The concept was envisaged under National Urban Transport Policy 2006[127] which sought the development of a cashless fare payment mechanism that can work across all public transport systems in the country including metros, buses etc. This vision led to the establishment of the Interoperable Fare Management System ('IFMS').[128] The aim of NCMC is to provide seamless connectivity to the passengers across all transit systems in the country and bring convenience and ease of payments for them.[129] The NCMC card is expected to have a stored value that can be used in the offline mode during the transit and at other retail space. Further, the interoperable system would also lead to huge economies of scale for the public transport operators as duplicity of efforts will be removed and it will bring standardisation across issuance,

[127] MOHUA. (2015, July 25th). *Report of the Committee for Standards and Specifications of National Common Mobility Card.* Ministry of Urban Development. Retrived on November 17, 2023, from https://mohua.gov.in/upload/uploadfiles/files/CommitteeReportofNCMC03.pdf

[128] MOHUA. (2015). *Report of the Committee for Standards and Specifications of National Common Mobility Card.*

[129] Khaneja, V. *National Common Mobility Card - A Single Card for a Gamut of Digital Transactions*. Centre for Development of Advanced Computing. Retrieved on November 7, 2023, from https://www.cdac.in/index.aspx?id=blog_ni_onoc.

acceptance, networking interfaces, clearing, settlement and dispute resolution systems.[130] In furtherance of this, a committee[131] was constituted which was tasked to develop an interoperable system which is vendor and operating system agnostic and to define card and device specifications and standards. This committee had representatives from C-DAC, NIC, NPCI, DMRC, BMRCL, BIS and DFS. The committee recommended developing and publishing NCMC standards and specifications and aligning the system with other government initiatives such as Make in India, PMJDY and aadhar based eKYC. Subsequently PM Narendra Modi launched the One Nation One Card on 4th May 2019.[132] Since then, several states have launched the NCMC cards. For example, Kochi Metro Rail Limited has partnered with Axis Bank to launch 'Kochi1Card'. The card's functionality also extends to offline and online stores across India.[133] Similarly, in Mumbai, Paytm Payments Bank and SBI bank have rolled out the NCMC card which can be used for travel, e-commerce, etc.[134] Earlier, Madhya Pradesh also announced its plans to dedicate Rs. 230 crore to build and implement infrastructure for common mobility cards.[135] To further incentivise the adoption, the RBI has allowed licensed bank and non-bank issuers to issue PPIs for transport networks without a mandatory know your customer (KYC) verification.[136]

Further it will also support multimodal transport options and can store loyalty points and concession passes. The implementation of NCMC aims to provide stakeholders an agnostic digital fare collection where the customers can use these cards issued by any bank for digital fare payments in offline mode and transport operators can use any NCMC compliant Automated fare collection ('AFC') system from any vendor[137]. It will also help the customers to get associated with any bank/payment network as per their choice rather than being restricted

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[130] MOHUA. (2015, July 25th). *Report of the Committee for Standards and Specifications of National Common Mobility Card.* Ministry of Urban Development. Retrived on November 17, 2023, from https://mohua.gov.in/upload/uploadfiles/files/CommitteeReportofNCMC03.pdf

[131] MOHUA. (2015). *Report of the Committee for Standards and Specifications of National Common Mobility Card.*

[132] Press information Bureau. (2019, July 15th). *One Nation One Card*. Ministry of Road Transport & Highways. Retrieved on November 19, 2023, from https://pib.gov.in/PressReleasePage.aspx?PRID=1578744

[133] Axis Bank. (2023). *KMRL Axis bank Kochi1 card - Features & benefits*. Axis bank. Retrieved November 4, 2023, from https://www.axisbank.com/retail/cards/transit-cards-home/transit-cards/kmrl-axis-bank-kochi1-card/features-benefits

[134] NPCI. (2023). RuPay contactless cards. Retrieved on November 7, 2023, from https://www.npci.org.in/what-we-do/rupay-contactless/product-overview

[135] Times of India. (2024, February 8). One nation, one card: Metro corpn proposes ₹230cr plan. Times of India. Retrieved on March 5, 2024, from: https://timesofindia.indiatimes.com/city/bhopal/madhya-pradesh-metro-rail-corporation-proposes-rs-230-crore-plan-for-common-mobility-cards/articleshow/107509003.cms

[136] Deccan Herald. (2024, February 27). Bengaluru likely to see KYC-less national common mobility cards in early March. Deccan Herald. Retrieved on March 5, 2024, from https://www.deccanherald.com/india/karnataka/bengaluru/bengaluru-likely-to-see-kyc-less-national-common-mobility-cards-in-early-march-2910980

[137] Khaneja, V. *National Common Mobility Card - A Single Card for a Gamut of Digital Transactions*. Centre for Development of Advanced Computing. Retrieved on November 7, 2023, from https://www.cdac.in/index.aspx?id=blog_ni_onoc.

to a single bank or payment network. Further, it will also help transport operators in reducing installation and maintenance costs. The acceptance of NCMC cards issued by multiple banks will further help to achieve a higher rate of digital penetration for fare collection.[138] NCMC is going to play a key role in enabling digital inclusion and ease of living by providing a single instrument that will work as an all purpose transit card as well as for retail and e-commerce purchases.

Interaction with Principles expounded above

	National Common Mobility Card (NCMC)
Interoperability	• NCMC allows customers to use a single debit/credit/prepaid card to make payments for travel, shopping, toll duties, and withdraw money as well. • The NCMC is also accepted in multiple states, enabling an interoperable mode to avail transport services across Indian states.
Inclusiveness	• NCMC can be extended to semi-urban areas, however, it is yet to be seen as to how it will be included.[139]
Scalability	• The combination of interoperability, contactless smart card technology, scalable backend infrastructure, and government support enables the NCMC to be extremely scalable relative to the fragmented transportation services access cards that are limited to their home state or to the transportation mode for which they are issued
Enabling Regulatory Environment	• The RBI announced that it has included NCMC auto-replenishment under the e-mandate framework.[140] However, there is need for clarity to ascertain the regulatory guidelines that govern the NCMC framework.
Usability	• Since NCMC by itself is a functionality requirement and not a card, the usability of such a card can be gauged by the usability of cards being issued by the partnered banks. For instance, currently,

[138]Khaneja, V. *National Common Mobility Card - A Single Card for a Gamut of Digital Transactions*. Centre for Development of Advanced Computing. Retrieved on November 7, 2023, from https://www.cdac.in/index.aspx?id=blog_ni_onoc.

[139] Lele S. & Saigal R. *NCMC: Another step towards a less-cash India*. PwC. Retrieved on November 17, 2023, from https://www.pwc.in/industries/financial-services/fintech/fintech-insights/ncmc.html

[140] Medianama (2024, August 26). *RBI Expands e-Mandate Framework to Include FASTag, NCMC.* Retrieved on July 22, 2025 from https://www.medianama.com/2024/08/223-rbi-expands-e-mandate-framework-include-fastag-ncmc/

	Mastercard and Union Bank cards have special features to make them more user-friendly for the visually impaired.[141]
Accountability	• There is minimal information available on how the NCMC system will bring accountability in the system as currently there is no regulatory framework.
Last mile Delivery	• The NCMC system, once established, has the potential to reach the last mile as rural areas may greatly benefit from the access to an interoperable card such as the NCMC. • The NCMC system with its integration with other networks like debit and credit cards has the potential to bring last mile delivery to previously underserved areas.
Affordability	• While the cards may be issued free of cost, there do exist annual charges etc.[142] A model similar to that adopted by Kanpur Metro and Kochi Metro can be looked into to encourage the use of these cards by providing a 10% discount on the rides taken using the card.[143]
Consumer Centricity and Trust-based Approach	• The entire NCMC system has been designed to ensure a seamless experience for consumers by enabling them to access varied services via a single card.
Participatory Process	• A concept document[144] was released by NPCI which gave a brief idea and overview of the technology. However, there is a scope to have a more elaborate process of consultation and involve industry players in the system.

[141] Mastercard. (2021, October 25). *Mastercard Introduces Accessible Card for Blind and Partially Sighted People.* Mastercard Newsroom. Retrieved on Novemvber 7, 2023 from https://www.mastercard.com/news/press/2021/october/mastercard-introduces-accessible-card-for-blind-and-partially-sighted-people/ ***See also:*** Union Bank of India. (2023). *Sparsh Braille Card*. Union Bank of India. Retrieved on November 7, 2023 from: https://www.unionbankofindia.co.in/english/union-sparsh-debit-cards.aspx#:~:text=One%20of%20the%20most%20significant,differentiate%20between%20other%20banks%27%20cards

[142] Karunakar, R. (2022, September 20). *What Top Banks Charge For ATM, Debit Cards: All You Need To Know*. NDTV. Retrieved on Novemvber 7, 2023, from https://www.ndtv.com/business/all-you-need-to-know-about-various-charges-levied-by-banks-3358968

[143] Metrorail Today. (2023, April 4). *GoSmart National Common Mobility Card launched for Kanpur Metro.* Metro Rail Today. Retrieved on November 17, 2023, from https://metrorailtoday.com/news/gosmart-national-common-mobility-card-launched-for-kanpur-metro-commuters

[144] NPCI. (2019). *Concept Document for Implementation of One Nation One Card: Driving Low Value Payments*. National Payments Corporation of India, Retrieved on November 17, 2023, from: https://slbcorissa.com/wp-content/uploads/2019/07/NCMC.pdf

5.4. Central Bank Digital Currency

Countries across the globe have been experimenting with the idea of Central Bank Digital Currency (CBDC). Currently, CBDCs are being explored by 137 countries, collectively representing over 98 percent of the global GDP.[145] In simple words, a CBDC is an equivalent of physical money i.e. cash. The RBI defines CBDC as *"the legal tender issued by a central bank in a digital form. It is the same as a fiat currency and is exchangeable one-to-one with the fiat currency. Only its form is different".*[146] The CBDC, built on blockchain technology, is being pushed by the central bank as a more convenient, trustable and secure option for executing transactions.

CBDCs distinguish themselves from cryptocurrencies like stablecoins and have emerged as a preferred digital currency option. While CBDCs share similarities with stablecoins, particularly in their goal of maintaining stable value, they also exhibit fundamental differences. Stablecoins are a distinct class of private, stabilised cryptocurrencies designed to be pegged to another currency, commodity, or financial instrument. The primary objective of stablecoins is to ensure a relatively stable value over time, offering a digital alternative to traditional volatile cryptocurrencies. In contrast to the decentralised nature of cryptocurrencies, CBDCs are issued and operated by central banks. This distinction is pivotal, as it introduces a level of governmental authority and oversight. The involvement of central banks in CBDC issuance establishes a framework for regulation, enhancing trust and reliability compared to the more autonomous nature of stablecoins.

Moreover, CBDCs carry significant potential as assets for the global trading landscape. The state-backed and regulated nature of CBDCs aligns them closely with traditional fiat currencies, making them a more stable and predictable unit of value. This stability is particularly valuable in international trade, where participants seek reliable and secure means of conducting transactions. CBDCs, being state-issued, possess legal tender status, further solidifying their acceptance and recognition in the global marketplace.

Amongst other benefits, a CBDC enables a) the reduction in infrastructural costs by eliminating the need for printing and maintaining cash for the central bank; b) increased convenience for consumers by reducing the effort of carrying cash everywhere and; c) speedier and efficient settlements by doing away with the need for interbank settlements.

A CBDC can be designed and implemented in different ways depending on each country's central purpose for introducing CBDCs.[147] For instance, some countries deploy CDBCs

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[145] Mckinsey. (2023, March 1). *What is Central Bank digital currency (CBDC)?* McKinsey & Company. Retrieved November 15, 2023, from https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-central-bank-digital-currency-cbdc

[146] RBI. (2021, July 21). *Central Bank Digital Currency – Is This the Future of Money*. Reserve Bank of India. Retrieved on November 29, 2023, from https://www.rbi.org.in/Scripts/BS_SpeechesView.aspx?Id=1111.

[147] D, P., & Kar, S. (2022, May 20). *Assessing the viability of an Indian Central Bank Digital Currency (CBDC).* Indian Public Policy Review, 3 (3 May-Jun), 43–58. Retrieved on November 29, 2023, from https://doi.org/10.55763/ippr.2022.03.03.003

specifically for the retail segment whereas other countries like India are using CBDCs for both retail and wholesale segments. Another ground of distinction can be the role of the central bank in the issuance and management of digital currency. In a *direct CBDC* or also known as *single-tier model,* the central bank itself manages *"all aspects of the CBDC system including issuance, account-keeping, transaction verification et. al."*[148] thus resulting in a direct claim on the central bank. Whereas, in an *intermediate model,* instead of the central bank, third parties like banks and private entities are responsible for distributing CBDC to consumers. A CBDC can further be either token-based i.e. exchange of CBDC occurs between holders or account-based CBDC where a record of transactions is maintained.

In October 2022, the Indian banking ombudsman, the RBI released a concept note on CBDC discussing the different models of CBDC and the model best suited to Indian realities.[149] The paper proposed an account-based model for CDBC in the wholesale segment and a token-based intermediate CBDC for the retail segment. Since then, India has launched pilot projects for both retail and wholesale CBDCs. The pilot for wholesale CBDC i.e. e₹-W was launched in November 2022 for secondary market transactions in government securities.[150] In December 2022, retail e-rupee i.e. e₹-R was launched in selected cities with selected banks being permitted to distribute tokens.[151] Retail firms like Reliance Retail have already started collaborating with permitted banks to ensure smooth consumer transactions at stores through e₹-R. Buyers would be able to execute purchases through digital rupee with the help of dynamic QR codes.[152]

The RBI is further actively promoting the integration of the e-rupee/CBDC with the UPI.[153] Previously, users of the e-rupee had to contend with separate QR codes for UPI and CBDC transactions, necessitating merchants to display two QR codes—one for each payment method. The new interoperability initiative seeks to eliminate this inconvenience by linking the UPI QR code technology infrastructure with CBDC. Under this interoperable system, users can now seamlessly scan any UPI QR code to initiate payments. This innovative approach simplifies the transaction process and also reduces supply side costs, as merchants are no longer required

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[148] RBI. (2022, October 7). *Concept Note on Central Bank Digital Currency.* Reserve Bank of India. Retrieved on November 27, 2023, from https://rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=1218

[149] RBI. (2022, October 7). *Concept Note on Central Bank Digital Currency.* Reserve Bank of India. Retrieved on November 27, 2023, from https://rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=1218

[150] RBI. (2022, November 18). *State of the Economy.* Reserve Bank of India. Retrieved on November 29, 2023, from https://rbi.org.in/scripts/BS_ViewBulletin.aspx?Id=21400

[151] Press Information Bureau. (2022, December 12). *Central Bank Digital Currency (CBDC) pilot launched by RBI in retail segment has components based on blockchain technology*. Ministry of Finance. Retrieved on November 7, 2023 from https://pib.gov.in/Pressreleaseshare.aspx?PRID=1882883

[152] Singh, M. (2023, February 2). *India's retail giant Reliance to accept CBDC at stores*. TechCrunch. Retrieved on November 7, 2023 from https://techcrunch.com/2023/02/02/india-retail-reliance-cbdc-digital-rupee-stores/.

[153] Ojha, S. (2023, September 5). *SBI, six other bank customers can scan UPI QR code and pay via digital rupee*. Live Mint. Retrieved on November 4, 2023, from https://www.livemint.com/money/personal-finance/digital-rupee-gets-big-boost-sbi-six-other-bank-customers-can-scan-upi-qr-code-and-pay-via-digital-rupee-here-is-how-11693896792208.html

to replace their existing QR codes. Instead, they can display a single QR code that accommodates both UPI and CBDC payments.

This strategic move is designed to enhance the convenience of digital currency usage for individuals and businesses alike. Key players in the banking sector, such as State Bank of India, Bank of Baroda, Kotak Mahindra Bank, Yes Bank, Axis Bank, HDFC Bank, and IDFC First Bank, have implemented UPI interoperability on their CBDC applications. By leveraging the established distribution systems of leading Indian banks, this is expected to boost the adoption of the RBI's CBDC. The collaborative effort towards interoperability would create a more user-friendly and widely accepted digital currency ecosystem, ultimately fostering the seamless integration of CBDC into everyday financial transactions. The offline feature of e₹ further enables the user to transact in locations with limited or no internet connectivity.[154] It is expected to mirror the advantages of physical cash, making it a reliable solution for usage in remote areas.[155]

The implementation of offline CBDC is a huge milestone in the path to digital inclusion, bringing even unbanked people based in areas where internet connectivity has still not found its way under the sphere of digital payments. In addition to the offline functionality, a 'programmable' CBDC is being explored that would allow the linking of the money to a specific purpose. For instance, bank credit lent for the purpose of purchasing agricultural inputs could be only used for this purpose thus ensuring trustability in the usage of funds and avoiding diversions for unintended purposes. Currently, the programmability use cases are being explored across Direct Benefits Transfer (DBT) schemes, interest subvention scheme, lending, employee allowances for defined purposes, etc.[156]

However, certain challenges exist in the effective implementation of these ideas. For instance, ensuring the offline functionality of CBDCs would also bring up several challenges, including security risks. Since the money is stored in a physical device rather than a digital cloud, the risk of exposure of CBDC to potential fraud and malicious breaches increases significantly. A fraudster can easily duplicate devices and misuse the stored tokens. Additionally, adoption of CBDC has been sluggish, falling short of initial projections that anticipated daily transactions to surpass a million by the end of 2023. When India launched its CBDC pilot program in December 2022, it aimed for one million daily transactions by the end of 2023. This goal was achieved with various government-owned and private sector banks depositing employees' salaries and benefits into their CBDC wallets. As of March 2025, the e-Rupee in circulation grew to ₹10,16 crores and the pilot has been expanded to 15 banks and 60 lakh users.[157] To

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[154] RBI Digital Rupee e-₹ FAQs. Retrieved on July 22, 2025 from https://www.rbi.org.in/commonman/English/scripts/FAQs.aspx?Id=3686

[155] *Ibid*

[156] *Ibid*

[157] The Hindu (2025, May 29), *e-Rupee in circulation grows to ₹1,016 crore; RBI explores cross-border CBDC pilot.* The Hindu. Retrieved on July 22, 2025 from https://www.thehindu.com/business/e-rupee-in-circulation-grows-to-1016-crore-rbi-explores-cross-border-cbdc-pilots/article69632789.ece

address the sluggish adoption, the RBI is implementing various initiatives. One such measure involves creating a sandbox that enables startups to experiment with different use cases for CBDC.

Interaction with Principles expounded above

	Central Bank Digital Currency (CBDC)
Interoperability	• CBDC along with UPI and digital wallets have the ability to work together smoothly and potentially encourage citizens and merchants to embrace it.[158] Towards this, the CBDC is partnering with banks.[159]
Inclusiveness	• Pilot study for this project saw participation of 100,000 customers,[160] however, its true potential in terms of inclusiveness can only be assessed with time.
Scalability	• CBDC systems operate on blockchain technology and eliminates the cost relating to physical currency. As a result, CBDC transactions incur remarkably low costs. • Given its quick and convenient features, CBDC has the potential to be scaled.[161]
Enabling Regulatory Environment	• Currently, the RBI is overseeing the regulatory mechanism for the CBDC.
Usability	• In terms of use, it will be similar to UPI and will be convenient and easy.
Accountability	• As the issuer and regulator of the CBDC, the RBI would have direct oversight and control over its functioning. • CBDC transactions are further recorded on a distributed ledger technology ('DLT') platform, which provides transparency and

[158] RBI. (2022, October 7). *Concept Note on Central Bank Digital Currency.* Reserve Bank of India. Retrieved on November 27, 2023, from https://rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=1218

[159] Singh, A. (2023, February 8). *Unpacking India's CBDC Pilots as Country Prepares for Digital Rupee.* Coin Desk. Retrieved on November 7, 2023 from https://www.coindesk.com/policy/2023/02/08/unpacking-indias-cbdc-pilots-as-country-prepares-for-digital-rupee/

[160] Singh, A. (2023, April 6). *India targeting one million CBDC users in three months, prioritizing offline transfers: Sources*. CoinDesk. Retrieved on November 8, 2023, from https://www.coindesk.com/policy/2023/04/06/india-targeting-one-million-cbdc-users-in-three-months-prioritizing-offline-transfers-sources/

[161] Karra, M. (2023, March 4). *India's E-rupEE is here: What to expect from the retail CBDC pilot*. The Economic Times. Retrieved on November 24, 2023, from https://economictimes.indiatimes.com/small-biz/money/indias-e-rupee-is-here-what-to-expect-from-the-retail-cbdc-pilot/articleshow/98404352.cms

	immutability. Usage of these systems may enable a greater degree of security relative to other modes of payment as all transactions can be traced.
Last mile Delivery	• CBDC can be extended to rural areas but there is a need to enhance connectivity and literacy in these areas for it to be successful.[162] Further, there will also be a need to create awareness among the rural population.
Affordability	• Users shall need an internet connection, a smartphone and an account with the participating bank to use CBDC at this stage.[163]
Consumer Centricity and Trust-based Approach	• Given its nascent stage, it is difficult to assess the consumer centric approach of CBDC, however, with banks involved, it might well have similar trust as enjoyed by banks.
Participatory Process	• In order to make the consumers aware of CBDC, its allied risks and benefits, the RBI had released a concept note.[164] However, there is a need for a more elaborate consultative process with key stakeholders.

5.5. Bharat Bill Payment System/ Bharat Connect

Bharat Bill Payment System ('BBPS'), launched in 2016 by the National Payments Corporation of India, is a centralised electronic payment system that facilitates bill payments for various services in India by bringing different participants onto the same platform.[165] Through BBPS, a user can make payments for a range of services from anywhere at any time through any payment instrument i.e. plastic money, internet banking, cash, etc. High accessibility and interoperable nature make BBPS a convenient choice for both businesses and customers.[166] BBPS rebranded itself to Bharat Connect in 2024, focusing on expansion to

[162] Castelino, A. (2023, January 16). *Union Budget 2023: 5 ways to make digital rupee or CBDC a success.* The Times of India. Retrieved on November 17, 2023 from https://timesofindia.indiatimes.com/business/budget/union-budget-2023-5-ways-to-make-digital-rupee-or-cbdc-a-success/articleshow/96948280.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst

[163] Press Information Bureau. (2022 December 12). *Central Bank Digital Currency (CBDC) pilot launched by RBI in retail segment has components based on blockchain technology.* Ministry of Finance. Retrieved on November 7, 2023 from https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1882883

[164] RBI. (2022, October 7). *Concept Note on Central Bank Digital Currency.* Reserve Bank of India. Retrieved on November 27, 2023, from https://rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=1218

[165] NPCI. (2023). *Bharat BillPay - One-stop Destination for All Bill Payments | NPCI*. Retrieved on November 12, 2023, from https://www.npci.org.in/who-we-are/group-companies/npci-bharat-billpay-ltd/bharat-billpay-overview

[166] NPCI. (2020, January 15). *Digital payment of recurring bills through Bharat Bill Payment System*. Ministry of Electronics and Information Technology. Retrieved on November 12, 2023, from https://www.meity.gov.in/writereaddata/files/DigitalPayment_Bharat_Bill.pdf.

payments for utilities, telecom, DTH, municipal taxes, subscriptions, education fees, and more, through multiple channels like UPI, internet banking, and physical outlets.[167]

The BBPS process involves multiple participants, including the biller, BBPOU, agent, and NPCI. Each participant has a specific role to play in ensuring the smooth functioning of the BBPS platform and providing a seamless bill payment experience to customers.[168] The biller is the entity that issues the bill and collects payments from customers. In the BBPS process, the biller registers with the BBPS and provides the necessary details, including the due dates and amount due. The biller also receives the payment from the customer via the BBPS platform. The BBPOU (Bharat Bill Payment Operating Unit) is the entity that operates the BBPS. It provides the necessary technology infrastructure and services to facilitate bill payments. As of January 2024, 46 banks are permitted to operate as BBPOU.[169] However, to encourage greater participation, the RBI expanded the scope of the BBPOUs to include non-bank payment aggregators as well.[170] The 'agent' is the entity that interacts with the customer and facilitates bill payments. The agent could be a bank, a mobile wallet, physical collection centres, or any other entity that has tied up with the BBPS. The agent provides the necessary interface and connectivity to the BBPS platform. The Bharat Bill Payment Central Unit (BBPCU) i.e. the NPCI acts as the umbrella organisation that oversees the BBPS. The NPCI sets the guidelines and standards for the BBPS and ensures its compliance with regulatory requirements.

The BBPS ecosystem has experienced a significant expansion since September 2019, when it had 168 billers and processed 1.10 crore transactions worth ₹1,900 crore. The ecosystem has grown to encompass 22,338 billers and processed 500.06 million transactions worth ₹2,36,453 crores till Q1 of FY25-26.[171] To boost the growth further, considerable steps have been taken over the last few years to upscale BBPS. Until December 2022, the BBPS allowed only recurring payments and was available for a restricted number of utility services only. The ambit of BBPS has now been expanded to include even non-recurring payments thus helping users avoid the hassle of remembering and scheduling payments for a recurring service each time thus enabling timely payments.[172] Furthermore, aside from basic utilities, BBPS can now also

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[167] FindiBankit (2025, March 19). *From BBPS to Bharat Connect : Transforming Digital Bill Payments in India.* Retrieved on July 23, 2025 from https://blogs.bankit.in/from-bbps-to-bharat-connect-transforming-digital-bill-payments-in-india#:~:text=Let's%20dive%20into%20the%20exciting,connecting%20every%20corner%20of%20Bharat.%E2%80%9D

[168] RBI. (2023). *Draft Guidelines for Implementation of Bharat Bill Payment System (BBPS)*. Reserve Bank of India. Retrieved November 28, 2023, from https://m.rbi.org.in/scripts/bs_viewcontent.aspx?Id=2866

[169] RBI. (2023). *List of Banks permitted to operate as Bharat Bill Payment Operating Unit (BBPOU) under Bharat Bill Payment System (BBPS) in India – Position as on February 02, 2023*. Reserve Bank of India. Retrieved on November 28, 2023, from https://www.rbi.org.in/Scripts/bs_viewcontent.aspx?Id=3385

[170] Business Standard. (2024, March 1). Reserve Bank of India widens scope of BBPS to non-bank payment aggregators. Retrieved on March 5, 2024, from https://www.business-standard.com/finance/news/rbi-expands-the-scope-of-bbps-directions-to-non-bank-payment-aggregators-124022901171_1.html

[171] Bharat Connect Website. Retrieved on July 23, 2025 from: https://www.bharat-connect.com/statistics/

[172] RBI. (2022, December 31). *Monetary and Credit Information Review.* Reserve Bank of India. Retrieved on November 28, 2023, from https://rbi.org.in/scripts/PublicationsView.aspx?Id=21625; (2022, December 20) RBI.

be used for ancillary purposes like paying rent or even paying taxes. The ambit would also include B2B payments such as invoices thus leading to increased convenience for businesses alike. Another key measure undertaken by the RBI to drive the adaptability of BBPS is to bring NRIs within the scope of BBPS thus allowing cross-border inward remittances.[173] BBPS has also introduced Seventh and Eighth Settlement cycle wef 24th of August 2024, which is expected to mitigate settlement risk and increase the overall efficiency of the settlement process.[174]

The implementation of BBPS can further be improved by overcoming some potential gaps in the system, one being awareness of BBPS. Although BBPS allows retail outlets to act as agents, their involvement in the process is currently limited. Potential measures to incentivize retail outlets to act as agents can be considered.

Interaction with Principles expounded above

	Bharat Bill Payment System (BBPS)/ Bharat Connect
Interoperability	• BBPS functions as a one-stop solution for consumers of Indian banks and non-banks to pay their bills via ATMs, Internet Banking, Website Login, Mobile App, Mobile Banking, etc.
Inclusiveness	• RBI and several banks have taken initiatives towards enhancing inclusiveness, however, more progress needs to be made. • AU Small Finance Bank's initiative to launch bill service payment through video banking has been a step in the direction of digital inclusivity and accessibility.[175]
Scalability	• BBPS as a system is scalable, however, there is a need for constant effort in this direction. • Canara Bank and NPCI Bharat BillPay have launched a service for NRIs in Oman to pay bills for their families in India through BBPS.

Governor's Statement - Shaktikanta Das. Reserve Bank of India. Retrieved on November 28, 2023, from https://rbi.org.in/scripts/BS_ViewBulletin.aspx?Id=21460

[173] RBI. (2022, December 29). *Annex 3: Important Regulatory Measures.* Reserve Bank of India. Retrieved on November 28, 2023, from https://rbi.org.in/scripts/PublicationReportDetails.aspx?ID=1229

[174] Bharat BillPay Ltd. Notice dated 16th August, 2024. Retrieved on July 23, 2025 from https://www.bharat-connect.com/strapi/uploads/Introduction_of_Seventh_and_Eighth_Settlement_Cycle_56b852f8cb.pdf

[175] Srivats, K. (2023, April 18). *AU small finance bank enables bill payment via video banking*. BusinessLine. Retrieved on November 13, 2023, from https://www.thehindubusinessline.com/money-and-banking/au-small-finance-bank-enables-bill-payment-via-video-banking/article66750123.ece

	• Along with this, the government has even expanded the services of BBPS to UPI 123Pay which means that BBPS can be used even on a feature phone.[176]
Enabling Regulatory Environment	• The Bharat Bill Payment Operating Units ('BBPOUs') have to adhere to certain guidelines formulated by RBI and NPCI. These duties help create a regulatory environment. • The RBI regularly revises the framework governing BBPS to align it with the contemporary developments and provide more clarity. For instance, in February 2024, the RBI issued revised norms with the intent to streamline the process of bill payments and enhance consumer protection.[177]
Usability	• BBPS is available in multiple regional languages and provides voice calling services for the application's use on feature phones.[178]
Accountability	• One of the manners in which BBPS maintains its accountability is by requiring non-bank entities who seek to operate as BBPOUs to be audited and maintained regularly. • Further, an entity has to comply with the FDI Policy and regulations framed under the Foreign Exchange Management Act, 1999 (FEMA), if applicable.[179]
Last mile Delivery	• With the introduction of the UPI 123Pay, BBPS can now be accessed by anyone and does not require smartphones to use the system.[180]
Affordability	• Transactions under BBPS are being pushed to be made free of cost by the government.[181]

[176] LiveMint. (2022, November 11). *How users can pay electricity bill via UPI 123PAY. A step-by-step guide.* Live Mint. Retrieved on November 7, 2023 from https://www.livemint.com/industry/banking/how-users-can-pay-electricity-bill-via-upi-123pay-a-step-by-step-guide-11668146216036.html

[177] Reserve Bank of India. (2024, February 29). Master Direction – Reserve Bank of India (Bharat Bill Payment System) Directions, 2024. Retrieved on March 5, 2024, from https://rbi.org.in/Scripts/BS_ViewMasDirections.aspx?id=12616

[178] LiveMint. (2022, November 11). *NPCI enables electricity bill payments on 123PAY for feature phone users.* Live Mint. Retrieved on November 7, 2023 from https://www.livemint.com/technology/tech-news/npci-enables-electricity-bill-payments-on-123pay-for-feature-phone-users-11668147898907.html

[179] Spiceroutelegal. (2023). *Bharat Bill Payment System.* Spice Route Legal. Retrieved on November 7, 2023 from https://spiceroutelegal.com/bharat-bill-payment-system/

[180] LiveMint. (2022, November 11). *NPCI enables electricity bill payments on 123PAY for feature phone users.* Live Mint. Retrieved on November 7, 2023 from https://www.livemint.com/technology/tech-news/npci-enables-electricity-bill-payments-on-123pay-for-feature-phone-users-11668147898907.html

[181] Rudra, T. (2022, September 2). *Govt Doesn't Support Charging Fee From Users For BBPS Transactions: Report.* Inc 42. Retrieved on November 17, 2023 from

Consumer Centricity and Trust-based Approach	• The BBPCU and the BBPOU are required to set up efficient customer protection and grievance redressal systems. The BBPOUs then have to handle customer grievances and disputes as per set procedures and standards for billers, agents or end-customers.[182]In the revised framework issued in February 2024, the RBI has mandated NPCI Bharat BillPay Ltd. to put in place a dispute resolution framework for centralised end-to-end complaint management. The norms also prescribe obligations for other stakeholders like BBPOUs and Customer Operating Units to ensure effective grievance redressal.[183]
Participatory Process	• BBPS was launched through a pilot program in 2016 and has been expanded since then depending on the results of the pilot.[184]

5.6 United Payment Interface

The Unified Payments Interface is the crown jewel in the government's Digital Public Infrastructure plans. Launched in 2016, the UPI has revolutionised the manner in which Indians transact digitally and has created adequate digital literacy for Indians to slowly become comfortable with the other digital financial initiatives launched by the Indian government under their Digital India Initiative.

With UPI, India was successful in operationalising an interoperable and instantaneous payment settlement system for both peer-to-peer and peer-to-merchant use cases.[185] UPI has been a raging success and has gained a major share in India's digital transactions, with around 675 banks being live on the platform,[186] and funds to the tune of Rs. 18,395 Mn being transferred in the month of June 2025. The UPI network envisages various entities who come together through the use of standardised APIs to make the platform a reality.[187] First and foremost, the banking companies can register themselves as both Payer and Payee PSPs which enables users

https://inc42.com/buzz/govt-doesnt-support-charging-fee-from-users-for-bbps-transactions-report/

[182] Spiceroutelegal. (2023). *Bharat Bill Payment System.* Spice Route Legal. Retrieved on November 7, 2023 from https://spiceroutelegal.com/bharat-bill-payment-system/

[183] Reserve Bank of India. (2024, February 29). Master Direction – Reserve Bank of India (Bharat Bill Payment System) Directions, 2024. Retrieved on March 5, 2024, https://rbi.org.in/Scripts/BS_ViewMasDirections.aspx?id=12616

[184] Press Trust of India. (2016, August 31). *PCI launches Bharat Bill Payment System pilot project.* Business Standard. Retrieved on November 15, 2023 from https://www.business-standard.com/article/finance/npci-launches-bharat-bill-payment-system-pilot-project-116083100405_1.html

[185] NPCI. *India's Unified Payment Gateway for real-time payment transactions.* NPCI. Retrieved on November 7, 2023, from https://www.npci.org.in/PDF/npci/upi/Product-Booklet.pdf

[186] NPCI. *UPI Product Statistics.* NPCI. from https://www.npci.org.in/what-we-do/upi/product-statistics

[187] NPCI. *India's Unified Payment Gateway for real-time payment transactions.* NPCI. Retrieved on November 7, 2023, from https://www.npci.org.in/PDF/npci/upi/Product-Booklet.pdf

to on-board, link bank accounts, and pay/receive funds into their bank account.[188] Furthermore, UPI envisages the role for third-party service providers or TPAPs which provide technology solutions and platform capabilities for the banks and customers.[189]

The goal of financial inclusion was further enhanced by the launch of UPI123pay which enables the use of UPI on some 40 crore feature phones existing in India.[190] By utilising the simple facilities of calling and IVR, the users can perform the function onboard, receiving and transferring funds on the UPI platform.[191] Efforts have also been made to make UPI a global reality, with the launch of UPI One World, which allows foreign nationals from G20 countries to use UPI-linked PPI for performing merchant transactions throughout the country.[192] Similarly, the RBI in a tie-up with the Singapore government announced linkage of UPI and Singapore's PayNow which will allow cross-border payments in a seamless manner.[193]

The UPI has been an incredible success in the government's digitisation efforts and its success has enabled its parent body, the NPCI to begin exporting the technology abroad through the NPCI International Payments Limited ('NIPL'), establishing India as a Digital Goods leader globally.[194] The seamless and easy to use interface have made peer to peer and peer to merchant transactions domestically as well as internationally, easier and reliable across the board for all stakeholders involved. At present, UPI has been operationalised for cross border payments from 7countries,[195] with an additional 13 countries with whom the Indian government has signed MoUs to export UPI technology to and create UPI powered cross border transactions possible between the partnering countries.[196]

To advance the development and utilisation of UPI further, the RBI announced several measures. The proposed initiatives focus on introducing "Conversational Payments" on UPI,

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[188] NPCI. *India's Unified Payment Gateway for real-time payment transactions.* NPCI. Retrieved on November 7, 2023, from https://www.npci.org.in/PDF/npci/upi/Product-Booklet.pdf

[189] NPCI. *India's Unified Payment Gateway for real-time payment transactions.* NPCI. Retrieved on November 7, 2023, from https://www.npci.org.in/PDF/npci/upi/Product-Booklet.pdf

[190] RBI. (2022, March 8). *Reserve Bank of India launches (a) UPI for Feature Phones (UPI123pay) and (b) 24x7 Helpline for Digital Payments* DigiSaathi. Retrieved on November 17, 2023, from https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=53385

[191] NPCI. *Product Overview UPI 123PAY: Call karo. Pay Karo*. NPCI. Retrieved on November 17, 2023, from: https://www.npci.org.in/what-we-do/upi-123pay/product-overview

[192] NPCI. *A Brief Introduction to UPI One Word.* NPCI. Retrieved on November 7, 2023, from https://www.npci.org.in/what-we-do/upi-one-world

[193] George, A. Vaid, R. & Banerjee, A. (2023, March 14). *India's UPI integrates with Singapore's PayNow: What's next for cross-border payments and remittances?* Forbes India. Retrieved on November 7, 2023, from https://www.forbesindia.com/blog/finance/indias-upi-integrates-with-singapores-paynow-whats-next-for-cross-border-payments-and-remittances/

[194] NPCI. *NPCI International*. Retrieved on November 7, 2023, from https://www.npci.org.in/who-we-are/group-companies/npci-international

[195] NPCI website. *List of countries and members.* Retrieved on July 22, 2025 from https://www.npci.org.in/what-we-do/upi-global/upi-global-acceptance/live-members

[196] Bharadwaj, N. (2023, May 1) *India's UPI Interface to Become Accessible to More Users.* India Briefing. Retrieved on November 27, 2023, from https://www.india-briefing.com/news/global-acceptance-of-indias-digital-payment-systems-europe-latest-to-join-26183.html/

enabling offline payments through the use of Near Field Communication (NFC) technology via 'UPI-Lite,' and enhancing transaction limits for small-value digital payments in offline mode.[197]

The introduction of "Conversational Payments" represents a significant leap forward in UPI functionality. This innovative payment mode leverages Artificial Intelligence (AI) to allow users to engage in conversations with AI-powered systems for initiating and completing transactions securely. This enhances the ease of use and also broadens the reach of the UPI system by catering to users across both smartphones and feature phones. The availability of this feature in multiple languages, starting with Hindi and English, further aligns with the goal of transcending linguistic barriers, deepening digital penetration in the country.

Furthermore, the proposal to facilitate offline transactions using "UPI-Lite" and NFC technology would boost the speed and convenience of executing small-value transactions while ensuring reliability and minimal transaction decline. Towards this, several providers like Google Pay, Paytm, BHIM and PhonePe are already enabling UPI Lite.[198] By leveraging NFC technology, the RBI aims to make retail digital payments feasible even in situations where connectivity is weak or unavailable, thereby promoting the adoption of UPI-Lite. This would help in building a versatile payment system that can cater to diverse scenarios, contributing to a more resilient and accessible digital payment ecosystem.

In addition to these advancements, the RBI has recognized the demand for an increase in transaction limits for small-value digital payments in offline mode. Responding to industry demands, the RBI has raised the per transaction limit for UPI Lite to INR 1000 , while retaining the overall limit of INR 5000.[199] This adjustment seeks to encourage a wider adoption of this payment mode, accommodating a broader spectrum of use cases, including transit payments and everyday small-value transactions, facilitating faster, reliable, and contactless payments.

The RBI's proactive approach to enhancing UPI functionalities is in line with the demands arising from the evolving digital payments landscape. The proposed measures not only leverage cutting-edge technologies like AI and NFC but also address the nuanced demands of users and businesses. By promoting conversational interactions, offline capabilities, and increased transaction limits, the UPI would be instrumental in fostering financial inclusion and digitization in the country.

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[197]RBI. (2023, August 10). *Statement on Developmental and Regulatory Policies*. Retrieved on October 31, 2023, from https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=56174

[198]Times of India. (2024, January 8). UPI Lite on Google Pay, Paytm and other UPI apps. TOI. Retrieved on March 5, 2024, from https://timesofindia.indiatimes.com/gadgets-news/upi-lite-on-google-pay-paytm-and-other-upi-apps-steps-to-enable-add-amount-and-make-pin-free-payments/articleshow/106621078.cms

[199] The Economic Times. (2023, December 23). Major changes in UPI 2023: Increase in transaction limits, UPI Lite X, NPS contributions, other big changes made. ET. Retrieved on March 5, 2024, from https://economictimes.indiatimes.com/wealth/save/major-changes-in-upi-2023-increase-in-transaction-limits-upi-lite-x-nps-contributions-other-big-changes-made/articleshow/106395508.cms?from=mdr

However, several concerns persist around the usage of UPI, the key being cybersecurity. According to a report covering the period from January 2020 to June 2023, nearly half (47.25 percent) of the reported cybercrime cases were associated with UPI fraud. These frauds can take several forms.[200] One significant threat involves phishing attacks, where cybercriminals employ deceptive tactics, such as fake UPI apps or fraudulent messages, to trick users into revealing sensitive information. Malware poses another risk, with potential security compromises on mobile devices, leading to unauthorised access to UPI accounts. Identity theft remains a prevalent concern, as cybercriminals may exploit stolen credentials to gain unauthorised access and engage in fraudulent activities. Data breaches of UPI transaction databases could expose user details, transaction histories, and other sensitive information. Transaction spoofing, lack of user awareness, and insufficient encryption further contribute to the cybersecurity challenges around UPI. Continuous efforts by UPI service providers, banks, and regulatory authorities are essential to enhance the overall security of the UPI ecosystem and protect users from potential risks.

However, it is important to acknowledge the efforts being undertaken by the government to tackle security concerns. For instance, Sanchar Saathi Portal has been launched with the help of which fraudulent numbers are being blocked. With the help of Portal, the authorities can block personal data stored on a lost or stolen smartphone, including net banking details, UPI IDs. This has helped in saving almost Rs 1000 crore over the last few months.[201] Earlier, the government also announced that it is working with the RBI, banks and other stakeholders in the UPI ecosystem to devise a new innovative mechanism that would considerably reduce financial frauds.[202]

Interaction with Principles expounded above

	United Payments Interface (UPI)
Interoperability	• Users can pay and transact via various UPI services, irrespective of the service provider of the sender and receiver.
Inclusiveness	• UPI has been able to reach almost the entire population, especially with the recent update of accessing UPI on feature phones. • The introduction of Bhashini, the government's AI language translation platform, seeks to enhance linguistic inclusion in UPI

[200] FCRF. (2023). *A Deep Dive into Cybercrime Trends Impacting India.* Future Crime Research Foundation. Retrieved November on 28, 2023, from https://www.futurecrime.org/fcrf-cyber-crime-survey-2023

[201] Moneycontrol. (2024, March 4). Govt working with RBI on mechanism to block fraudsters from using victims' money: Vaishnaw. Moneycontrol. Retrieved on March 5, 2024, from https://www.moneycontrol.com/news/business/govt-working-with-rbi-on-mechanism-to-block-fraudsters-from-using-victims-money-vaishnaw-12400631.html

[202] Moneycontrol. (2024, March 4). Govt working with RBI on mechanism to block fraudsters from using victims' money: Vaishnaw. Moneycontrol. Retrieved on March 5, 2024, from https://www.moneycontrol.com/news/business/govt-working-with-rbi-on-mechanism-to-block-fraudsters-from-using-victims-money-vaishnaw-12400631.html

	payments.[203] By incorporating voice-based services, Bhashini aims to make UPI transactions more accessible and user-friendly, particularly for individuals who may face language barriers or have varying levels of literacy. ● The incorporation of voice-activated features as part of the 'Hello! UPI' initiative also signifies a move towards inclusion.[204] Users will now have the capability to perform various financial transactions, such as checking bank balances, initiating B2B transfers, and more, through voice commands.
Scalability	● UPI has been one of the most scalable technological developments in the country today, given its simplicity, interoperability and affordability. ● It is currently being exported to 13 countries with an addition of 4 more nations after the 2023 G20 meeting in New Delhi.[205]
Enabling Regulatory Environment	● Since the NPCI owns and operates the UPI, it regularly issues rules and guidelines to ensure consumer safety and enable innovative solutions in the payments sector.
Usability	● UPI has been seamlessly integrated into the country's digital economy via various applications. It is even available in multiple languages and employs the Interactive Voice Response technology to function on feature phones.
Accountability	● The NPCI is responsible for managing and operating the UPI platform in India.
Last mile Delivery	● UPI has been able to reach all nooks and corners of India. In the financial year 2025, UPI was responsible for 85% of the total digital transactions. Of these, it has been seen that there has been an increase of about 118% UPI transactions in rural and semi-urban India (in 2024).

[203]ETBFSI. (2023, October 16). *How Bhashini is expanding voice-based payment services via UPI, frictionless credit*. ETBFSI.com. Retrieved November 5, 2023, from https://bfsi.economictimes.indiatimes.com/news/fintech/how-bhashini-is-expanding-voice-based-payment-services-via-upi-frictionless-credit/104452643

[204]Ray, A. (2023, September 7). *Hello, UPI: Use voice commands to send money, pay bills; know new UPI features and how they work.* The Economic Times. Retrieved on November 4, 2023, from https://economictimes.indiatimes.com/wealth/save/hello-upi-use-voice-commands-to-send-money-pay-bills-know-new-upi-features-and-how-they-work/articleshow/103464077.cms

[205]Bharadwaj, N. (2023, October 11). *Unified payments interface (UPI) from India: Tracking global acceptance*. India Briefing News. Retrieved November 23, 2023, from https://www.india-briefing.com/news/global-acceptance-of-india-unified-payments-interface-upi-tracker-26183.html/

Affordability	• One can afford to use UPI on a feature phone, with a bank account and without any internet connection. Additionally, UPI has zero transaction fees for the consumer as against other digital payment platforms, making it an affordable option.
Consumer Centricity and Trust-based Approach	• To help build consumer's trust, NPCI has recently launched the 'UPI-Help' on the Bharat Interface for Money (BHIM) UPI to provide hassle free grievance redressal.
Participatory Process	• There was no participatory process by the NPCI or RBI on UPI as such. However, in future it is recommended to have a consultative process.

5.7 National Digital Health Mission (Ayushman Bharat Digital Mission)

The National Digital Health Mission ('NDHM') was an initiative launched by the Indian government on the 15th of August, 2020 with the primary objective of creating an ecosystem for the provision of healthcare services.[206] The program has been launched to further advance the mission of digital inclusion propelled by the government over the last decade. The implementation of the government program is brought about by the National Health Authority ('NHA'), functioning under the governance of the Ministry of Health and Family Welfare.[207] In September 2021, the programme was rolled-out on a national level and renamed as the Ayushman Bharat Digital Mission ('ABDM').[208]

The ABDM aims to make universal health coverage a possibility for all the citizens of India. The operationalisation of the ABDM is brought about by several constituent digital systems such as the AB-Health Account ('ABHA') Number (previously 'Unique Health ID). Healthcare Professional Registry ('HPR'), Health Facility Registry ('HFR'), and the ABHA Mobile Application.[209] The ABHA Number has been envisaged as a unique-national level I'D much like the Aadhaar, which can help access a wide range of data and medical records while enabling interoperability and consent-based access.[210] The HPR and HFR aim to create a

[206] Press Information Bureau. (2020, August 15). *Prime Minister salutes the country's valiant fight with COVID in his I-Day address to the nation.* Ministry of Health and Family Welfare. Retrieved on November 7, 2023, from https://pib.gov.in/PressReleseDetail.aspx?PRID=1646049.

[207] National Health Authority. (2023). *About NHA.* Retrieved on November 7, 2023, from https://nha.gov.in/NHA.

[208] Press Information Bureau (2021, September 26). *PM to launch Ayushman Bharat Digital Mission on 27th September, Ayushman Bharat Digital Mission will create a seamless online platform that will enable interoperability within the digital health ecosystem*. Prime Minister's Office. Retrieved on November 7, 2023 from https://pib.gov.in/PressReleasePage.aspx?PRID=1758248.

[209] NHA. (2023). *Ayushman Bharat Digital Mission Components.* National Health Authority. Retrieved on November 7, 2023, from https://ndhm.gov.in/abdm-components.

[210] NHA. (2023). *Ayushman Bharat Digital Mission (ABDM)*. National Health Authority. Retrieved on November 7, 2023, from https://abdm.gov.in/abdm.

standardised repository of healthcare professionals and health facilities across the country.[211] The ABHA Mobile Application is to serve as a consent-manager application for users to access, maintain and share their personal health records with various service providers.[212]

Since the introduction of the National Health Policy in 2017, India has seen some major advancement and implementation of a national digital health ecosystem.[213] The enrolment to the ABHA Number has reached around 73.98 Crore people, with around 49.06 Crore people having linked their personal health records with the same.[214] A lot of these registrations have been facilitated by integration of other already-registered users, such as those under the PMJDY scheme and the CoWIN platform.[215] The number of health facilities and healthcare professionals registered have reached a level of around 4 Lakh registrations.[216] The NHA has also recently launched the Unified Health Interface ('UHI') which aims to be an open protocol developed by the healthcare community and governed by the NHA.[217] At a global level, efforts have been made by the WHO to advance the objective of digital health.[218] The UK's National Health Service ('NHS') has also adopted health digitisation as one of its primary objectives, while Australia's Digital Health Agency has been successful in enrolling almost 98% of its population to My Health Record (MHR) – a national digital health record platform.[219]

However, the NDHM brings with it certain cybersecurity concerns as well. One significant concern is the potential for unauthorised access and breaches of sensitive health data. The vast repository of personal health information within the NDHM poses a tempting target for cybercriminals seeking to exploit or misuse this data. The risk of data breaches, whether through hacking attempts or insider threats, raises concerns about the privacy and security of individuals' health records. While the Health Data Management Policy assigns the NHA the responsibility of issuing appropriate technological and operational guidelines to ensure the

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[211] NHA. (2023). *Ayushman Bharat Digital Mission Components.* National Health Authority. Retrieved on November 7, 2023, from https://ndhm.gov.in/abdm-components.

[212] NHA. (2023). *Ayushman Bharat Digital Mission, Create ABHA Account*. National Health Authority. Retrieved on November 7, 2023, from https://phr.abdm.gov.in/.

[213] NITI Aayog. (July 2020). *National Digital Health Mission Strategy Overview.* National Health Authority. Retrieved on November 7, 2023, from https://www.niti.gov.in/sites/default/files/2021-09/ndhm_strategy_overview.pdf

[214] PIB Delhi (2025, February 11)*Update on the implementation of Ayushman Bharat Digital Mission (ABDM).* Ministry of H*ealth and Family Affair.* Retrieved on July 22, 2025 from https://www.pib.gov.in/PressReleseDetailm.aspx?PRID=2101737
NHA. (2023). *ABDM Insights*.National Health Authority. Retrieved on November 27, 2023, from https://dashboard.abdm.gov.in/abdm/

[215]NHA. (2023). *ABDM Insights*.National Health Authority. Retrieved on November 27, 2023, from https://dashboard.abdm.gov.in/abdm/

[216]NHA. (2023). *ABDM Insights*.National Health Authority. Retrieved on November 27, 2023, from https://dashboard.abdm.gov.in/abdm/.

[217]National Health Authority (2023). *NHA launches the Unified Health Interface Initiative.* Ministry of Health and Family Welfare. Retrieved on November 27, 2023, from https://abdm.gov.in/collaborative-development.

[218]Swaminathan, S. Et al (2021). *Global Strategy for Digital Health, 2020-2025*. World Health Organisation. Retrieved on November 21, 2023 from https://iris.who.int/bitstream/handle/10665/344249/9789240020924-eng.pdf?sequence=1&isAllowed=y

[219] Australian Digital Health Agency. (2023) *Statistics and Insights*. Retrieved on November 21, 2023, from https://www.digitalhealth.gov.au/initiatives-and-programs/my-health-record/statistics

security and privacy of personal data, as well as the maintenance of electronic medical and health records,[220] there is currently limited guidance on addressing cybercrime incidents. According to India Cyber Threat Report 2025, the healthcare sector accounts for 21.82% of all the cybercrimes.[221] Therefore, prioritising cybersecurity measures becomes imperative to uphold individuals' trust in the security and integrity of their health data within the framework of the NDHM.

Interaction with Principles expounded above

	National Digital Health Mission
Interoperability	• NDHM allows all of the patient's information to be found on one platform and can be accessed by various stakeholders, albeit with the patient's consent. • NDHM uses FHIR - Fast Healthcare Interoperability Resources interoperability system, the latest interoperability system being used for sharing health data seamlessly between stakeholders.[222]
Inclusiveness	• Ever since NDHM's inception, about 73.98 crore Health IDs (now ABHA) have been registered. This has even spread to rural areas and has been accessible to the more vulnerable populations.
Scalability	• NDHM is meant to scale the access to good medical services to all segments of society in an affordable and inclusive manner. It does so, through the aggregation of data and the utilisation of the internet to enable services such as tele-consultations to people from remote areas.
Enabling Regulatory Environment	• Health Data Management Policy (HDM Policy) was released on 14th Dec 2020 by the Ministry of Health and Family Welfare, Government of India. It is a guidance document which sets out the minimum standards for privacy and data protection that should be

[220] National Health Authority (). *National Digital Health Mission: Health Data Management Policy.* Retrieved on July 22, 2025 from https://abdm.gov.in/publications/policies_regulations/health_data_management_policy

[221] Seqrite Blogs (2025, May 22). *Why Healthcare Has Become the Top Target for Cyberattacks in India – and What we Can Do about it.* Retrieved on July 22, 2025 from https://www.seqrite.com/blog/why-healthcare-has-become-the-top-target-for-cyberattacks-in-india-and-what-we-can-do-about-it/

[222] Athaley, C. (2023, September 1). *Ayushman Bharat Digital Mission - India's Leapfrog Moment.* abdm. Retrieved on November 18, 2023, from https://abdm.gov.in:8081/uploads/Ayushman_Bharat_Digital_Mission_India_s_Leapfrog_Moment_495788b1eb.pdf

	followed by all the participants/stakeholders of the Ayushman Bharat Digital Mission (ABDM) ecosystem.[223]
Usability	• NDHM makes use of Audio and Video chat services and various startups in collaboration with NDHM are aiming to incorporate multilingual facilities into their applications to extend their usability.
Accountability	• The strategy paper on NDHM provides that the system will be designed to measure accountability of all health providers.
Last mile Delivery	• NDHM has been able to deliver and reach even the rural population, through applications like eSanjeevani. • The usage of NDHM also enables record-keeping, solving the issue of lost documentation and enabling a more informed diagnosis to individuals from remote and rural areas.
Affordability	• The use of NDHM requires a smartphone and access to internet services and therefore is affordable as we see a boost in smartphone adoption across India.
Consumer Centricity and Trust-based Approach	• While the technology tries to adopt a trust based approach, it has experienced some data breaches in the past. There is a need to enhance cybersecurity in order to build trust.
Participatory Process	• NDHM had sought inputs from stakeholders by floating its consultation paper and thereby making sure that the stakeholders participate in the process.

5.8. Open Credit Enablement Network (OCEN)

The Open Credit Enablement Network ('OCEN') is a digital framework of Application Programming Interfaces (APIs) that has the potential to democratise and transform India's digital lending landscape. Designed to deliver financial products directly to individuals and micro, small, and medium enterprises (MSMEs), OCEN aims to eliminate their dependence on traditional lenders. Developed by iSPIRT, an Indian software industry think tank, OCEN could facilitate the creation of a credit marketplace or digital ecosystem of lenders and loan service providers ('LSPs').

Traditionally, acquiring a loan requires LSPs to take on a range of responsibilities, including sourcing, identity verification, underwriting, disbursement, recollections, and dispute

[223] PIB ().*National Digital Health Ecosystem.* Ministry of Health and Family Welfare Retrieved on July 22, 2025 from https://www.pib.gov.in/PressReleasePage.aspx?PRID=1942715

management. Each of these processes is time-consuming and costly, impacting the profits earned by an LSP. By taking these processes online, loan disbursements can be made more quickly and at a lower cost, potentially resulting in more favourable interest rates charged by lenders. This enables LSPs to holistically expand their offerings[224] and at the same time, this allows borrowers to obtain credit within the course of their daily business activities and leverage new data flows to be eligible for loans. And finally, OCEN gives lenders the ability to widen their market and provide innovative credit products while reducing the cost of acquiring customers.

OCEN simplifies and automates the lending process, bundling these processes and executing them online. It streamlines screening processes to identify loan-worthy customers and onboard new borrowers.[225] However, with the introduction of OCEN and the consequent increase in the number of borrowers, there is a likelihood of a rise in the incidence of loan defaults. Addressing this challenge may require regulatory interventions as and when the regulator deems fit. A consultative approach in enabling OCEN and regulating it will instil the necessary confidence for more private players to enter the market and for the technology to be adopted on a wider scale.

Further, the transparency of loan-related data could pose a challenge as companies will possess a list of defaulters who might then be excluded from the lending process. It is crucial that lending processes should not become exclusionary and that every effort is made to provide potential borrowers with the loans they seek. This could be achieved by ensuring that loan eligibility criteria are inclusive and based on factors beyond credit history, such as cash flow, invoices, and receipts as enabled by the account aggregator framework.

Interaction with Principles expounded above

	Open Credit Enablement Network (OCEN)
Interoperability	● OCEN establishes a standardized lending protocol. The Sahay app, in particular, has collaborated with lending partners to establish this new credit system. ● Merchants can swiftly register and acquire instant loans from lenders by providing their GST identification number and bank details.

[224] Sahamati Team(2020, Aug 04). *OCEN & Account Aggregators will change digital lending in India*. Sahamati. Retrieved on November 22, 2023, from https://sahamati.org.in/ocen-account-aggregators-will-change-digital-lending-in-india/.
[225] Kumar, K. (2022, December 26). *OCEN: A digital transformation of credit systems?* Observer Research Foundation. Retrieved on November 22, 2023, from https://www.orfonline.org/expert-speak/ocen-a-digital-transformation-of-credit-systems/.

Inclusiveness	● OCEN has been designed keeping in mind democratising of credit systems. ● OCEN does away with the hurdles of the assets and incomes owned by a person for borrowing money, it opens up the scope of the credit system in India.
Scalability	● OCEN is built on a scalable infrastructure and given its convenient use, may scale like the way UPI has.
Enabling Regulatory Environment	● There is a need for further clarity to understand the regulatory environment governing OCEN.
Usability	● OCEN aims to simplify financial transactions and services for end-users. This is achieved through intuitive user interfaces, clear instructions, and streamlined processes which increases its usability.
Accountability	● There is need for further clarity to understand how OCEN integrates accountability as there isn't adequate data available on its underlying framework and oversight mechanisms in the public domain as of the writing of this publication.
Last mile Delivery	● Over 80% of MSMEs face a lack of access to formal financing, driving them to rely on informal credit sources. To tackle this issue, OCEN aims to revolutionise the credit landscape for micro-enterprises by providing tailored financing solutions to meet their unique needs leveraging non-traditional methods such as 'Alternative credit decisioning' that utilise data to determine trustworthiness for loans.
Affordability	● To access OCEN, an individual needs a smartphone and requires GST registration.
Consumer Centricity and Trust-based Approach	● Customers can benefit from the flexibility of loan sizes, quicker approval processes, automated account analysis, and the convenience of avoiding the need to visit a physical bank.
Participatory Process	● Although OCEN aims at democratising credit, there is a lack of clarity as to how the government involved stakeholders in the process.

6. Way Forward

While the government has made significant efforts towards building DPIs and boosting digital and financial inclusion through various schemes and programmes, there are still existing gaps that need to be filled in order to truly digitise the country. The above mentioned use cases will play a pivotal role in enabling inclusion, however, these use cases as well as any future initiative must be developed keeping in mind all the above identified principles. At the outset of this research exercise, it is also imperative to state that the state of emerging use cases in India shows great promise in solving issues such as financial inclusion and propelling the industry forward. Overarchingly, we observe positive levels of compliance with our proposed principles, instilling further confidence in us as to their potential to promote greater inclusivity in the financial space.

In enabling inclusive growth of the financial ecosystem in India, we believe it is crucial to assess the impact that new concepts and systems may have on the financial inclusion efforts being driven by the public and private actors. Future policy interventions such as Open Banking and open protocols will be immensely beneficial for the purpose of financial inclusion. Further Open banking has seen a rise across countries globally as countries transition towards digital means to increase access to financial services.

Under open banking, non-financial institutions can offer financial services using data aggregation to reduce the barriers of entry for underbanked and unbanked segments of society. It enables multiple benefits for the underserved segment such as credit assessment, faster loan approvals, and mobile payments that enable them to generate adequate credit data for them to stand a better chance to get included in the formalised banking sector.[226] The Indian approach to open banking is differentiated by its parallel development of DPIs, creating a platform for operationalising user-authorised data portability and interoperability across the economy.[227] The positive impacts of the open banking systems created domestically have gained an added boost from the implementation of the Account Aggregator ('AA') framework that enables easier access to financial data amongst financial information providers ('FIP's) such as banks and insurance providers and financial information users ('FIU's) such as cash-flow based lenders and wealth managers.[228] As we move forward, the uptake of open banking APIs across banks are likely to rise, creating a new avenue for FinTech companies to provide services in

[226] Preziuso, M., Koefer, F., & Ehrenhard, M. (2023, August 1). *Open banking and inclusive finance in the European Union: Perspectives from the Dutch stakeholder ecosystem*. SpringerOpen. Retrieved on November 25, 2023, from https://jfin-swufe.springeropen.com/articles/10.1186/s40854-023-00522-1

[227] Carrière-Swallow, Y., Haksar, V., & Patnam, M. (2021, February). *India's Approach to Open Banking:Some Implications for Financial Inclusion.* IMF Working Papers. Retrieved on November 29, 2023, from https://www.imf.org/-/media/Files/Publications/WP/2021/English/wpiea2021052-print-pdf.ashx

[228] Bharadwaj, N. (2023, October 11). *India's account Aggregator network: Financial data sharing made efficient.* India Briefing News. Retrieved on November 27, 2023, from https://www.india-briefing.com/news/indias-account-aggregator-network-makes-financial-data-more-accessible-allows-individual-consent-23161.html/

collaboration with traditional banks to underserved segments of society as APIs would allow FinTech players to integrate access to multiple banks through a singular user facing application, simplifying the user experience and increasing the breadth of services they may avail from a singular application.[229]

Further, one of the prerequisites for an empowered digital India is also a robust cybersecurity infrastructure. The increase in collection, processing and storage of data also creates cybersecurity concerns as bigger pools of data stored by a singular entity is likely to attract bad actors and raise the possibilities of breach if not sufficiently protected. Market players and participants are the major target group of such cyber attacks and such instances critically damage the faith consumers have in the integrity of the digital financial landscape.[230] Since June 2023, attacks on financial services have topped 4.5 billion (up from 3.7 billion, an 18% increase) in the Asia-Pacific-Japan region, signifying a worrying regional trend.[231]

With the rising trends in cybersecurity incidents in India and across the globe coinciding with the rise of FinTech and its increasing interoperability with traditional financial services, cybersecurity has to become a major priority for the industry to sustain, grow and onboard individuals from the underserved segment of society. While regulatory norms and standards prescribed by the RBI address these concerns, compliance with these norms by the industry is yet to be achieved fully as systems must continually adapt to the ever-changing cybersecurity vulnerabilities.

In conclusion, the digital inclusion efforts in this Techade and under the broader vision of the *Amrit Kaal* must holistically and with a principled approach move towards its goal. The use cases be it developed by the government or the private sector must take every stakeholder together and learn from each other in order to provide the best available solution to the citizens. Adherence with the proposed principles will further enable the next phase of digital financial inclusion. The potential for financial inclusion through the use cases show promise and must be tuned in light of the changing realities.

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[229] Dubey, E. (2023, December 6). *Open banking API: A step-by-step guide with examples*. Cashfree Payments Blog. Retrieved November on 26, 2023, from https://www.cashfree.com/blog/open-banking-api/#What_Led_To_the_Growth_of_Open_Banking_in_API

[230] Mumbai Fintech Hub. (2023). *Cyber Security in the FinTech Industry*. Mumbai FinTech. Retrieved on November 29, 2023, from https://fintech.maharashtra.gov.in/documents/doc/Cyber_Security_inFintech.pdf

[231] State of the Internet. (2023, November). *A Year in Review: A Look at 2023's Cyber Trends and What's to Come*. Akamai. Retrieved on November 19, 2023, from https://www.akamai.com/resources/state-of-the-internet/2023-year-review

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