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DIGITISING INDIA



TOWARDS AN INCLUSIVE GROWTH OF THE ECOSYSTEM



RESEARCH PAPER

DIGITISING INDIA: TOWARDS AN INCLUSIVE GROWTH OF THE ECOSYSTEM

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I. Executive Summary

The advancement of India's digital financial inclusion has been rapid and far-reaching, owing to foundational interventions such as Aadhaar-enabled identity, payments simplified by the Unified Payments Interface (UPI), and the expansion of bank account creation under various schemes. This progress has been further strengthened by projects such as the BharatNet initiative and the National Common Mobility Card (NCMC). In recent years, the overlaying Open Network for Digital Commerce (ONDC) and the Open Credit Enablement Network (OCEN) have helped establish a robust architecture for a digitally empowered and financially inclusive economy at scale. These initiatives have expanded access to essential services, enhanced efficiency, and thereby demonstrated the efficacy of coordinated action between government agencies, sector regulators, and industry.

The Reserve Bank of India's Financial Inclusion Index reflects these gains, yet critical challenges demand urgent attention to achieve universal, equitable, and sustainable financial inclusion. Around 25,000 villages still lack access to high-speed broadband, and if left unaddressed, infrastructure gaps could erode hard-won progress. A pronounced digital divide between urban and rural regions disproportionately excludes women and marginalised communities. Affordability remains a barrier, even for entry-level devices. High rates of payment fraud, particularly in UPI transactions, which account for half of all digital payment-related frauds, are straining end-user trust in the integrity of digital ecosystems. Chronic underinvestment in cutting-edge research hinders the adoption of emerging technologies, a problem exacerbated by regulators lagging behind technological advancements.

At its core, this report advocates a principle-based framework to usher in the next phase of India's digital inclusion journey. These principles, interoperability, inclusiveness, scalability, enabling regulation, usability, accountability, last-mile delivery, affordability, consumer centricity, and participatory processes, provide a structured basis for policy formulation, the technology design, and innovation. The framework prioritises the reliability and reach of underlying infrastructure, institutionalises inclusiveness in product design and service delivery, and foster innovations that are scalable and cost-effective. Strengthening trust in digital ecosystems through ubiquitous security, real-time grievance redressal, and seamless consumer protection remains imperative for the growth of our digital economy.

With India poised to become a USD 7 trillion economy by 2030, aligning infrastructure development, regulatory architecture, and market innovation with these guiding principles will ensure that India's digital transformation is expansive in scale, equitable in impact, resilient in design, and globally competitive in execution.

1. Introduction

Achieving greater digital financial inclusion remains a key objective of the Indian government. India has approximately 806 million internet users,¹ of whom 350 million use digital payment methods.² The country's digital payments sector is poised for rapid expansion, with transaction volumes projected to triple from 159 billion in FY24 to 481 billion by FY29. Over the same period, the total market value is expected to almost double, rising from USD 3.16 trillion (₹265 trillion) to USD 7.06 trillion (₹593 trillion).³ In FY 2023-24, UPI's total transaction volume exceeded 131 billion and is expected to grow to 439 billion by FY29,⁴ contributing 91% of the overall digital payments.⁵ India's digital payments ecosystem has progressed significantly, driven largely by the government's push for digitisation. Through the Digital India mission, the government is promoting digitisation across sectors and use cases, which has led to widespread adoption of digital payments.

The mission envisions digital infrastructure as both a core utility and a tool for empowering every citizen. Several initiatives under this mission bridge the digital divide between rural and urban populations. The Digital India initiative, unique in its scale and scope, offers a model other countries could follow. One of its key objectives is to achieve a "faceless, paperless, and cashless" status.⁶ With the digital economy valued at roughly USD 175–200 billion in FY 2022-23, India's ambition of reaching USD 1 trillion by 2030 underscores the ongoing need for robust digital payment systems like UPI.⁷ According to a study by Boston Consulting Group and Phone Pe, India's digital payment market will triple to reach USD 10 trillion, with digital payments constituting 65% of all transactions by 2026.⁸ This potential of the digital payments ecosystem to be a key enabler in the vision of becoming a trillion dollar digital economy.

This **Techade** offers the country an opportunity to achieve greater good for more citizens through progressive policymaking and enhanced digitisation. An inclusive growth of the ecosystem will play a crucial role in realising the vision of a trillion-dollar digital economy. Reliance on payment systems has increased multifold, and they are now integrated into daily life, from shopping and commuting to lending and beyond.

There is a need for inclusive growth on both the 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

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 PwC India, The Indian Payments Handbook - 2024-2029, <https://www.pwc.in/assets/pdfs/indian-payment-handbook-2024.pdf>.

⁵ Id.

⁶ 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>

⁷ 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>.

⁸ 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

codes), National Common Mobility Card (NMC), Central Bank Digital Currency (CBDC), Open Network for Digital Commerce (ONDC) and Bharat Bill Payment System (BBPS) are playing a huge role in enhancing digital financial inclusion and bringing more and more individuals into the net. The same will be crucial in **fulfilling the purpose of *Amrit Kaal***, which is to improve the lives of 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 to ensure that existing and future interventions and technologies align with the broader goal of digital financial inclusion.

1.1. Methodology

The methodology for this paper combines focused group discussions, one-on-one interviews with relevant stakeholders, and extensive secondary research. Primary sources of information came from direct interactions with key stakeholders, including industry experts, civil society organisations, and FinTech professionals. These engagements provided invaluable insights into the practical nuances and challenges of digital and financial inclusion, as well as the way forward for the next phase of digitisation in the country. Complementing the firsthand information, we conducted extensive secondary research to ensure a robust and well-rounded understanding of existing guidelines, regulatory frameworks, and best practices.

2. Becoming a Digital Financially Inclusive Society

Efforts for greater financial inclusion date back at least five decades, to around 1969, when banks were nationalised to provide services to rural regions. In 2005, the Reserve Bank of India (RBI), began creating an environment that incentivised banks to increase financial inclusion by offering basic checking account services with low or no minimum balance requirements.⁹ The widespread adoption of digital technologies not only has the potential to boost the economy but also offers opportunities for the underserved population to join the formal economy.¹⁰ The importance of digitisation also has legal backing, as access to the internet is now legally protected as a fundamental right in India.¹¹

With the launch of the Digital India Mission in 2015, the government announced its vision for inclusive growth in 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.¹² Through this mission, the government aims to give a much needed thrust to identified growth areas that cut across multiple Ministries and Departments.

The government has undertaken several initiatives, including promoting a digital economy and providing mobile phones and internet connectivity, which have paved the way for the emergence of digital financial services accessible to all, including individuals in remote areas. With the introduction of the digital ID (Aadhaar) and the proliferation of mobile phones, the government has addressed challenges of access and usage to a large extent. The launch of Pradhan Mantri Jan-Dhan Yojana (PMJDY) accounts has enabled millions of Indians to access financial services. Over the last decade, the government has introduced several similar initiatives to advance digital financial inclusion.

Additionally, the government's focus on building vernacular language support should be taken into account. In India, out of 700 million internet users, 500 million prefer native languages over English. Through the Bhashini project, the government aims to provide internet content in 22 major vernacular languages.¹³ Further, many start-ups have increasingly begun offering services in regional languages.

Another key factor driving the massive adoption of digital payments was the demonetisation of ₹500 and ₹1000 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 shift towards digital modes of payment.¹⁴ The intersection of the

⁹ 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>

¹⁰ 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

¹¹ Supreme Court of India. (2020, January 10). *Anuradha Bhasin vs Union Of India*. Indiankanoon. Retrieved November 7, 2023, from <https://indiankanoon.org/doc/82461587/>

¹² 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/>

¹³ Bhashini, National Language Translation Mission, MeitY, Retrieved November 24, 2023 at <https://bhashini.gov.in>

¹⁴ 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>

demonetisation policy along with the rapid expansion of affordable internet during this 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 to build a digitally and financially inclusive society:

2.1. Digital India Programme

The Digital India Programme is the government's flagship umbrella initiative to build a digital-ready knowledge society. The programme drives all government services and processes to sequentially digitise and provide greater access to people by leveraging the reach of the internet. It operates on 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 these three pillars, the programme brings under its aegis all initiatives for increasing digitisation and acts as an umbrella initiative, guiding the digitisation process across the country holistically. It has brought to the fore major digital governance initiatives such as Aadhaar, MyGov, the Open Government Data Platform (OGDP), and the Unified Payments Interface (UPI), among many others that have significantly advanced the digitisation of multiple facets of Indian citizens' lives.

2.1.1 Digital Public Infrastructure

Building Digital Public Infrastructure (DPI) has been one of the key objectives of the Indian government. DPI refers to a set of shared digital building blocks enabled by interoperable open standards or specifications.¹⁵ India has become the first country to build all three foundational building blocks of DPI - digital identity i.e. Aadhaar, real time payments i.e. UPI, and a data exchange i.e. Account Aggregator framework through the Digital Empowerment Protection Architecture (DEPA) and DigiLocker.¹⁶ These DPIs form the backbone of digital infrastructure, enabling the seamless delivery of public services. Collectively known as 'India Stack,' they have fostered innovation and competition, addressed gaps in digital financial inclusion, expanded the market, and supported the government in the targeted delivery of benefits.¹⁷ Several nations, including the Philippines, Morocco, and Ethiopia, are already using India Stack platforms.¹⁸ The following DPIs have become pillars of digital financial inclusion.

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. 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>

¹⁶ 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

¹⁷ 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>

¹⁸ Bain & Company ((2023) E-Economy 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

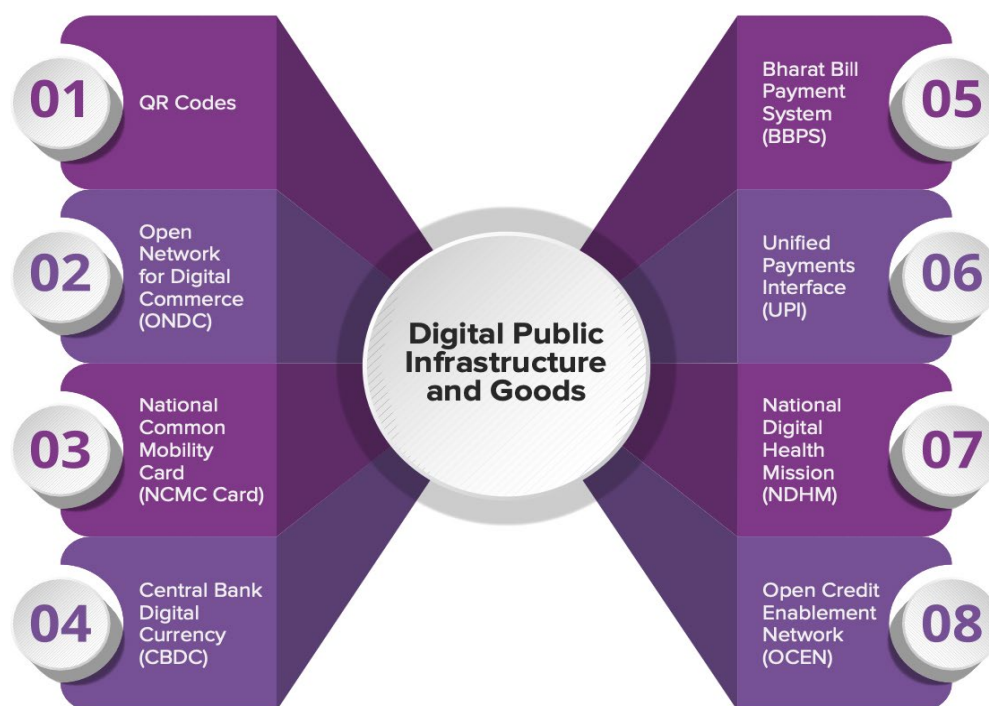


Figure 2: Digital Public Infrastructure and Goods

Aadhaar

As per reports, 142.5 crore people in India hold Aadhaar cards,¹⁹ making Aadhaar the world's largest biometric identification program. Launched in 2009 and managed by the Unique Identification Authority of India (UIDAI), a statutory body, Aadhaar was operationalised through the Aadhaar (Targeted Delivery of Financial and Other Subsidies, Benefits and Services) Act, 2016. It became the basis for targeted direct benefit transfers under government schemes to beneficiaries and was integrated into identification programmes across various government initiatives..

The identification scheme helped the government cut out middlemen and directly transfer benefits to beneficiaries. Over time, more integrations of the ID system were mainstreamed, most importantly, Aadhaar-enabled Payment Systems (AePS) and Aadhaar-enabled Banking Accounts (AeBA), which allow individuals to access the formal banking system without needing to identify themselves at every stage. This is particularly valuable for underserved and unserved citizens who often lack the financial and digital literacy to remember passwords and/or use smartphones comfortably. By May 2025, AePS recorded 105 million transactions worth ₹28,703 crore in a single month, underscoring its role in enabling financial inclusion through last-mile banking and micro-ATMs.²⁰

Unified Payments Interface (UPI)

¹⁹ Aadhaar Dashboard, https://uidai.gov.in/aadhaar_dashboard/ (last visited August 8, 2025).

²⁰ 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).

In March 2011, an RBI document revealed that non-cash transactions per individual stood at just 6 per annum.²¹ At the time, only a small fraction of approximately 10 million retailers in India accepted card payments. By 2025, however, over 340 million merchant QR codes facilitate UPI payments nationwide.²² The stark contrast highlights the earlier gap between those who used digital payments and those who did not, a gap that was especially concerning given financial challenges black money and corruption.

The government set up the National Payments Corporation of India (NPCI) in April 2009 to consolidate as well as integrate 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 arising from 53.9 in 2021 to 64.2 in 2024. Payment digitisation has more than doubled, driven by 185 billion UPI transactions in FY 2024-25.²³ In terms of value, UPI transactions increased from ₹200 lakh crore in FY 2024-25 to ₹261 lakh crore.²⁴

The traditionally cash-driven Indian economy has responded well to the UPI revolution, making it a household payment option across the country. The technology has boosted small businesses by enabling fast and secure bank-to-bank transactions, even for small amounts. To make this digital payment revolution more inclusive, the NPCI rolled out two offline payment modes for users- USSD code *99#²⁵ and UPI's 123Pay.²⁶

By dialling *99# users can send and receive interbank account-to-account funds, check balances, and set or change their UPI PIN, among other services. Further, NPCI launched UPI123Pay to enhance the diversity, utility, and transformational power of digital innovations in the country. This instant payment system allows feature phone users to use UPI safely and securely through four technology options: calling an interactive voice response (IVR) number, using app functionality on feature phones, a missed call-based approach, and proximity sound-based payments.

With the huge success of UPI and other DPIs, India now aims 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.²⁷ India's DPI gained further recognition through the G20 Endorsement, paving the way for wider acceptance on the global stage. India also launched the Global Digital Public Infrastructure

²¹ 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>.

²² 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).

²³ 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).

²⁴ The Economic Times, UPI share surges to 83.7 pc in digital transactions for FY25 (May 30, 2025), <https://cfo.economictimes.indiatimes.com/news/upi-dominates-digital-payments-in-india-surges-to-837-market-share-in-fy25/121517195> (last visited August 8, 2025).

²⁵ NPCI. (2023). *A USSD based mobile banking service*. Retrieved November 22, 2023, from <https://www.npci.org.in/what-we-do/99/product-overview>

²⁶ 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>.

²⁷ 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>

Repository (GDPIR), a comprehensive resource hub on DPIs deployed by member nations.²⁸ Targeting Africa and Asia as prime regions for exporting DPIs. India has entered into MoUs with several countries. For instance, India and Colombia signed a Memorandum of Understanding (MoU) to promote digital transformation in both countries through India Stack initiatives such as knowledge sharing and capacity building.²⁹ Additionally, India signed MoUs with Armenia, Sierra Leone, Suriname, Antigua, Barbados, Trinidad and Tobago, Papua New Guinea, and Mauritius, offering them India Stack and DPI at no cost with open-source access. As of now, 12 countries have deployed India's DPI.³⁰

While efforts to deepen digitalisation and financial inclusion are commendable, offline UPI solutions have not gained traction compared to internet-enabled, app-based UPI, and their scalability remains untested. Further, concerns persist over the surge in financial frauds accompanying the adoption of digital payments in India, with UPI becoming the primary target and accounting for 56–60% of all digital payment frauds in FY 2023-24, necessitating stronger security measures. The number of incidents has risen sharply with almost 13.42 lakh cases of UPI fraud reported in FY 2023-24 compared to 7.25 lakh in the previous year.³¹ With internet penetration projected to reach 70% by 2027 and digital payment transactions expected to grow by 100–120% between 2022 and 2027, addressing UPI fraud through enhanced security measures like UPI 4.0 will be critical to sustaining India's digital economy growth.³² Fraudsters have also evolved their methods, increasingly relying on social engineering, an issue that may only be mitigated through greater financial literacy among citizens.

Rising financial frauds and disruptions also have consequences beyond immediate monetary losses. They erode consumer trust in the integrity of such systems, a crucial concern for a country like India, which is seeking to onboard a significant number of first-time users into the digital financial landscape. Aware of growing UPI fraud concerns, the government has introduced multiple interventions, including recent UPI 4.0 enhancements with AI-powered fraud detection, to ensure secure digital payments and sustain the growth of the digital economy. These measures are expected to reduce financial fraud on UPI.

2.2. Pradhan Mantri Jan Dhan Yojana

The PMJD Yojana is the government's flagship financial inclusion initiative, launched on 28 August 2014 with the objective of *banking the unbanked, securing the unsecured, and funding the unfunded*. This scheme seeks to provide universal access to banking facilities with no minimum balance requirement, while also allowing participants to earn interest on their accounts. It further enables citizens to receive Direct Benefit Transfers (DBT) under various schemes such as Pradhan Mantri Jeevan

²⁸G20 GDPIR. Global Digital Public Infrastructure Repository. Retrieved on March 5, 2024 from <https://www.dpi.global/>

²⁹ 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>

³⁰**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>.

³¹ 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).

³² 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/>.

Jyoti Bima Yojana (PMJJBY), Pradhan Mantri Suraksha Bima Yojana (PMSBY), Atal Pension Yojana (APY), and Micro Units Development & Refinance Agency Bank (MUDRA) schemes.³³

The initiative quickly made its mark, earning a Guinness World Record in January 2015 for *‘the most bank accounts opened in one week.’*³⁴ Since its launch, the Pradhan Mantri Jan Dhan Yojana has expanded financial inclusion by offering services such as zero-balance deposits, with a total deposit balance of ₹263,064.90 crore, issuance of 38.48 crore RuPay debit cards, and accidental insurance coverage of up to ₹2 lakh for accounts opened after August 28, 2018. As of July 9, 2025, the scheme has reached 55.83 crore beneficiaries across the country.³⁵

The initiative has been widely recognised as a progressive step towards efficient and targeted delivery of DBTs. It has also driven greater participation in other DBT schemes among economically disadvantaged groups and played a pivotal role in the holistic empowerment of rural women, both by enhancing access to benefits and by fostering their systemic inclusion in the formal financial system.³⁶ As of August 2024, the Pradhan Mantri Jan Dhan Yojana has expanded banking coverage to 66.6% of rural and semi-urban areas,, a substantial increase from pre-2014 levels, with women accounting for 55.6% of all account holders.³⁷

In its initial phase (2014-2018), the Yojana focussed on ensuring that at least one member from each household was included in the financial inclusion scheme. Since 2018, building on the success of this first phase, the programme has shifted its focus to bringing every adult in the country within th ambit of financial inclusion. This shift has resulted in remarkable adoption rates among unbanked, unserved, and underserved segments of society. Looking ahead, targeted incremental interventions and policy refinements under the Yojana could further advance its objectives, significantly enhance access to digital financial services, and continue uplifting the underserved and unserved populations.

2.3. BharatNet

The global push for digitalisation has prompted governments worldwide toinvest heavily in building resilient and accessible digital infrastructure. India is no exception, having recognised early on that necessity of such infrastructure to empower its *digital nagriks* (Citizens) and ensure they can fully benefit from the oppotunities the digital revolution brings to its shores.

In 2012, the National Optical Fiber Network (NOFN) was launched and later renamed ‘BharatNet’ with an expanded mission. The project aims to provide high-speed connectivity to 2,50,000 gram panchayats

³³ 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>.

³⁴ 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>.

³⁵ 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 Campaign Sees Significant Progress (July 15, 2025), <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2036417> (last visited July 23, 2025).

³⁶ 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>.

³⁷ 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).

(GPs) and connect all 6.55 lakh villages by 2028 under Phase III.³⁸ To realise these goals, the government established a special purpose vehicle (SPV), Bharat Broadband Network Limited (BBNL), tasked with leading the country's fibre-optic expansion.

odate, BBNL has laid 6,93,303 kilometres of fibre across the country, covering 2,14,325 gram panchayats.³⁹ Key challenges delaying completion include difficult terrain, logistical hurdles, 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 and accelerating BharatNet's rollout.⁴⁰

BharatNet and other initiatives funded by Digital Bharat Nidhi (DBN) have made significant strides in expanding coverage. Under the BharatNet project, 2,14,325 gram panchayats have been made service ready, and more than 13 lakh fiber to the home connections have been provided. Additionally, 18,736 4G sites have been commissioned under DBN-funded mobile schemes across more than 26,000 villages as of June 2025.⁴¹ However, many of these connections remain unreliable and slow, offering little long-term benefit, as most sites are effectively non-functional, operating at 2G mobile network speeds or lower.

2.4. Digital Banking Units

In April 2022, taking impetus from the Finance Minister's 2022-23 Budget speech, the RBI issued preliminary guidelines for establishment Digital Banking Units (DBUs) by scheduled commercial banks to further financial inclusion. In October 2022, the Prime Minister announced the expansion of DBUs to 75 districts across the country, nationalising this promising initiative and promoting access to digital banking services. In 2023 alone, 84 DBUs became operational.⁴² The DBUs form part of the 'doorstep banking' initiatives aimed at increasing access for previously unbanked segments of society.⁴³

DBUs are essentially physical spaces with minimal technology infrastructure, enabling customers to enjoy cost-effective and convenient access to digital banking products and services in an efficient, paperless, secure, and connected environment. Most services are available in self-service mode at any time, all year round. DBUs facilitate activities such as savings account opening, balance enquiries, passbook printing, fund transfers, fixed deposit investments, loan applications, cheque stop-payment instructions, credit and debit card applications, tax and bill payments, and nominations.

³⁸ Bharat Broadband Network Ltd., BharatNet Project Status (2025), <https://bbnl.nic.in/> (last visited July 23, 2025);.

³⁹ 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).

⁴⁰ 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).

⁴¹ Press Info. Bureau, Digital and Broadband Connectivity (July 30, 2025), <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2150173> (last visited August 8, 2025).

⁴² Press Info. Bureau, Gov't of India, Press Release, (July 20, 2025), <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1896726>.

⁴³ 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>.

They also feature Cash Deposit Machines (CDMs), Multi-Functional Kiosks (MFKs), and Video Know Your Customer ('video KYC') assistance, and act as digital financial literacy centres.⁴⁴ Due to their nascent rollout, it is currently not possible to assess their impact on increasing financial inclusion beyond the theoretical advantages they present. Nevertheless, DBUs are a progressive initiative aimed at enhancing engagement with digital financial services for disadvantaged communities and, at the very least, will help increase the level of comfort these segments have in interacting with digital alternatives. The initiative holds the potential to acclimatise underserved and unserved populations to digital financial solutions, acting as a bridge to onboard citizens into the formal banking sector. Given the breadth of their services, DBUs may also foster digital financial literacy among new populations if tailored to do so through government policies.

There is no doubt that the government has been working towards enhancing digitisation through a range of schemes and initiatives, as discussed above. Digital public infrastructure is playing a pivotal role in the broader framework, encouraging businesses to advance digitisation to the next level, enabling them to develop consumer-centric products, as is evident in the case of UPI. While these initiatives and the government's efforts deserve recognition, there remains considerable ground to be covered. Several existing challenges must be addressed for these initiatives to realise their full potential. In the upcoming chapter, we will assess the gaps and challenges in our financial inclusion efforts through both a demand- and supply-side lens.

⁴⁴ 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

Significant efforts have been made to advance digital financial inclusion in the country. As outlined in the preceding chapter, a range of initiatives has been undertaken to bring more people on board the digital bandwagon. However, despite these efforts by both the government and the private sector, considerable challenges remain and must be addressed in the years ahead.

To realise the vision of transforming India into a digitally empowered society and knowledge economy, it is important to identify the challenges of digital inclusion from multiple perspectives and tackle them systematically. True inclusion requires the creation of services and conditions that improve people's quality of life in areas such as education, health, public services, and employment, while also providing the financial means to access the technologies that enhance ease of living.

There are certain prerequisites that must be fulfilled if digital technologies are to become a cornerstone of inclusion for all. From infrastructure and telecommunications to the development of digital skills and expertise, each factor must be considered. This chapter outlines the key challenges to digital inclusion from both the supply and demand-sides, offering a comprehensive view of the primary barriers to achieving it.

3.1. Supply side barriers

Supply side barriers refer to the systemic, structural, and socio-economic obstacles that hinder the ecosystem including government and private sector, from effectively offering services. For the purposes of this study, we have limited supply side barriers to encompass infrastructure, user interface with financial services, socio-economic concerns driving the digital divide, and the regulatory norms that determine 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 is often unprofitable for fiber companies. For those in rural, remote, and underdeveloped areas, this lack of infrastructure makes broadband adoption strenuous. In the E-Government Development Index, India ranks 97 out of 193 nations.⁴⁵ India scores fairly high in human capital development and online service provision but is held back by **relatively lower levels of infrastructure development**.⁴⁶

For digital inclusion to happen, digital technology must be available to the widest possible population, and actual development must be supported by facilitating exchanges and creating businesses and jobs. The country must promote Income-generating economic activities with monetary transactions alongside

⁴⁵ United Nations. (2024). *UN E-Government Knowledgebase*. from: <https://publicadministration.un.org/egovkb/en-us/Data/Country-Information/id/77-India>

⁴⁶ 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>.

providing better internet. Better infrastructure must be paired with improved facilities for integration into the digital economy.

Since BharatNet was operationalised 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, posing a significant obstacle to India's digital future.⁴⁷ Out of 1,04,574 Wi-Fi hotspots in gram panchayats enabled under BharatNet, only 10,000 were active as of May 2025, highlighting challenges with sustaining internet access.⁴⁸

The BharatNet initiative's impact is further dulled further by its linear architecture (a single cable connects the villages), which affects the ability to provide 99% uptime, a key requirement for internet service providers. Additionally, the use of Fiber Point of Interconnect (FPOI) relying on established telecom fibre cables results in longer restoration times when errors occur. Thus, while the intention of the project was admirable, its rollout has not met initial objectives. Since digital financial inclusion depends on reliable internet access, prioritising the fiberisation of the country is essential.

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, access to consistent and affordable internet underpins access to government services, which have steadily moved online over the last decade. A lack of affordable internet may also deepen the chasm of digital divide, stalling years of progress in bringing citizens from rural and remote areas online.⁴⁹ There is a need to facilitate community broadband networks focussed on public service priorities. Additionally, mobile devices should be available at lower price points so more people can access them. In 2025, the cheapest smartphone in India costs approximately 150% of the average monthly income of an Indian citizen.⁵⁰ In rural and remote areas, internet availability is often intermittent, poor, or non-existent.⁵¹ Service providers must ensure availability through community networks and public WiFi/ internet access points. Such networks should also provide good-quality upload and download speeds to meet local users' needs.

3.1.2 Lack of User Interface

While technology has disrupted the digital financial space, gaps remain in achieving last mile delivery. An important aspect is making digital tools user-friendly to boost meaningful adoption once they are operational in remote and rural India. During our stakeholder interactions, they highlighted vital issues such as prevalent language barriers that create additional hurdles, and stressed the importance of grassroots engagement in financial literacy. For many people facing these language barriers, access is limited simply because they cannot understand terms of agreement. These barriers also make them

⁴⁷ 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)

⁴⁸ 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)

⁴⁹ 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>.

⁵⁰ 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).

⁵¹ 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>.

vulnerable to debt cycles, economic exploitation, and predatory lending practices. Reportedly, 60% of active internet users identified language as the biggest obstacle to adopting online services.⁵²

While financial inclusivity often focusses on language barriers It extends beyond that. Understanding financial services requires grasping complex jargons and confusing terms or clauses. This poses a challenge for non-English-speaking customers to navigate these complexities and build trust in the overall process. For instance, a survey conducted in an Odisha village found that most households could not understand English, and therefore struggled to comprehend text communications from banks.⁵³ It is important to promote vernacular verbal communication presented in an easy-to-understand way, with simplified steps and local examples to help newly onboarded digital nagriks feel comfortable.

3.1.3 Digital Divide

Despite significant efforts to bridge the digital divide, gaps remain. As of 2025, 60.6% of the rural population uses the internet compared to 80% of the urban population, highlighting a persistent divide.⁵⁴ This digital divide intersects across urban and rural areas, men and women, marginalised and privileged communities, low- and high-income groups, young and older populations, and different castes.⁵⁵ Because of the intersectionality, a blanket policy on digital literacy may not be effective. A nuanced, intersectional approach is urgently needed.

Several government initiatives aim to bridge this digital divide, but there is still a long way to go to realise tangible results. For instance - pilot projects like the Jan Dhan Plus initiative have highlighted multiple solutions to increase women's active participation 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 the programme is scaled.⁵⁶ Under this pilot, the Bank of Baroda and Women's World Banking mobilised women business correspondents, and unlike general practices, they observed that rural women were more likely to invest and save monthly. However, women and more particularly, rural women face additional barriers such as lack of financial independence, limited access to formal financial services, and skepticism toward digital alternatives due to socio-economic factors. 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 PMJDY.⁵⁷ Studies also show

⁵² 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/>.

⁵³ 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>

⁵⁴ DataReportal, Digital 2025: India (Jan. 2025), <https://datareportal.com/reports/digital-2025-india> (last visited July 23, 2025).

⁵⁵ 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>

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).

⁵⁷ Pradhan Mantri Jan-Dhan Yojana, Account Statistics (2025), <https://www.pmjdy.gov.in/account-statistics-country.aspx> (last visited July 23, 2025).

that uptake of financial services favours men, underscoring a gender gap that requires policy intervention.⁵⁸

Most women use their Jan Dhan accounts solely to access direct benefit transfers and do not deposit money or use 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 2024-25.⁵⁹ In most cases, they also lack a say in how the DBT monies are used in most circumstances.⁶⁰ Thus, while women appear financially included on paper under the Jan Dhan Yojana, multiple operational and cultural barriers prevent them from engaging meaningfully with financial inclusion schemes. A 2024 survey found that 95% of women were unaware of the overdraft facility linked to their Jan Dhan accounts, highlighting persistent awareness gaps.⁶¹ The report also found that nudging women to save up to INR 500 a month created enough impetus to form saving habits, making them more inclined to use their accounts meaningfully, signifying potential for positive change if government policies provide similar encouragement.

In terms of rural-urban divide, the role of PMJDY is important.⁶² While the scheme enhanced financial access for various marginalised groups, the high number of dormant accounts remains a major drawback. Notably, the percentage of dormant accounts with zero balance is highest among regional rural banks. Reports show that 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.⁶³

Further, operational issues such as onerous KYC requirements, unnecessary levies when coupled with UPI⁶⁴ and the increasing number of inoperative accounts under the yojna act as barriers in rural areas.⁶⁵ These operational obstacles have significantly impacted continued use of the yojana, resulting in 4.8 crore beneficiaries not renewing their RuPay cards.⁶⁶ It is important to acknowledge the significant socio-economic differences among people in India and the need for flexibility in financial schemes designed for different segments of the unbanked population. If digitisation aims to be accessible to

⁵⁸ 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>

⁵⁹ 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).

⁶⁰ 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>

⁶¹ 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).

⁶² 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>

⁶³ The Indian Express, PMJDY: Zero-Balance Accounts Drop to 18.2% (Apr. 10, 2025), <https://indianexpress.com/article/business/banking-and-finance/pmjd-y-zero-balance-accounts-drop-18-2-9245763/> (last visited July 23, 2025).

⁶⁴ 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-pmjd-y-and-financial-inclusion/1318631/>

⁶⁵ 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>

⁶⁶ 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).

most people, schemes need to be holistic and address these issues. The government must identify and close gaps in internet service penetration to ensure benefits do not remain limited to a few.

Furthermore it is imperative to understand the fallout from policies that do not approach technology adoption with nuance. A lack of faith in digital technologies or limited capacity, whether due to unaffordable entry points like phones or low digital literacy, holds back citizens in rural and remote India from using not only financial technology solutions but also critical healthcare services enabled by technology. During the implementation of the Ayushman Bharat Digital Mission, launched during the COVID-19 pandemic with tools like e-Sanjeevani and electronic health records, the policy did not perform well in rural areas due to lack of access to smartphones, computers, and the internet. Poor or no connectivity for approximately 70% of the population has hindered access to digital public health services as intended..⁶⁷ Studies show that lack of access to digital technology among marginalised groups can further increase health inequalities..⁶⁸

Another clear example of the digital divide is accessing public services and entitlements through digital means, which remains a challenge for marginalised groups, as seen with 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 strata struggle to access benefits they are entitled to, either because they cannot use or are unaware of how to navigate the technology platform. For instance, a survey conducted in rural Odisha found that most respondents reported failures with biometric authentication when accessing PDS benefits..⁶⁹

3.1.4. Creating an Enabling Environment for Innovation

From the supply side, there is a need to focus on creating an enabling environment that supports products and innovations designed for digital and financial inclusion in a representative way. Currently, policies and schemes do not provide enough incentives or encouragement for companies to develop targeted products that address the gaps identified in this chapter.

It is important to highlight that the entire ecosystem, including government and private sector, must take responsibility for creating this environment According to the NITI Aayog India Innovation Index 2024, India's gross expenditure on R&D ('GERD') is 0.76% of its GDP, which is lower than Brazil and South Africa..⁷⁰ The private sector contributes 36.4% of India's GERD, while China and the United States contribute 77% and 75%, respectively..⁷¹ A lack of initiatives such as incentives or schemes for R&D holds back the industry and private-public partnerships from developing innovative solutions for regional problems, limiting the scaling of solutions for those who need them most. The government and private sector must work together to invest more in R&D and build products and infrastructure that meet the public's needs.

⁶⁷ 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/>

⁶⁸ 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>

⁶⁹ 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>

⁷⁰ 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).

⁷¹ The Economic Times, India's R&D investment lacks behind global peers, private sector involvement low: Economic Survey, (July 22, 2024), <https://economictimes.indiatimes.com/news/science/indias-rd-investment-lags-behind-global-peers-private-sector-involvement-low-economic-survey/articleshow/111927926.cms> (last visited August 8, 2025).

Further, while digital innovation creates various business opportunities, the values generated depend on those involved in the process. The ecosystem must take responsibility here as well.. The industry must recognise that a lack of diversity in perspectives and experiences can significantly affect the scope of digital innovation and directly influence the representativeness of the products and services created. Greater diversity in age, gender, nationality, ethnicity, race, sexual orientation, socioeconomic status, and disability can minimise mistakes during innovation. For example, facial recognition systems often struggle with darker skin tones, and AI-enabled speech recognition systems often fail to accurately identify female voices, etc.⁷² Stakeholders must build a working awareness of inclusion and diversity in relation to digital technologies. There is also a growing need to design accessible digital products that cater to diverse sensory, cognitive, and physical abilities.

Creating an enabling regulatory environment is essential to give companies the space to innovate. Excessive regulatory interventions and frequent changes without involving all stakeholders discourage the industry from investing and innovating further. Overregulation also leads to unintended consequences such as higher prices for consumers,⁷³ fewer incentives for companies⁷⁴ to onboard new customers, and reduced motivation⁷⁵ to develop innovative solutions.

The government and industry must work together to create an enabling environment that encourages product innovation to address digital inclusion challenges. A light-touch regulatory approach combined with a consultative process will strengthen the ecosystem. Collaborative efforts to lower barriers to digital inclusion will go a long way in realising the vision of a truly Digital India.

3.2 Demand side barriers

In addition to the supply-side barriers as discussed above, demand-side challenges also hinder digital inclusion. These challenges act as roadblocks to the penetration of digitalisation in the country. This section traces some of these barriers..

3.2.1. Lack of Digital Literacy

One of the main barriers to digital inclusion in India is the lack of digital literacy. Many people choose to remain excluded because they neither recognise the benefits nor feel an urgent need for electronic solutions to their problems. In 2023, approximately 62% of India's population lacked digital literacy, despite ongoing advancements in digital infrastructure and literacy initiatives.⁷⁶ This underscores the urgent need for government- and private-led programmes to raise digital literacy, especially in the broader context of digitisation. India must explore diverse strategies and resources to address the

⁷² 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>.

⁷³ 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

⁷⁴ 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

⁷⁵ 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

⁷⁶ The CSR Journal, "Digital literacy in India, a pressing priority" <https://thecsrjournal.in/world-computer-literacy-day-digital-literacy-india/>

unique needs of its citizens. Educational programmes should be tailored to people from different socio-economic backgrounds, age groups, education levels, and ethnicities.

India must incentivise and train people in the benefits of digital literacy to ensure inclusion reaches the grassroots.⁷⁷ During the COVID-19 pandemic, the government deployed contact-tracing apps without first educating citizens on how to use them. While the strategy worked in metropolitan cities, it failed to benefit rural areas where people neither knew how to operate the apps nor understood their value.. Digital solutions must clearly add value, whether through improved livelihoods, better communication, or entertainment, before citizens' feel motivated to learn and adopt them. Policymakers and industry should advocate digital technology as a medium for delivering economically valuable information and services.

The challenge lies not in the absence of schemes for digital inclusion, but in their effectiveness. Programmes like PMJDY and BharatNet aim to achieve broad inclusion goals, yet many people remain unaware of them. Although the government has introduced these measures, they have not translated into tangible results. Continuous monitoring and strong awareness campaigns are essential to actualise their intended impact.

3.2.2 Lower purchasing power and concerns around affordability

The global pandemic has adversely impacted the purchasing power of middle- to low- income groups worldwide and India has faced similar economic fluctuations. Inflation has strained household budgets, further eroding the purchasing power of these groups.. A survey found that 52% of respondents expect their savings to decline due to inflation⁷⁸ which has, in turn, reduced rural populations' access to internet services. *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 borrowed phones rather than owning them.⁷⁹ While the government aims to bring affordable data plans for all types of users, significant income disparities persist. This makes it essential to include individuals who struggle to meet even basic necessities within the scope of digitalisation.. Bridging this gap requires increasing job opportunities for marginalised groups in rural areas so they can afford digital services. To reduce costs, the government must invest in digital infrastructure to make the internet affordable and improve smartphone accessibility for rural and remote communities.

3.2.3. Mistrust

Trust in the financial ecosystem is a critical factor in driving the adoption and consistent use of any financial service, and the same holds true for FinTech solutions. Since data is the lifeblood of digital inclusion, digital trust becomes its core. Losing this trust fuels concerns about the role technology plays in lives of individuals today.⁸⁰ Past financial inclusion initiatives underscore the importance of

⁷⁷ 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/>.

⁷⁸ 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).

⁷⁹ 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).

⁸⁰ Roseth, B. (2022, August 11). *Trust: An Obstacle and an Opportunity for Digital Transformation*. IDB. Retrieved on November 27, 2023, from

trust. For example, the banking sakhis (also known as banking correspondents) promoted by the National Rural Livelihood Mission (NRLM) since 2015 significantly advanced inclusion across rural and remote India.⁸¹ During our stakeholder discussions, experts stressed that consumer trust is essential for unserved and underserved communities to adopt and rely on financial services and instruments. At a basic household level, peculiar dynamics can emerge, males in the family may gatekeep smart devices from women. Consequently, even when women know how to operate smartphones, they may avoid remitting money through them due to either a lack of trust within family settings or mistrust in intermediaries.

In these contexts, financial service providers have a positive obligation to offer solutions that mitigate mistrust. They can achieve this by implementing simplified redressal mechanisms, providing assistance in vernacular languages, and expanding the presence of banking correspondents across rural and remote areas. At a macro level, such efforts require conducive regulatory norms that enable companies to bridge the trust gap and onboard more consumers. While higher data protection regulations are justified given the rise in financial frauds, aligning these regulations with the industry's compliance capacity can encourage greater adherence. This alignment would, in turn, foster stronger trust and security. In the subsequent chapter, we address these concerns through a principle-based regulatory approach that balances the industry's ability to innovate with the need for stronger consumer security online.

The above challenges are remediable, but removing them requires targeted policy interventions and joint efforts from both the public and private sectors. A principle-based approach must remain at the core of every policy and infrastructural interventions. In the next chapter, we outline ten such principles that should guide the decision-making process of both the government and industry. If followed, these principles could play a decisive role in enhancing digital financial inclusion.

<https://blogs.iadb.org/ideas-matter/en/trust-an-obstacle-and-an-opportunity-for-digital-transformation/>

⁸¹Vaid, 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/>

4. Principles of Digital Financial Inclusion

The government has taken notable steps to bring more people onto the digital bandwagon, but persistent gaps continue to slow the pace of digital inclusion. A key reason for these gaps is the absence of clear guiding principles to shape initiatives and technology deployment. The next phase of digital inclusion will be driven by digital public infrastructure and emerging use cases, both of which will play a pivotal role in achieving the objectives of digital financial inclusion.

These guiding principles establish essential ground rules for the government and companies to follow when developing technologies that serve the public. In 2016, the G20 introduced 8 high-level principles for digital financial inclusion.⁸² Building on that foundation, the government and private sector must take collective responsibility to reach the unreached.

Based on our primary and secondary research, we have identified the following key principles that should guide the design, implementation, and delivery of technologies and services::

Principle 1: Interoperability

Interoperability means technology should seamlessly work with other products and systems, allowing consumers to transact beyond the network of their own bank or financial service provider. It reduces costs, unlocks economies of scale, and boosts the financial viability of services.⁸³ By fostering competition and creating network effects, interoperability benefits both businesses and consumers.⁸⁴ It also enables all stakeholders to interact across integrated ecosystems data, financial, and regulatory. The technologies discussed in Chapter 5 rely on interoperability as a core operational principle.

One of the clearest examples of interoperability comes from the National Highway Authority of India (NHAI). It has proposed shifting from a closed-loop FASTag system to a Global Navigation Satellite System (GNSS) for toll collection.⁸⁵ The GNSS system will accept all payment form factors, reducing congestion at toll booths and ensuring smoother travel. Similarly, every new technology should remain platform-agnostic and interoperable to reach a wider audience.

Principle 2: Inclusiveness

⁸² 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>

⁸³ 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>.

⁸⁴ 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>

⁸⁵ 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>

An inclusive financial ecosystem means "*embedding inclusion in the design of all policies, regulations, supervisory practices, products, services, security procedures, technologies and infrastructure.*"⁸⁶ To create such an ecosystem, participants must develop products and services that remove access barriers and reduce the level of ability required to use them. Inclusiveness should be ingrained in emerging technologies to ensure they reach the widest audience and prevent people's limitations from becoming barriers. For example, the account aggregator framework can significantly improve loan access for Micro, Small, and Medium Enterprises (MSMEs). While MSMEs can currently access collateral-free loans through the CGTMSE scheme, the reach of such initiatives remains limited. With the account aggregator framework, banks can assess businesses based on cash flows, past Goods and Services Tax (GST) records, and other informational collateral. Technology will achieve true inclusiveness and advance digital financial inclusion when it bridges the gap between the served and underserved, using innovative metrics to expand access..

Principle 3: Scalability

Technological systems should be easily scalable and capable of reaching every corner of the country. Digital payments and other technologies have seen unprecedented adoption because they are easy to use, significantly speed up processes, and integrates seamlessly across interoperable platforms. Any new technology must be designed with scalability in mind. For example, QR codes achieved mass adoption quickly because they scaled at minimal cost and delivered a low failure rate for users. Similarly, technologies like the NCMC or Central Bank Digital Currency (CBDC) should be built to expand rapidly and affordably to all parts of the country.

Principle 4: Enabling Regulatory Environment

Emerging technologies require a supportive regulatory framework. Regulators should create rules through a participatory process that actively engages all relevant stakeholders. Digital public infrastructure must remain open to all industry players to foster innovation and service delivery. Regulators should work to provide greater certainty and transparency, encouraging the growth of innovative business models. Harmonisation across different regulatory bodies will further strengthen the environment and enable sustainable innovation..

Principle 5: Usability

New technologies must feature user interfaces that cross linguistic and disability barriers. Digital financial inclusion relies on cost-effective digital tools to deliver formal financial services to excluded and underserved populations, so these tools must remain simple and comprehensible for their intended users.. Designing applications and websites in vernacular languages, offering easy access to human representatives, and using simplified design elements can instil confidence in first-time users. Voice recognition, for example, has enabled many specially-abled individuals to adopt digital tools. In short, technology should be easy, intuitive, and accessible for all.

Principle 6: Accountability

Accountable and transparent digital financial systems are essential for building trust. Stakeholders must avoid concentration risk and resultant single point of failure. Regulators and consumers alike deserve clear accountability from financial service providers. Organisations can strengthen accountability by conducting regular audits that assess not only financial resources and management but also the algorithms and technical tools they deploy. For example, the RBI's Guidelines on Digital Lending require regulated entities to collect data with distinct audit trails. Accountability becomes even

⁸⁶ 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

more critical for digital public goods such as ONDC and CDBC, given the vast scale of their potential impact.

Principle 7: Last-Mile Delivery

Last-mile delivery remains a major barrier for new technologies and government initiatives, specially in rural areas. For example, many rural residents can not access direct benefit transfers because these funds are deposited into bank accounts that require access to ATMs or bank branches, both scarce in remote and rural regions. Without convenient cash-out points, beneficiaries struggle to use the support they are entitled to, undermining the purpose of the scheme.. This challenge affects programs such as Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) wages, maternity entitlements, and student scholarships, which often remain inaccessible in rural areas. Financial services technology can bridge this gap by ensuring reliable last-mile delivery. Every technology provider must address how it will guarantee that benefits reach the end customer before rolling out its services.

Principle 8: Affordability

A major segment of the population targeted for financial and digital inclusion often lacks the resources to afford the technology itself. Several government policies and corporate social responsibility (CSR) initiatives aim to reduce these costs. Reducing obstacles between service and adoption is a pivotal principle for service providers. Regulations should also give the industry room to provide affordable solutions, as seen with UPI, where the regulator and banks initially absorbed losses to drive adoption of digital payments. Technologies built to increase inclusion must prioritise affordability.

Principle 9: Consumer Centricity and Trust-based Approach

Every consumer-oriented product company should keep consumers at the core of its technological innovation. A consumer-oriented product or service not only helps scale the business but also strengthens trust within the ecosystem. This requires a deep understanding of consumer needs, behaviours, and preferences.⁸⁷ Building trust in the digital finance ecosystem is equally critical. Many people lack financial literacy and are cautious about adopting new technologies. To boost adoption and effectiveness, trust should be embedded in the design from the outset. One effective approach is to implement robust grievance redressal systems, which instil confidence and reduce scepticism by ensuring consumers can easily resolve issues.

Principle 10: Participatory Process

A core principle of efficient and effective regulation is a participatory and consultative approach. Any proposed regulation should first be opened for public consultation to gather diverse perspectives and ensure it addresses the needs of all stakeholders. At present, regulatory processes are often insufficiently consultative or transparent, creating friction with industry players and eroding consumer trust. For instance, adopting models like the Telecom Regulatory Authority of India (TRAI) stakeholder consultation process can serve as a valuable precedent for other regulators.. Embedding a consultative and participatory process as a core principle will lead to more robust regulations that foster both innovation and sustainable growth.

At a minimum, these ten principles should remain at the heart of policy-making, decision-making, and the development of digital infrastructure aimed at enhancing financial inclusion. The next phase of digitisation and digital financial infrastructure must be built on this foundation. In the following chapter, we identify key emerging use cases in the digital financial infrastructure space and juxtapose them

⁸⁷ 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

against these principles to assess where we currently stand in building the next phase of digital financial infrastructure.

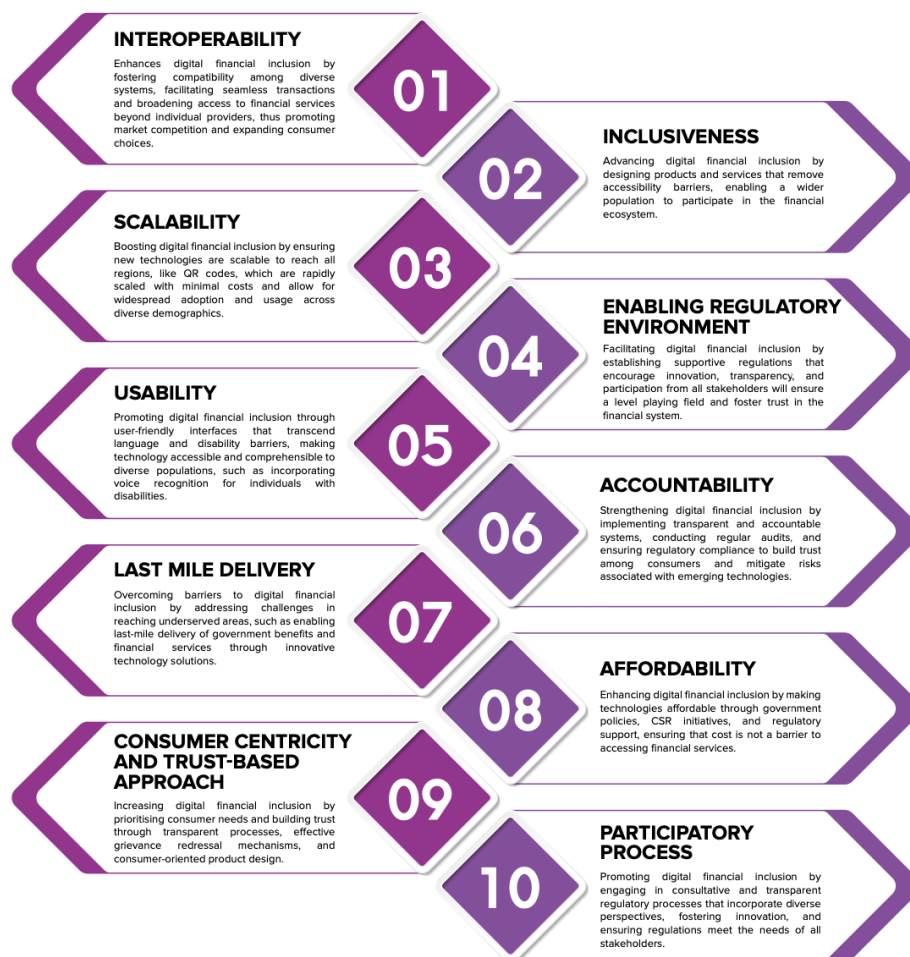


Figure 1: Principles for Digital Financial Inclusion

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

The next phase of digital financial inclusion will be driven by specific use cases, including digital public infrastructure and other emerging technologies. These use cases will bear the responsibility of addressing the gaps identified in the previous chapters, working in tandem with government schemes to foster an enabling ecosystem and advance digital inclusion to its next stage. However, they can only achieve these objectives if the principles outlined above remain central to their development. This report identifies select use cases that are likely to play a crucial role in the next phase of digital inclusion and examines their alignment with these guiding principles.

5.1. QR Codes

The origin of QR (Quick Response) codes can be traced back to 1994, when Japan first started using them in the automobile industry.⁸⁸ Initially, their use remained largely restricted to tracking and shipping products. However, their application expanded significantly in recent years, particularly during the pandemic, when societies across the globe were compelled to adopt contactless alternatives to traditional processes. This shift resulted in the ubiquitous presence of QR codes. From accessing academic textbooks to enhancing brand outreach, QR codes are now being utilised for a wide range of purposes, streamlining and facilitating even the most routine aspects of daily life.⁸⁹

One of the major sectors that has seen the adoption of QR codes on a massive scale is the payments industry. A QR code enables users to make payments with a simple scan, avoiding the hassles of cash-related transactions. For instance, payments through QR codes allow users to transfer the exact amount, eliminating the need for change and consequently shortening queues at stores. On the merchant's side, a payment QR code entails lower costs compared to traditional payment methods like credit cards, which often have higher associated fees. A QR code designed for 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.⁹⁰ In dynamic QR codes, a unique payment code is generated for each transaction, making it harder for fraudsters to intercept transactions and thereby increasing security. Furthermore, 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 improves the overall customer experience and fosters loyalty. In addition to

⁸⁸ 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>

⁸⁹ 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>

⁹⁰ 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>.

providing a seamless payment experience, dynamic QR codes also offer valuable insights into customer behaviour and payment trends, enabling businesses to optimise payment processes and improve ROI.⁹¹

Bharat QR and UPI QR are two widely used QR codes in India that have become integral to daily lives. Driven by demonetization in 2016, both systems have made significant strides in overcoming traditional barriers to digital and financial inclusion. UPI processes over 18 billion transactions every month in India, serving 491 million individuals and 65 million merchants in total.⁹² As of March 2025, there were a total of 6.7 million Bharat QR users in India.⁹³ Their unique interoperability feature further allows customers to make QR code transactions through any payment app, making them one of a kind globally. In 2020, interoperable QR codes received a major 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 increased convenience for consumers but also reduced infrastructural costs. Instead of installing multiple 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, in light of the G20 summit, the RBI announced the extension of the UPI facility to international delegates and tourists from any of the G20 countries,⁹⁴ and allowed credit card holders to link their credit cards to UPI.⁹⁵

However, despite the progress, certain obstacles remain in achieving the highest level of financial inclusion through QR codes. These challenges include:

- Lack of Trust:** The lack of trust in making payments using QR codes remains a major obstacle for people considering a transition to digital payments. Statistically, the number of frauds in UPI transactions has risen steadily over the past few years, reaching over 13.42 lakh fraud cases in FY24 amounting to ₹1,087 crore. The RBI's annual report of FY 24-25 notes that digital frauds accounted for 56.5% of all banking fraud cases, amounting to ₹520 crores.⁹⁶ limited guidance on preventing fraud and the increasingly innovative methods used by fraudsters make it particularly challenging to build trust in the digital payment system.⁹⁷

⁹¹ 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>

⁹² 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>

⁹³ 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>

⁹⁴ 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

⁹⁵ 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

⁹⁶ 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>

⁹⁷ ETOnline. (2022, November 10). *Online fraud: Do you often use QR codes to pay? Check these tips to avoid getting duped*. The Economic Times. Retrieved 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>

To combat these threats and UPI-related fraud,⁹⁸ 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 measures, the number of fraud cases continues to rise 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 every month. This often leads to frequent downtimes and outages, causing inconvenience for both consumers and merchants.⁹⁹ Additionally, the government's order for Payment System Providers (PSPs) to offer UPI services free of cost leaves PSPs with little incentive to innovate and creates a significant financial burden.¹⁰⁰

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 entirely new systems. For instance, a system could be developed to generate a QR code for commuters to enter their destination and access transit services.¹⁰¹ Another option could be generating a QR code on printed bills, allowing citizens to make payments directly.¹⁰²

Interaction with Principles expounded above

	Bharat QR
Interoperability	● Bharat QR is inherently interoperable, allowing consumers to use a single QR code to make payments through various payment applications.¹⁰³

⁹⁸ 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>

⁹⁹ 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/>.

¹⁰⁰ 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>.

¹⁰¹ 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>

¹⁰² 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>

¹⁰³ 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>.

	It is also integrated with major banks, making its adoption seamless and further enhancing interoperability.¹⁰⁴
<i>Inclusiveness</i>	- The ease of use and simplicity with which Bharat QR can be integrated across financial services allows the technology to boost adoption in previously unserved and underserved areas. - Until March 2025, Bharat QR had about 6.7 million registered users. - As a Person-to-Merchant (P2M) payment system, efforts have been made to educate merchants about its existence and usage. - Earlier, Bharat QR partnered with Visa and BillDesk to bring over 300 million users into the digital payment ecosystem, broadening the reach of merchants and service providers accepting QR code payments.¹⁰⁵
<i>Scalability</i>	- RBI data suggests that banks have deployed 3.2 million Bharat QRs. - Its interoperable nature and simplistic design allow integration across financial services, making it truly scalable.
<i>Enabling Regulatory Environment</i>	- Since the NPCI owns and operates Bharat QR, it also issues the rules and guidelines with which it must comply.¹⁰⁶ - Bharat QR must also adhere to RBI-issued guidelines..¹⁰⁷
<i>Usability</i>	- Bharat QR has been seamlessly integrated into the country's digital economy via various applications. For instance, Bharat QR in Paytm can be used along with the sandbox, which provides instant audio payment confirmation.¹⁰⁸ - 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.¹⁰⁹ - It also enables direct payment into the merchant's bank account.¹¹⁰
<i>Accountability</i>	The NPCI, along with the RBI, issues regular notices detailing QR code-related frauds and the measures being taken to address them.

¹⁰⁴ 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>

¹⁰⁵ 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>

¹⁰⁶ NPCI. (2023). *UPI BHIM Guidelines*. NPCI. Retrieved on November 7, 2023, from <https://www.bhimupi.org.in/files/bhim/BHIM-UPI-Guidelines.pdf>

¹⁰⁷ 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>

¹⁰⁸ PaytmBusiness. (2023). *Paytm Soundbox*. Paytm. Retrieved on November 17, 2023, from <https://business.paytm.com/sandbox>

¹⁰⁹ 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>

¹¹⁰ 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/>

	- As Bharat QR comes under a similar level of scrutiny as its technology counterparts (being under the purview of both the RBI and NPCI), accountability is integrated through its design. - Accountability mechanisms in the sector could be further enhanced by exploring easier methods of grievance redressal alongside other avenues.
<i>Last mile Delivery</i>	Bharat QR requires a smartphone and an internet connection. Thus, unlike UPI, it cannot be used on feature phones. However, with the rapid adoption of smartphones across rural and remote India, Bharat QR can potentially be deployed in these regions in the years to come.
<i>Affordability</i>	Building a QR code is relatively inexpensive, making it accessible and affordable for any small business.
<i>Consumer Centricity and Trust-based Approach</i>	- The interface of Bharat QR helps build consumer trust by incorporating multiple data elements, including consumer helpline, thereby enabling widespread use.¹¹¹ - To further strengthen trust, the platform has even developed grievance redressal mechanisms to ensure safer and more reliable transactions.¹¹²
<i>Participatory Process</i>	The RBI released the 'Report of the Committee for Analysis of QR Code,' providing an analysis of QR code usage. Public comments were also sought to understand stakeholders' perspectives.¹¹³

5.2. Open Network for Digital Commerce

The Open Network for Digital Commerce (ONDC) is another flagship project of the central government aimed at maximising e-retail penetration by enabling e-commerce through an open protocol based on open-source specifications.¹¹⁴ The aim of this network is to bring sellers, both small or large, into an interoperable system where they can access a wide range of consumers without being restricted to any single platform. One of the fundamental features of ONDC is its interoperability buyers and sellers do not need to be on the same platform to conduct business. Once a seller is on any ONDC-integrated platform, they become discoverable across all platforms within the network.

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

¹¹¹ 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>

¹¹² 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>

¹¹³ 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>

¹¹⁴ 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/>

enables access to a wide range of sellers available on different platforms. From the consumer's perspective, they can browse and purchase using a single platform regardless of the seller's platform.

Interaction with Principles expounded above

	Open Network for Digital Commerce (ONDC)
Interoperability	ONDC allows all buyers, sellers, logistics partners, and consumers to interact with each other after registering only once.
Inclusiveness	- ONDC aims to empower small businesses and encourage local culture by providing fair opportunities to all stakeholders.¹¹⁵ - It offers an open platform for local artisans and rural businesses to sell their products nationwide, promoting inclusive growth of MSMEs through e-commerce.
Scalability	- While the pilot phase of ONDC launched in 5 metro cities¹¹⁶, it now operates in over 616 cities.¹¹⁷ Within a few years of launch, ONDC has completed more than 20.4 crore cumulative orders and includes 7.6 lakhs sellers and service providers.¹¹⁸ - Ekart (Flipkart's logistic arm) has onboarded ONDC, enhancing access, efficiency, and growth opportunities for MSME traders.¹¹⁹
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.¹²⁰ The ONDC Network Policy is further being developed that also details the obligations of sellers around protection of personal information and grievance redressal.¹²¹

¹¹⁵ 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/>

¹¹⁶ 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>

¹¹⁷ 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>

¹¹⁸ 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>

¹¹⁹ 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>

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

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.¹²² • The platform is actively considering partnerships for text-to-audio, translators and visual-focussed solutions.¹²³
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.¹²⁴ • ONDC has launched its Online Dispute Resolution (ODR) integrated into their Issue & Grievance Management framework.¹²⁵
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.¹²⁶
Affordability	• One can access it through various platforms including Paytm, Craftvillla, Meesho, PhonePe, Mystore, IDFC First, Spice Money and Namma Yatri etc., without paying any additional fees.¹²⁷
Consumer Centricity and Trust-based Approach	• ONDC has launched an Online Dispute Resolution ('ODR') mechanism to protect consumer rights in case of any issues.¹²⁸ ONDC'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.

¹²² 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>

¹²³ 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/>

¹²⁴ 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/>

¹²⁵ ONDC Website. Retrieved on July 22, 2025 from <https://ondc.org/blog/enabling-fair-commerce-ondcs-issue-grievance-management-igm-goes-live/>

¹²⁶ 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>

¹²⁷ 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/>

¹²⁸ 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>

Participatory Process

- A consultation paper was first released and floated to the public to get an understanding of all key issues and problems.¹²⁹

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.¹³⁰ 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 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.

¹²⁹ 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>

¹³⁰ 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>

The concept was envisaged under National Urban Transport Policy 2006¹³¹ 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').¹³² 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.¹³³ 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, acceptance, networking interfaces, clearing, settlement and dispute resolution systems.¹³⁴ In furtherance of this, a committee¹³⁵ 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 2019.¹³⁶ 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.¹³⁷ Similarly, in Mumbai, Paytm Payments Bank and SBI bank have rolled out the NCMC card which can be used for travel, e-commerce, etc.¹³⁸ Earlier, Madhya Pradesh also announced its plans to dedicate Rs. 230 crore to build and implement infrastructure for common mobility cards.¹³⁹ 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.¹⁴⁰

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

¹³¹ 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>

¹³² MOHUA. (2015). *Report of the Committee for Standards and Specifications of National Common Mobility Card*.

¹³³ 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.

¹³⁴ 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>

¹³⁵ MOHUA. (2015). *Report of the Committee for Standards and Specifications of National Common Mobility Card*.

¹³⁶ 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>

¹³⁷ 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>

¹³⁸ NPCI. (2023). RuPay contactless cards. Retrieved on November 7, 2023, from <https://www.npci.org.in/what-we-do/rupay-contactless/product-overview>

¹³⁹ 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>

¹⁴⁰ 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>

and transport operators can use any NCMC compliant Automated fare collection ('AFC') system from any vendor.¹⁴¹ It will also help the customers to get associated with any bank/payment network as per their choice rather than being restricted 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.¹⁴² 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)
<i>Interoperability</i>	• 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.
<i>Inclusiveness</i>	• NCMC can be extended to semi-urban areas, however, it is yet to be seen as to how it will be included.¹⁴³
<i>Scalability</i>	• 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
<i>Enabling Regulatory Environment</i>	• The RBI announced that it has included NCMC auto-replenishment under the e-mandate framework.¹⁴⁴ However, there is need for clarity to ascertain the regulatory guidelines that govern the NCMC framework.
<i>Usability</i>	• 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, Mastercard and Union Bank cards have special features to make them more user-friendly for the visually impaired.¹⁴⁵

¹⁴¹Khaneja, 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.

¹⁴²Khaneja, 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.

¹⁴³ 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>

¹⁴⁴ 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/>

¹⁴⁵ Mastercard. (2021, October 25). *Mastercard Introduces Accessible Card for Blind and Partially Sighted People*. Mastercard Newsroom. Retrieved on November 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:

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.¹⁴⁶ 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.¹⁴⁷
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 document¹⁴⁸ 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.

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.¹⁴⁹ 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"*.¹⁵⁰ The

<https://www.unionbankofindia.co.in/english/union-sparssh-debit-cards.aspx#:~:text=One%20of%20the%20most%20significant,differentiate%20between%20other%20banks%27%20cards>

¹⁴⁶ Karunakar, R. (2022, September 20). *What Top Banks Charge For ATM, Debit Cards: All You Need To Know*. NDTV. Retrieved on November 7, 2023, from

<https://www.ndtv.com/business/all-you-need-to-know-about-various-charges-levied-by-banks-3358968>

¹⁴⁷ 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>

¹⁴⁸ 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>

¹⁴⁹ 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>

¹⁵⁰ 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.

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.¹⁵¹ For instance, some countries deploy CBDCs 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."¹⁵² 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.¹⁵³ The paper proposed an account-based model for CBDC 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.¹⁵⁴ In December 2022, retail e-rupee i.e. e₹-R was launched in selected cities

¹⁵¹ 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/ipp.2022.03.03.003>

¹⁵² 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>

¹⁵³ 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>

¹⁵⁴ 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

with selected banks being permitted to distribute tokens.¹⁵⁵ 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.¹⁵⁶

The RBI is further actively promoting the integration of the e-rupee/CBDC with the UPI.¹⁵⁷ 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 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.¹⁵⁸ It is expected to mirror the advantages of physical cash, making it a reliable solution for usage in remote areas.¹⁵⁹

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.¹⁶⁰

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

¹⁵⁵ 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>

¹⁵⁶ 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/>.

¹⁵⁷ 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>

¹⁵⁸ RBI Digital Rupee e₹ FAQs. Retrieved on July 22, 2025 from <https://www.rbi.org.in/commonman/English/scripts/FAQs.aspx?Id=3686>

¹⁵⁹ *Ibid*

¹⁶⁰ *Ibid*

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.¹⁶¹ To 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.¹⁶² Towards this, the CBDC is partnering with banks.¹⁶³
Inclusiveness	• Pilot study for this project saw participation of 100,000 customers,¹⁶⁴ 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.¹⁶⁵
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 immutability. Usage of these systems may enable a greater degree of security relative to other modes of payment as all transactions can be traced.

¹⁶¹The 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>

¹⁶²RBI. (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>

¹⁶³ 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/>

¹⁶⁴ 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/>

¹⁶⁵ 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>

<i>Last mile Delivery</i>	• 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.¹⁶⁶ Further, there will also be a need to create awareness among the rural population.
<i>Affordability</i>	• Users shall need an internet connection, a smartphone and an account with the participating bank to use CBDC at this stage.¹⁶⁷
<i>Consumer Centricity and Trust-based Approach</i>	• 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.
<i>Participatory Process</i>	• In order to make the consumers aware of CBDC, its allied risks and benefits, the RBI had released a concept note.¹⁶⁸ 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.¹⁶⁹ 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.¹⁷⁰ BBPS rebranded itself to Bharat Connect in 2024, focusing on expansion to payments for utilities, telecom, DTH, municipal taxes, subscriptions, education fees, and more, through multiple channels like UPI, internet banking, and physical outlets.¹⁷¹

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

¹⁶⁶ 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

¹⁶⁷ 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>

¹⁶⁸ 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>

¹⁶⁹ 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>

¹⁷⁰ 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.

¹⁷¹ 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>

providing a seamless bill payment experience to customers.¹⁷² 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.¹⁷³ However, to encourage greater participation, the RBI expanded the scope of the BBPOUs to include non-bank payment aggregators as well.¹⁷⁴ 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 FY25-26.¹⁷⁵ 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.¹⁷⁶ Furthermore, aside from basic utilities, BBPS can now also 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.¹⁷⁷ 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.¹⁷⁸

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.

¹⁷² 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

¹⁷³ 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

¹⁷⁴ 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

¹⁷⁵ Bharat Connect Website. Retrieved on July 23, 2025 from: <https://www.bharat-connect.com/statistics/>

¹⁷⁶ 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. *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

¹⁷⁷ 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>

¹⁷⁸ 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

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.¹⁷⁹
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. - 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.¹⁸⁰
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.¹⁸¹
Usability	BBPS is available in multiple regional languages and provides voice calling services for the application's use on feature phones.¹⁸²
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.

¹⁷⁹ 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>

¹⁸⁰ 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>

¹⁸¹ 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

¹⁸² 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>

	Further, an entity has to comply with the FDI Policy and regulations framed under the Foreign Exchange Management Act, 1999 (FEMA), if applicable.¹⁸³
<i>Last mile Delivery</i>	With the introduction of the UPI 123Pay, BBPS can now be accessed by anyone and does not require smartphones to use the system.¹⁸⁴
<i>Affordability</i>	Transactions under BBPS are being pushed to be made free of cost by the government.¹⁸⁵
<i>Consumer Centricity and Trust-based Approach</i>	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.¹⁸⁶In 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.¹⁸⁷
<i>Participatory Process</i>	BBPS was launched through a pilot program in 2016 and has been expanded since then depending on the results of the pilot.¹⁸⁸

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.

¹⁸³ Spiceroutelegal. (2023). *Bharat Bill Payment System*. Spice Route Legal. Retrieved on November 7, 2023 from <https://spiceroutelegal.com/bharat-bill-payment-system/>

¹⁸⁴ 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>

¹⁸⁵ 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 <https://inc42.com/buzz/govt-doesnt-support-charging-fee-from-users-for-bbps-transactions-report/>

¹⁸⁶ Spiceroutelegal. (2023). *Bharat Bill Payment System*. Spice Route Legal. Retrieved on November 7, 2023 from <https://spiceroutelegal.com/bharat-bill-payment-system/>

¹⁸⁷ 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

¹⁸⁸ 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

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.¹⁸⁹ 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,¹⁹⁰ 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.¹⁹¹ First and foremost, the banking companies can register themselves as both Payer and Payee PSPs which enables users to on-board, link bank accounts, and pay/receive funds into their bank account.¹⁹² Furthermore, UPI envisages the role for third-party service providers or TPAPs which provide technology solutions and platform capabilities for the banks and customers.¹⁹³

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.¹⁹⁴ By utilising the simple facilities of calling and IVR, the users can perform the function onboard, receiving and transferring funds on the UPI platform.¹⁹⁵ 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.¹⁹⁶ 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.¹⁹⁷

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.¹⁹⁸ 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,¹⁹⁹ with an

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 NPCI. *UPI Product Statistics*. NPCI. from

<https://www.npci.org.in/what-we-do/upi/product-statistics>

¹⁹¹ 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>

¹⁹² 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>

¹⁹³ 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>

¹⁹⁴ 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

¹⁹⁵ 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>

¹⁹⁶ 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>

¹⁹⁷ 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/>

¹⁹⁸ NPCI. *NPCI International*. Retrieved on November 7, 2023, from <https://www.npci.org.in/who-we-are/group-companies/npci-international>

¹⁹⁹ 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>

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.²⁰⁰

To advance the development and utilisation of UPI further, the RBI announced several measures. The proposed initiatives focus on introducing "Conversational Payments" on UPI, 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.²⁰¹

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.²⁰² 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 5000.²⁰³ 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.

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

²⁰⁰Bharadwaj, 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/>

²⁰¹RBI. (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

²⁰²Times 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>

²⁰³The 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>

cybercrime cases were associated with UPI fraud. These frauds can take several forms.²⁰⁴ 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.²⁰⁵ 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.²⁰⁶

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 payments.²⁰⁷ 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.²⁰⁸ Users will now have

²⁰⁴FCRF. (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>

²⁰⁵ 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>

²⁰⁶ 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>

²⁰⁷ETBFSI. (2023, October 16). *How Bhashini is expanding voice-based payment services via UPI, frictionless credit*. ETBFSI.com. Retrieved November 5, 2023, from <https://bfsi.economicstimes.indiatimes.com/news/fintech/how-bhashini-is-expanding-voice-based-payment-services-via-upi-frictionless-credit/104452643>

²⁰⁸Ray, 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

	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.²⁰⁹
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).
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

<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>

²⁰⁹Bharadwaj, 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/>

healthcare services.²¹⁰ 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.²¹¹ In September 2021, the programme was rolled-out on a national level and renamed as the Ayushman Bharat Digital Mission ('ABDM').²¹²

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.²¹³ 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.²¹⁴ The HPR and HFR aim to create a standardised repository of healthcare professionals and health facilities across the country.²¹⁵ 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.²¹⁶

Since the introduction of the National Health Policy in 2017, India has seen some major advancement and implementation of a national digital health ecosystem.²¹⁷ 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.²¹⁸ 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.²¹⁹ The number of health facilities and healthcare professionals registered have reached a level of around 4 Lakh registrations.²²⁰ 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.²²¹ At a global level, efforts have been made by the WHO to advance the objective of digital health.²²² The

²¹⁰ 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/PressReleaseDetail.aspx?PRID=1646049>.

²¹¹ National Health Authority. (2023). *About NHA*. Retrieved on November 7, 2023, from <https://nha.gov.in/NHA>.

²¹² 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>.

²¹³ NHA. (2023). *Ayushman Bharat Digital Mission Components*. National Health Authority. Retrieved on November 7, 2023, from <https://ndhm.gov.in/abdm-components>.

²¹⁴ NHA. (2023). *Ayushman Bharat Digital Mission (ABDM)*. National Health Authority. Retrieved on November 7, 2023, from <https://abdm.gov.in/abdm>.

²¹⁵ NHA. (2023). *Ayushman Bharat Digital Mission Components*. National Health Authority. Retrieved on November 7, 2023, from <https://ndhm.gov.in/abdm-components>.

²¹⁶ NHA. (2023). *Ayushman Bharat Digital Mission, Create ABHA Account*. National Health Authority. Retrieved on November 7, 2023, from <https://phr.abdm.gov.in/>.

²¹⁷ 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

²¹⁸ PIB Delhi (2025, February 11) *Update on the implementation of Ayushman Bharat Digital Mission (ABDM)*. Ministry of Health and Family Welfare. Retrieved on July 22, 2025 from <https://www.pib.gov.in/PressReleaseDetail.aspx?PRID=2101737>

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

²¹⁹ NHA. (2023). *ABDM Insights*. National Health Authority. Retrieved on November 27, 2023, from <https://dashboard.abdm.gov.in/abdm/>

²²⁰ NHA. (2023). *ABDM Insights*. National Health Authority. Retrieved on November 27, 2023, from <https://dashboard.abdm.gov.in/abdm/>.

²²¹ 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>.

²²² Swaminathan, S. Et al (2021). *Global Strategy for Digital Health, 2020-2025*. World Health Organisation. Retrieved on November 21, 2023 from

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.²²³

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 security and privacy of personal data, as well as the maintenance of electronic medical and health records,²²⁴ 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.²²⁵ 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.²²⁶
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.

<https://iris.who.int/bitstream/handle/10665/344249/9789240020924-eng.pdf?sequence=1&isAllowed=y>

²²³ 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>

²²⁴ 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

²²⁵ 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/>

²²⁶ 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

<i>Enabling Regulatory Environment</i>	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 followed by all the participants/stakeholders of the Ayushman Bharat Digital Mission (ABDM) ecosystem.²²⁷
<i>Usability</i>	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.
<i>Accountability</i>	The strategy paper on NDHM provides that the system will be designed to measure accountability of all health providers.
<i>Last mile Delivery</i>	- 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.
<i>Affordability</i>	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.
<i>Consumer Centricity and Trust-based Approach</i>	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.
<i>Participatory Process</i>	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 management. Each of these processes is time-consuming and costly, impacting the profits earned by an LSP. By taking these

²²⁷ 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>

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 offerings²²⁸ 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.²²⁹ 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.
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.

²²⁸ 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/>.

²²⁹ 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/>.

<i>Usability</i>	• 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.
<i>Accountability</i>	• 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.
<i>Last mile Delivery</i>	• 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.
<i>Affordability</i>	• To access OCEN, an individual needs a smartphone and requires GST registration.
<i>Consumer Centricity and Trust-based Approach</i>	• 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.
<i>Participatory Process</i>	• 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.²³⁰ 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.²³¹ 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.²³² 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 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.²³³

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

²³⁰ 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>

²³¹ 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/wp2021052-print-pdf.ashx>

²³² 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/>

²³³ Dubey, E. (2023, December 6). *Open banking API: A step-by-step guide with examples*. Cashfree Payments Blog. Retrieved November 26, 2023, from <https://www.cashfree.com/blog/open-banking-api/#What-Led-To-the-Growth-of-Open-Banking-in-API>

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.²³⁴ 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.²³⁵

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.

²³⁴ 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

²³⁵ 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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