

Digital Public Infrastructure and Financial Self-Reliance: Reimagining India's Banking and Payments Ecosystem under Atmanirbhar Bharat

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Information of Article	ABSTRACT
Article history: Received: 01 July 2026 Presented: 22 August 2026 (INSPIRE-2026, GIBS Bengaluru) Keywords: Digital Public Infrastructure UPI Financial Inclusion Atmanirbhar Bharat DBT Digital Payments Banking Ecosystem Financial Resilience NPCI India Stack	Digital Public Infrastructure (DPI) — publicly governed, interoperable, and built to work at population scale — has become central to how India approaches financial inclusion, welfare delivery, economic resilience, and institutional modernisation. This paper examines the role of DPI in advancing the developmental vision of Atmanirbhar Bharat, analysing its contribution across five dimensions: financial inclusion, transaction efficiency, MSME credit expansion, fiscal governance, and payment sovereignty within India's banking and payments ecosystem. The study adopts a descriptive, analytical, and policy-oriented design, combining qualitative policy analysis with quantitative trend interpretation of secondary data for 2015–2025, organised through a three-pillar framework of infrastructure expansion, inclusion and resilience outcomes, and governance and sustainability. UPI transaction volumes grew from 1,079 crore in 2019 to over 20,849 crore in 2024, while cumulative DBT transfers crossed ₹30 lakh crore and eliminated an estimated ₹4 lakh crore in leakages. The Account Aggregator framework, together with UPI transaction histories, expands MSME formal credit penetration by reducing information asymmetry. The evidence supports all four hypotheses: DPI improves financial inclusion, digital payments strengthen MSME credit access, DPI reinforces financial resilience and payment sovereignty, and its effectiveness depends on regulatory governance and cybersecurity preparedness. Financial self-reliance in the digital age is built through infrastructure, not isolation.

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1. Background

Few digital governance transitions anywhere in the world compare in scale to what has happened inside India's financial system over the last ten years. A combination of interoperable platforms, biometric identity, real-time payment rails, and consent-based data-sharing has produced one of the largest public digital ecosystems ever built. Digital Public Infrastructure (DPI) — publicly governed, interoperable, and built to work at population scale — sits at the centre of this shift, and it has become central to how India now thinks about financial inclusion, welfare delivery, economic resilience, and institutional modernisation.

What sets DPI apart from earlier waves of digitisation is that it is not another set of siloed applications. It is foundational plumbing — infrastructure that governments, banks, fintechs, and everyday businesses can build on top of, rather than around. Aadhaar, UPI, DBT, DigiLocker, e-KYC, and the Account Aggregator framework together make up what is widely known as the 'India Stack,' and each of these components does a distinct job within a shared architecture.

It is worth being precise about what Atmanirbhar Bharat actually asks for, because the phrase is often misread as a call for economic isolation. It is not. The vision is about strengthening domestic institutional capacity, building financial resilience, encouraging innovation-led growth, and reducing unnecessary dependence on external systems — while remaining fully engaged with the global economy. Financial infrastructure sits close to the core of that

ambition, since the efficiency of a country's financial system shapes its ability to mobilise savings, allocate capital where it is needed, and deliver public welfare without leakage.

It is easy to forget how recently India's banking system looked very different. Before this transformation, roughly half of India's adult population had no meaningful access to formal banking. Opening an account could take the better part of a week, KYC compliance cost banks somewhere between ₹150 and ₹200 per customer, and welfare subsidies leaked away at a rate of 20 to 40 per cent. Cash, informal middlemen, and unregulated credit filled the gap, especially in rural India.

The turning point came with what is now called the JAM Trinity — Jan Dhan, Aadhaar, and Mobile. Aadhaar gave people a reliable digital identity; Jan Dhan opened bank accounts for those who had never had one; and mobile connectivity carried financial services into places bank branches never reached.

Together, these three pieces built the foundation on which everything else — UPI, DBT, Account Aggregator — was subsequently constructed.

This article works through five lenses to assess what DPI has actually delivered for the Atmanirbhar Bharat agenda: (i) the expansion of financial inclusion; (ii) improvements in state capacity and fiscal governance; (iii) reductions in transaction cost; (iv) better credit access for MSMEs; and (v) gains in payment sovereignty and economic resilience. It also takes a hard look at the governance challenges that rapid digitalisation has brought with it, drawing on evidence from the RBI, NPCI, the World Bank, the IMF, UNDP, and PwC over the period 2015–2025.

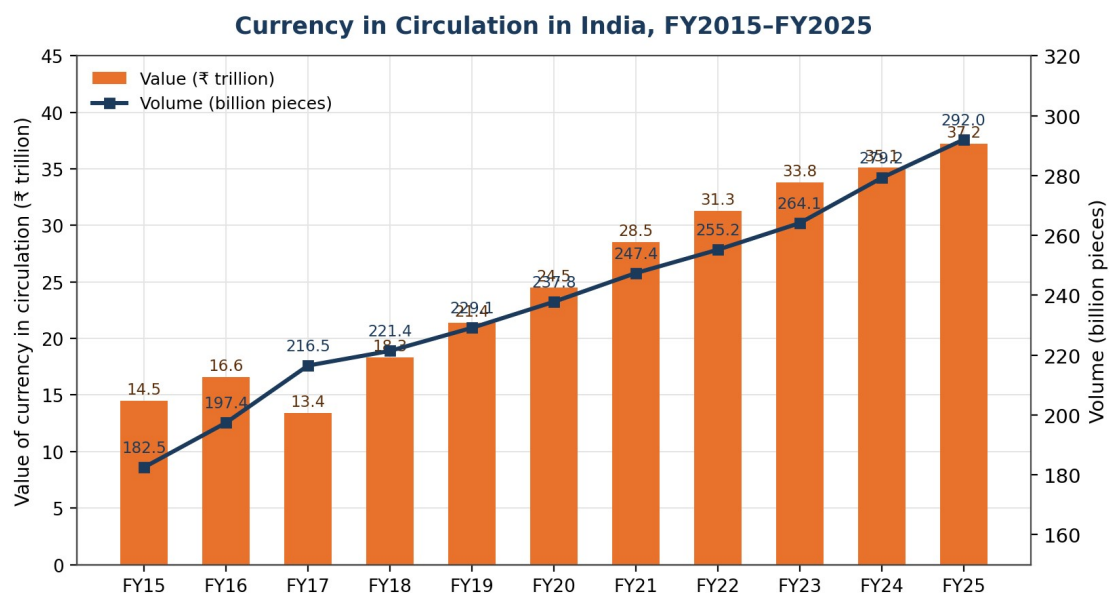


Figure 1: Currency in Circulation in India, FY2015–FY2025 (Source: RBI)

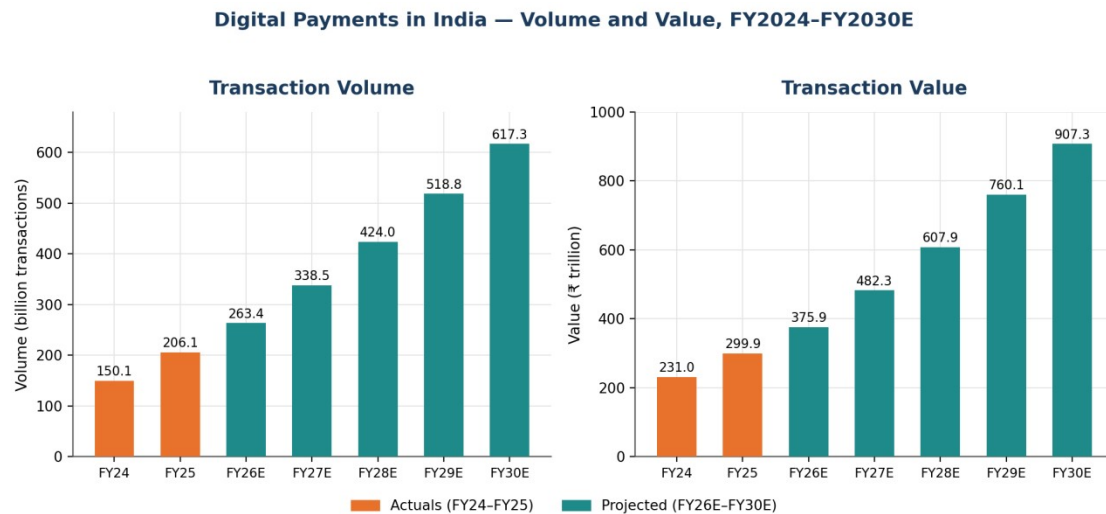


Figure 2: Digital Payments Transactions — Volume and Value, FY2024–FY2030E (Source: PwC Analysis)

A useful way to read Figures 1 and 2 together is that cash in circulation has kept rising in absolute terms — India is still a large, growing economy — but the growth curve for digital transactions is far steeper. Digital payments are on course to more than triple in volume and nearly quadruple in value between FY2024 and FY2030, a trajectory that would have been difficult to imagine a decade ago.

2. Review of Related Literature

A growing body of institutional and academic work has examined how digital financial infrastructure intersects with economic development. The strands most relevant to this study are summarised below.

- Desai et al. (2023) treat DPI as a reusable, horizontal foundation that prevents ecosystems from fragmenting into incompatible silos, pointing to Aadhaar and UPI as well-executed examples. Their central claim is that well-governed DPI creates room for innovation, competition, and productivity gains at the application layer, across many sectors at once.
- The Global Partnership for Financial Inclusion (2023) singles out India's JAM Trinity as a benchmark, arguing that open, interoperable DPI generates network externalities that lower transaction costs and widen economic participation.
- The World Bank (2023) describes India as having built the world's largest and most technically sophisticated DPI for financial inclusion, with particular emphasis on scalability, cost-efficiency, and the quality of its governance arrangements.
- RBI's Payments Vision 2025 lays out five strategic goalposts — Integrity, Inclusion, Innovation, Institutionalization, and Internationalization — that continue to shape India's digital payments trajectory.
- The IMF's Growing Retail Digital Payments report documents that UPI now accounts for roughly 49 per cent of global real-time payment transactions, a figure that alone signals India's position in this space.
- The UNDP DPI Playbook (developed with the G20) frames DPI as a social good — publicly governed, interoperable, and open-access — and positions it as foundational to achieving the Sustainable Development Goals.
- PwC's Indian Payments Handbook 2025–2030 examines the sustainability of the zero-MDR (Merchant Discount Rate) policy, the evolving use cases for UPI, and the trajectory of digital lending.
- Documentation from the Government of India's DBT Mission traces cumulative Direct Benefit Transfers exceeding ₹30 lakh crore, spread across hundreds of schemes and reaching millions of beneficiaries.

- Mahadevan and Srinivasan (IIM Bangalore, 2025) show that India built a national payments backbone at one of the lowest per-transaction costs anywhere in the world, treating NPCI's institutional model as a case study in frugal, transparent infrastructure design.
- IBEF's UPI reporting documents UPI's share of digital payments rising from roughly 34 per cent in 2019 to 83 per cent in 2024 — a compound annual growth rate of around 74 per cent.
- The World Bank Financial Access Survey and IMF data (2024) provide the cross-country panel data on mobile banking, SME credit penetration, and branch density used throughout this study, spanning 2017–2024.
- The Payment and Settlement Systems Act, 2007 (as updated in 2025) establishes the legal basis for oversight of India's payment systems, with the RBI as the designated supervisory authority and clear rules on netting and settlement finality.
- UNDP's G20 Compendium, Accelerating the SDGs through Digital Public Infrastructure, examines how DPI can advance sustainable development across health, education, agriculture, and financial inclusion, treating India's model as a template that other countries might adapt.

3. Objective

The paper dwells in detail on the role of Digital Public Infrastructure in promoting the developmental vision of Atmanirbhar Bharat, analysing its contribution across five core dimensions — financial inclusion, transaction efficiency, MSME credit expansion, fiscal governance, and payment sovereignty — within India's banking and payments ecosystem. The study is organised around five specific objectives:

- Tracing the evolution of DPI within India's banking and payments ecosystem.
- Examining DPI's contribution to financial inclusion.
- Assessing how UPI, DBT, and interoperable payment systems have advanced Atmanirbhar Bharat.
- Evaluating digital payments' effect on MSME credit access.
- Identifying the governance, cybersecurity, and regulatory challenges that remain.

Four hypotheses guide the analysis:

- H1: Digital Public Infrastructure significantly improves financial inclusion in India.
- H2: Growth in digital payments positively influences MSME formal credit penetration.
- H3: DPI strengthens India's financial resilience and payment sovereignty.
- H4: The effectiveness of DPI depends on strong regulatory governance and cybersecurity preparedness.

4. Methods

The study encompasses a descriptive, analytical, and policy-oriented research design, combining qualitative policy analysis with quantitative trend interpretation over the period 2015–2025. This study takes a descriptive, analytical, and policy-oriented approach, pairing qualitative policy analysis with quantitative trend interpretation to assess how digital financial infrastructure affects financial inclusion, governance efficiency, payment sovereignty, and economic resilience. Because DPI is still a relatively young and fast-moving field within financial governance and digital economics, the design remains deliberately exploratory.

4.1 Nature and Sources of Data

The study relies entirely on secondary data drawn from credible institutional reports, policy documents, and international databases. Principal sources include RBI Annual Reports and Payments Vision 2025, NPCI transaction statistics, the World Bank Financial Access Survey and IMF Data Portal, the IMF's Growing Retail Digital Payments report, the UNDP DPI Playbook, DBT Mission documents from the Government of India, PwC's Indian Payments

Handbook 2025–2030, and the IIM Bangalore institutional analysis of NPCI. The study window runs from 2015 to 2025, covering the core period of India's digital financial transformation.

4.2 A Three-Pillar Framework

To keep the analysis organised, the study uses a three-pillar framework for judging DPI's effectiveness. The three pillars interact continuously, and it is their combined effect — not any one pillar alone — that determines how much DPI contributes to financial self-reliance and economic resilience under Atmanirbhar Bharat.

Pillar I — Infrastructure Expansion	Pillar II — Inclusion & Resilience Outcomes	Pillar III — Governance & Sustainability
UPI transaction growth	Financial inclusion metrics	Regulatory reforms
Mobile banking transactions	DBT coverage	Cybersecurity preparedness
QR-code deployment	MSME credit expansion	Fraud trends & prevention
Digital payment penetration	Transaction cost reduction	Data privacy concerns
Banking access indicators	Household financial resilience	Institutional safeguards

Figure 3: Three-Pillar Analytical Framework for Evaluating DPI Effectiveness — the interaction of these pillars drives the outcome of financial self-reliance and economic resilience under Atmanirbhar Bharat (Source: Authors)

4.3 Tools and Techniques of Analysis

Trend analysis is used to track UPI transaction growth, the expansion of digital banking, and MSME credit trends over time. Comparative analysis sets traditional, branch-based banking against the digital ecosystem, and contrasts pre-DPI and post-DPI financial inclusion indicators. Policy analysis works through RBI's Payments Vision 2025, the architecture of DBT, the Payment and Settlement Systems Act 2007, and the various India Stack initiatives. Finally, conceptual analysis is used to explore the relationships between digital transaction intensity and MSME credit access, between financial inclusion and economic resilience, and between digital infrastructure and payment sovereignty.

5. Findings

UPI transaction volumes have grown from 1,079 crore in 2019 to over 20,849 crore in 2024, while cumulative DBT transfers crossed ₹30 lakh crore and eliminated an estimated ₹4 lakh crore in leakages through Aadhaar-seeded beneficiary verification. The Account Aggregator framework, in combination with UPI transaction histories, is shown to meaningfully expand MSME formal credit penetration by reducing information asymmetry and lowering appraisal costs. The detailed findings, organised by theme, are set out below.

5.1 Conceptual Framework of Digital Public Infrastructure

DPI can be thought of as an intermediate digital layer that lets governments, businesses, and citizens interact seamlessly. Where conventional digitisation tends to produce fragmented, one-off solutions, DPI is deliberately built around open standards, interoperability, scalability, and public governance. UNDP's framing captures this well: DPI is a publicly governed, interoperable, open-access digital architecture that enables both public and private innovation, while reducing transaction costs, increasing transparency, and producing more inclusive outcomes. Its core building blocks typically include digital identity systems, real-time payment rails, data-sharing frameworks, authentication layers, and public registries.

India Stack — Components and Functional Roles

India's version of DPI is among the most developed in the world. Nandan Nilekani's often-quoted line captures its ambition well: India Stack is 'to the digital economy what the railways were to industrial India' — foundational infrastructure that makes broader economic transformation possible. Table 1 sets out the main components and what each one does.

Table 1: India Stack — Components and Functional Roles (Source: RBI, NPCI, World Bank)

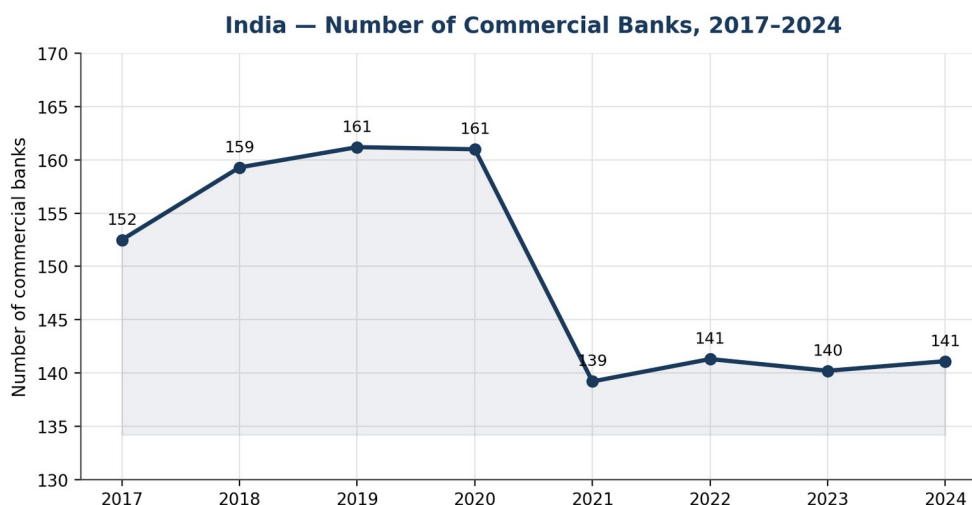
Component	Functional Role
Aadhaar	Biometric digital identity for over 1.4 billion residents
Jan Dhan	Financial inclusion — mass bank account opening across India
Mobile Connectivity	Digital access and financial reach to remote populations
DigiLocker	Trusted digital document storage and verification
e-KYC	Digital verification and streamlined customer onboarding
UPI	Real-time interoperable payments infrastructure at population scale
Account Aggregator	Consent-based financial data sharing enabling credit access

The COVID-19 pandemic ended up being an unplanned stress test for DPI, and it passed convincingly. Countries that already had digital identity and payment systems in place could get social protection benefits to people faster and more transparently than those that did not. In India, DBT rails carried welfare payments straight into beneficiaries' bank accounts even as the economy was disrupted. That episode is a useful reminder that DPI is not merely a technological layer — it functions as institutional infrastructure, one that improves governance efficiency, transparency, and economic participation all at once.

5.2 Financial Inclusion and the Digital Transformation of Banking

Financial inclusion has long been recognised as one of the more reliable predictors of economic development. Access to formal financial services — active accounts, affordable digital payments, credit, and basic consumer protection — builds household resilience, mobilises savings, supports investment, and reduces reliance on informal credit markets. Before DPI, India's banking system carried high KYC compliance costs (₹150–200 per customer), thin rural branch coverage, heavy cash dependence, slow account opening, and welfare leakages of 20–40 per cent. The JAM Trinity changed that picture by enabling digital onboarding at population scale.

The number of commercial banks in India tells an interesting, if secondary, part of this story. Bank numbers rose from roughly 152 in 2017 to a peak of about 161 in 2019, before falling to around 139 by 2021 — largely the result of government-driven consolidation among public sector banks. Since then, the count has stabilised near 141, suggesting a sector that has become leaner and more consolidated even as digital reach has expanded.

**Figure 4:** India — Number of Commercial Banks, Annual, 2017–2024 (Source: World Bank Financial Access Survey / IMF)

What is notable is that this consolidation happened without a corresponding contraction in access. Physical branch density held broadly steady, at roughly 14.3–14.6 branches per 100,000 adults, while mobile and internet banking

transactions grew from around ₹20–30 trillion in 2020 to an extraordinary ₹130 trillion by 2024. In other words, the banking system shifted from being branch-centric to mobile-centric, delivering efficiency gains that did not require a matching build-out of physical infrastructure.

Expansion of Digital Payments

The most visible sign of India's shift to digital finance is the sheer growth of UPI. By the first half of 2025, digital payments accounted for close to 99.8 per cent of all payment volume and 97.7 per cent of total transaction value. UPI's own share of India's digital payments climbed from around 34 per cent in 2019 to 83 per cent in 2024 — a compound annual growth rate of roughly 74 per cent. India now processes close to 49 per cent of the world's real-time payment transactions through UPI alone (IMF; IBEF).

A few statistics illustrate the scale of this shift:

- UPI transaction volumes crossed 20,849 crore annually in 2024, up from 1,079 crore in 2019 (NPCI).
- Transaction value reached ₹2,830 lakh crore in 2024, up from ₹18.4 lakh crore in 2019.
- Monthly UPI transactions crossed 19 billion in 2025, worth more than ₹24.5 lakh crore (The Economic Times).
- More than 688 banks now participate in the UPI ecosystem, serving 491 million individuals and 65 million merchants (NPCI, August 2025).
- The Payments Infrastructure Development Fund (PIDF) has enabled 5.45 crore digital touch points and more than 56 crore QR codes across roughly 6.5 crore merchant entities.

UPI Transactions — Volume and Value, FY2024-FY2030E

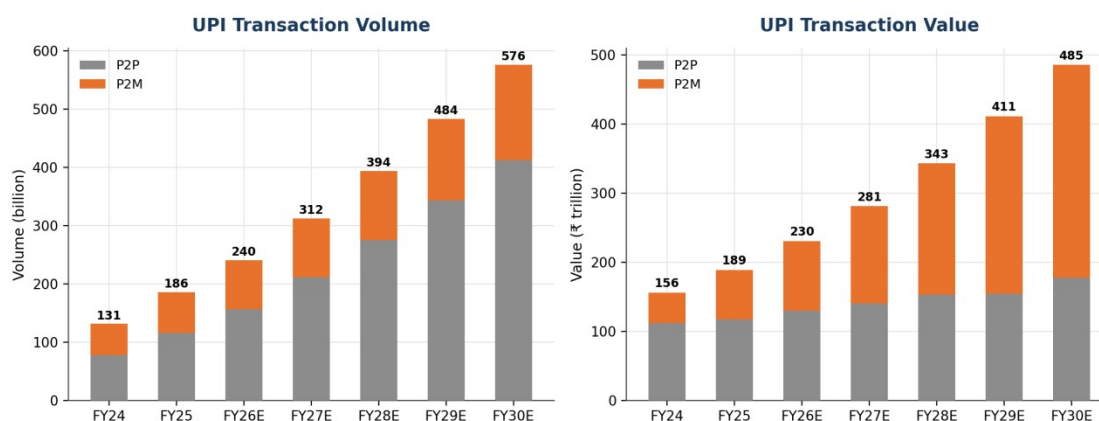


Figure 5: UPI Transactions — Volume and Value (P2P and P2M split), FY2024–FY2030E (Source: RBI; NPCI; PwC Analysis)

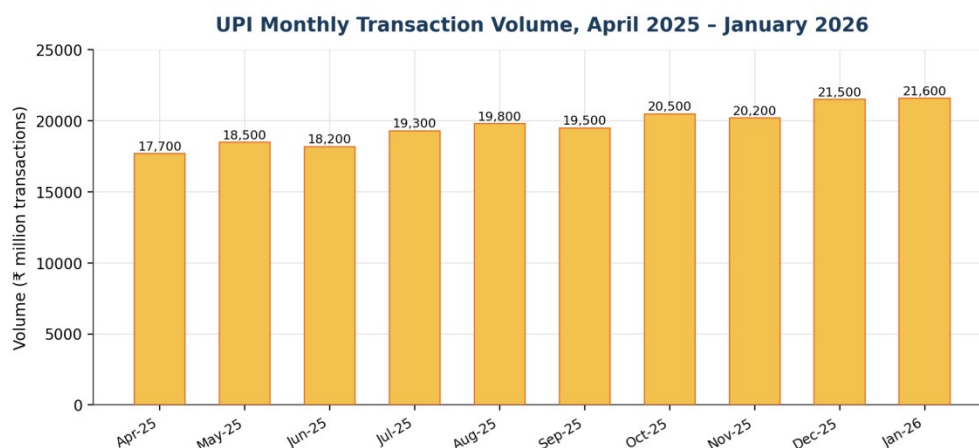
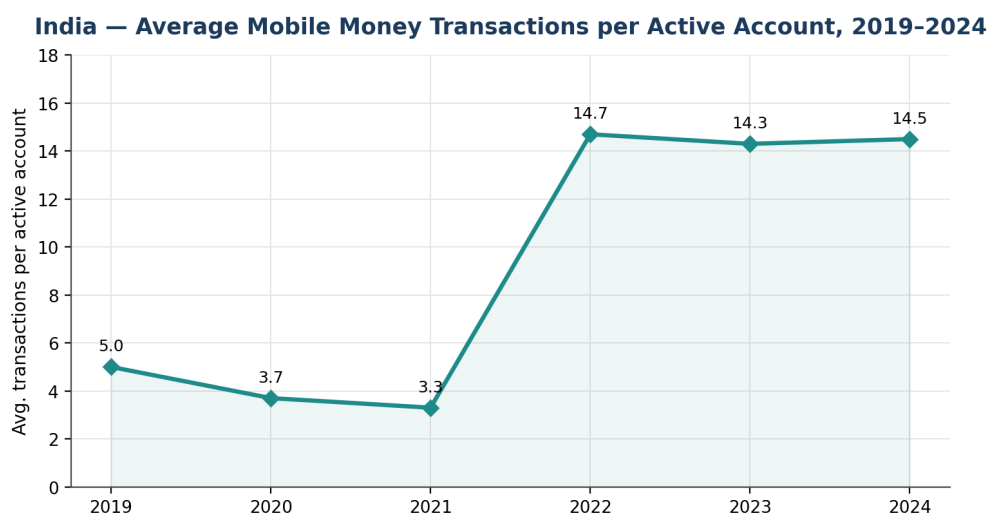


Figure 6: UPI Monthly Transaction Volume, April 2025 – January 2026 (Source: NPCI)**Commercial Banking Transformation**

The shift from physical to digital delivery channels shows up clearly in the numbers. Assets held by credit unions and cooperatives grew steadily from around ₹8 million in 2017, accelerating after 2020 and reaching close to ₹13 million by 2024 — evidence that cooperative institutions have been deepening their reach into semi-urban and rural credit markets alongside the larger digital push. Meanwhile, the value of mobile and internet banking transactions rose from negligible levels in 2017–18 to well above ₹1,300,000 million by 2024, which points not just to more transactions but to progressively higher-value payments moving through digital channels.

Financial Inclusion Outcomes

DPI's contribution to financial inclusion shows up across several dimensions at once: more bank accounts, more transaction activity, lower transaction costs, better welfare access, and greater participation by small merchants. Between 2021 and 2022–23, average mobile money transactions per active account nearly quadrupled, reaching about 15 transactions annually. Mobile money transaction counts rose from roughly 1 billion in 2017 to nearly 6.3 billion by 2024 — almost a sixfold increase. Registered mobile money accounts grew dramatically as well, from about 200 million in 2017 to close to 2 billion by 2021, tracking the parallel explosion in UPI-linked and digital wallet accounts. On average, every adult in India now conducts roughly six mobile money transactions a year — a fair indicator of how mainstream digital payments have become across demographic groups.

**Figure 7: India — Average Mobile Money Transactions per Active Account, Annual, 2019–2024 (Source: World Bank Financial Access Survey / IMF)****5.3 DPI, DBT, and Fiscal Governance**

Direct Benefit Transfer (DBT), introduced on 1 January 2013, changed how India delivers welfare — moving it toward efficient, transparent, and targeted disbursement. It began in just 43 districts and expanded nationwide from 12 December 2014. The JAM Trinity underpins the entire DBT system: more than 22 crore Jan Dhan accounts, 100 crore Aadhaar enrolments, and roughly 100 crore mobile connections together give India an implementation capacity for welfare delivery that few other countries can match.

As of January 2026, the Pradhan Mantri Jan-Dhan Yojana (PMJDY) has enrolled 57.37 crore beneficiaries across public sector banks, regional rural banks, private sector banks, and rural cooperative banks. Deposits held in these accounts stood at over ₹2,83,201 crore — a fair measure of just how deep financial inclusion has gone under the Jan Dhan programme. The scheme has also issued 39.63 crore RuPay debit cards, pulling beneficiaries further into the digital payments ecosystem.

The governance dividends from this architecture are substantial:

- Cumulative savings of roughly ₹4 lakh crore between 2014 and 2024, achieved by eliminating duplicate and 'ghost' beneficiaries.
- Aadhaar seeding has removed duplicate beneficiaries, ensuring welfare reaches only verified individuals.
- During COVID-19, digital transfers delivered fiscal support to targeted beneficiaries quickly and without any need for physical contact.
- Real-time monitoring of fund flows across schemes has meaningfully improved transparency and accountability.
- Cumulative DBT transfers have now crossed ₹30 lakh crore across hundreds of schemes and millions of beneficiaries.

Table 2 below draws on the DBT Performance Ranking of States/UTs, which scores India's federal units on parameters such as State Aadhaar Act adherence, Aadhaar saturation, CSS identification, portal compliance, data reporting, and savings/expenditure ratios. Haryana, Uttar Pradesh, and Tripura lead the overall rankings — a result that underlines how much institutional capacity and inter-governmental coordination matter for effective DBT implementation, quite apart from the underlying technology.

Table 2 (summary): DBT Performance Ranking of States/UTs — top and bottom performers (Source: DBT Mission, Government of India)

Rank	State/UT	Overall Score
1	Haryana	88.8
2	Uttar Pradesh	85.2
3	Tripura	80.2
4	Gujarat	77.3
5	Uttarakhand	74.3
...	...	...
34	Telangana	29.6
35	Assam	26.4
36	West Bengal	13.2

5.4 Digital Public Infrastructure and MSME Credit Expansion

MSMEs occupy an outsized place in India's economy relative to their size, contributing heavily to employment, exports, and GDP. Yet they have historically struggled to access formal credit, hampered by weak collateral, information asymmetry, thin financial documentation, and the simple fact that small-ticket lending is expensive to underwrite. DPI has the potential to change this picture by attacking the information problem directly, rather than working around it.

Digital payment systems generate a running transaction history that functions as an alternative measure of creditworthiness. Combined with the Account Aggregator framework, which allows consent-based sharing of financial data between borrowers and lenders, this creates a data-rich environment for credit assessment — one that depends much less on physical collateral or a conventional credit history, both of which have historically shut small enterprises out.

The implications for MSME financing run in several directions at once:

- Digital footprints reduce information asymmetry, lowering credit appraisal costs and enabling faster underwriting.
- Real-time transaction data speeds up credit appraisal, compressing lending cycles from weeks down to days.

- Lower transaction costs for lenders make smaller-ticket lending commercially viable in a way it previously was not.
- Formal credit is reaching segments that were previously underserved, reducing reliance on informal, high-cost credit.
- Combining GST data, UPI transaction histories, and Account Aggregator-sourced financial statements allows for a more holistic view of creditworthiness.

SME lending by commercial banks has followed a remarkably steady upward path. Outstanding loan assets grew from roughly ₹10,000,000 million in 2017, continued expanding through the pandemic years, and accelerated sharply after 2021. By 2024, outstanding SME loans had reached approximately ₹21,500,000 million — more than double the 2017 figure — a trend that reflects both stronger institutional appetite for SME lending and the effectiveness of MSME credit guarantee schemes.

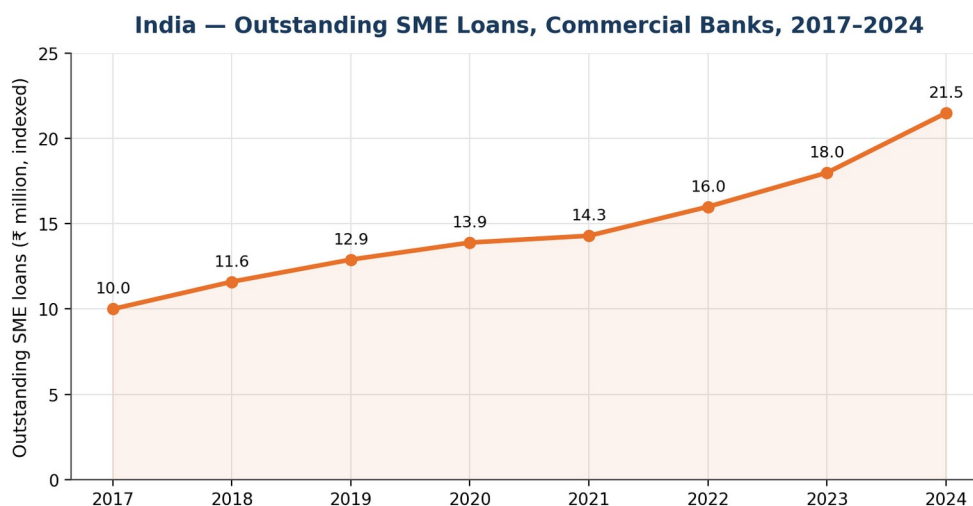


Figure 8: India — Outstanding SME Loans, Commercial Banks, Annual, 2017–2024 (Source: World Bank Financial Access Survey / IMF)

State-level panel data reinforces this pattern: a one per cent increase in digital transaction intensity is associated with a statistically significant rise in MSME formal credit penetration, and states with higher UPI adoption consistently show lower reliance on informal credit. This is precisely the relationship Hypothesis H2 predicts, and it carries real policy weight for anyone thinking about digital infrastructure as a lever for strengthening credit access among small enterprises.

5.5 Payment Sovereignty and Financial Self-Reliance

Financial self-reliance, in a globalized economy, does not mean cutting ties with international financial systems. It means something more specific: the capacity to mobilize domestic savings effectively, run resilient payment systems, deliver public transfers transparently, and avoid unnecessary dependence on foreign-controlled financial infrastructure. India's digital payment ecosystem has done a great deal to strengthen this kind of sovereignty, largely by building domestic, interoperable payment rails at national scale.

The National Payments Corporation of India (NPCI) — a not-for-profit institution established under the Payment and Settlement Systems Act 2007 — is the institutional anchor of India's payment sovereignty. NPCI operates UPI, RuPay, IMPS, NACH, AePS, FASTag, NFS, and CTS, which together form the backbone of the country's financial transactions. Mahadevan and Srinivasan (IIM Bangalore, 2025) document how NPCI has combined frugality with operational discipline to build a national payments backbone at one of the lowest per-transaction costs in the world. India now accounts for close to half of global real-time payment transactions.

RBI's Payments Vision 2025 reinforces this direction through its '4Es' theme — E-Payments for Everyone, Everywhere, Every time — aimed at making every e-payment option safe, secure, fast, convenient, accessible, and affordable. This is organized around five anchor goalposts: Integrity, Inclusion, Innovation, Institutionalization, and Internationalization.

UPI Pricing and Sustainability

The government's zero Merchant Discount Rate (MDR) policy has clearly accelerated UPI adoption, but it has also raised a legitimate question about long-run financial sustainability. UPI transactions currently generate no direct revenue, with the associated costs absorbed through government subsidy. Industry participants have flagged, consistently, that a zero-MDR framework leaves a structural funding gap for payment infrastructure. Balancing affordability against financial viability is likely to be one of the central policy challenges of the next phase, and it may eventually call for new revenue models or some re-calibration of the MDR framework — one that keeps the inclusion gains intact while putting infrastructure financing on a more sustainable footing.

Global Leadership and Strategic Positioning

India's DPI model is increasingly being looked at by other emerging economies as a possible template. India has entered UPI linkage agreements with Singapore, the UAE, France, Nepal, Bhutan, and Sri Lanka, and continues to push the internationalization of RuPay. These collaborations reinforce India's standing in global digital governance while keeping domestic autonomy intact — a genuine example of self-reliance operating alongside, rather than against, international engagement. The G20 India Presidency's Framework for Systems of Digital Public Infrastructure has further cemented India's leadership role in promoting DPI as a development tool worldwide.

5.6 Contributions

The paper offers a three-pillar framework for evaluating DPI effectiveness and identifies governance risks — cybersecurity fraud, data privacy, and the digital divide — that must be addressed to sustain these gains. It can be argued that financial self-reliance under Atmanirbhar Bharat is achieved through infrastructure-led inclusion rather than isolationist policy, and that the country's NPCI-anchored model of payment sovereignty offers a globally replicable template for other emerging economies.

5.7 Governance Challenges and Emerging Risks

For all its success, India's DPI ecosystem still faces real governance and institutional challenges. Data-driven governance gives the administration a powerful ability to design, implement, and monitor financial programmes — but that same capability brings a wide set of risks that need to be addressed proactively rather than after the fact.

Cybersecurity Risks

Digital payments have grown fast, and fraud has grown alongside them. Fraud transactions rose from 2.0 million in FY24 to 2.4 million in FY25. UPI fraud losses reached ₹5,730 million in 2022–23 (0.4 per cent of total UPI value), climbing to ₹11 billion in 2023–24 (0.5 per cent). By September 2024, 632,000 UPI fraud cases had been reported, with a total fraud value of ₹4,850 million.

The most common patterns behind this fraud fall into three categories: refund fraud, where scammers exploit the ease of P2P transfers by falsely claiming a mistaken payment and pressuring victims to 'return' funds; AI-driven impersonation, where deep-fake voice or video is used to pose as bank officials and extract OTPs or authorization for payments; and mule account fraud, where individuals are recruited — often through fake job offers — to move stolen funds through their own bank accounts, obscuring the money trail. Despite existing safeguards such as device binding, two-factor authentication, daily transaction limits, and use-case restrictions, fraud incidence keeps climbing. Centralized fraud databases and AI-based detection systems, including the MuleHunter AI initiative, are under active development and represent one of the more important frontiers in payment security right now.

Data Privacy and Governance

As digital identity and transaction data become more centralized, concerns naturally arise around privacy, data ownership, surveillance risk, and algorithmic discrimination. Getting the governance architecture right means balancing continued innovation against rights-based safeguards, in step with India's evolving data protection legislation. Transparent grievance redressal, meaningful consent mechanisms, and genuine algorithmic accountability are not optional extras here — they are what sustains public trust in DPI systems over time.

Digital Divide

Gaps in digital literacy, internet connectivity, smartphone access, and regional infrastructure persist, and they are sharpest in remote and tribal areas. Without deliberate, targeted intervention, digital transformation risks reinforcing exclusion among the very populations it is meant to help — undermining the inclusive development goals that Atmanirbhar Bharat is built around. Gender gaps in digital access deserve particular policy attention if DPI's benefits are to be shared equitably.

Sustainability of Free Payment Models

The zero-MDR policy has clearly done its job in accelerating adoption, but it leaves open a longer-run question about how payment infrastructure gets financed. Getting this balance right — affordability on one side, financial sustainability on the other — will likely require new revenue models or a rethink of the MDR framework.

Legacy Systems and Implementation Challenges

Rolling DPI out successfully means overcoming institutional inertia and integrating it with legacy systems still in use across banking, insurance, and government services. That, in turn, calls for building in data protection and security from the design stage rather than bolting it on afterward, adopting a genuinely human-centred approach to service delivery, investing in capacity building at both the institutional and individual level, and fostering collaboration across government, the private sector, civil society, and other stakeholders.

5.8 Policy Implications and Future Roadmap

India's experience with Digital Public Infrastructure carries lessons that extend well beyond its own borders. Sustaining and deepening the gains already made will likely depend on the following set of policy interventions.

Strengthening Regulatory Architecture

- Establish a unified Digital Financial Consumer Protection framework to safeguard user interests consistently across platforms.
- Mandate AI audit trails within digital credit algorithms, to keep decisions transparent and guard against discriminatory outcomes.
- Expand regulatory sandbox mechanisms to allow controlled experimentation in digital finance.
- Strengthen interoperability standards across payment systems to prevent the ecosystem from re-fragmenting.

Cybersecurity and Resilience

- Set up a National Digital Financial Resilience Fund to finance infrastructure upgrades and incident response.
- Require periodic stress testing of payment infrastructure to surface vulnerabilities before they are exploited.
- Deepen public-private cybersecurity coordination through structured information sharing and joint response protocols.
- Build out centralised fraud-monitoring systems and AI-based fraud detection, including initiatives like MuleHunter AI.

Expanding MSME Financial Inclusion

- Integrate UPI transaction data into formal credit scoring frameworks to widen credit access.
- Expand credit guarantee schemes for digitally verified MSMEs, reducing risk on the lender side.

- Strengthen Account Aggregator adoption in rural enterprises to enable consent-based credit assessment.

Bridging the Digital Divide

- Expand digital literacy missions and multilingual digital interfaces to reach non-English-speaking populations.
- Use subsidy frameworks to incentivise QR infrastructure deployment in low-income geographies.
- Direct targeted investment toward digital infrastructure in underserved regions.

Internationalization of India's DPI Model

India's DPI ecosystem is well placed to serve as a replicable model for other emerging economies. Strategic collaboration around digital payments and financial infrastructure can strengthen India's standing in global digital governance while preserving domestic autonomy. The next phase will likely focus on extending infrastructure into underserved areas, improving fraud prevention, exploring agentic AI, creating new UPI use cases, supporting innovation in lending and embedded finance, and further strengthening regulatory frameworks (PwC — The Indian Payments Handbook 2025–2030). India's bilateral UPI linkages and the G20 DPI Framework offer useful multilateral platforms for carrying this agenda forward.

6. Conclusion

Digital Public Infrastructure has, in a fairly short span of time, reshaped India's banking and payments ecosystem into something scalable, interoperable, and genuinely inclusive. The combination of Aadhaar, Jan Dhan, mobile connectivity, UPI, DBT, and the Account Aggregator framework has strengthened financial inclusion, brought transaction costs down, improved fiscal governance, widened MSME credit access, and enhanced payment sovereignty all at once. India now accounts for close to half of global real-time payment transactions, which is itself a striking demonstration that national-scale financial infrastructure can be built and run with real efficiency, and at low cost.

The broader lesson here is that financial self-reliance in the digital age is built through infrastructure, not through isolation. India's experience shows that publicly governed, interoperable platforms can support innovation, inclusion, and institutional resilience all at the same time, rather than forcing a trade-off between them. The evidence gathered in this study supports all four of the hypotheses set out at the start: DPI has meaningfully improved financial inclusion (H1); growth in digital payments has positively influenced MSME formal credit penetration (H2); DPI has strengthened India's financial resilience and payment sovereignty (H3); and DPI's effectiveness continues to depend on strong regulatory governance and cybersecurity preparedness (H4).

None of this progress is self-sustaining, however. Keeping it on track will require continued investment in cybersecurity architecture, data protection frameworks, AI governance mechanisms, institutional capacity, and digital literacy. Closer attention to system harmonisation, local capacity building, regulatory innovation, and genuine stakeholder collaboration would help DPI continue serving as a backbone for both government services and business development, without losing sight of citizen safety along the way. The DBT architecture's demonstrated ability to eliminate roughly ₹4 lakh crore in leakages, the Jan Dhan programme's enrolment of more than 57 crore beneficiaries, and UPI's emergence as the world's leading real-time payment platform together make a fairly compelling case for what well-designed digital public infrastructure can achieve.

The next phase of India's digital financial evolution has to move past pure expansion and toward resilience, trust, and governance maturity. Digital Public Infrastructure has become something more than a technological innovation — it now functions as the financial backbone of Atmanirbhar Bharat. Whether that continues to hold will depend on India's ability to balance scale with security, innovation with regulation, and digital efficiency with inclusive development — a balance that, if maintained, offers a genuinely replicable model for inclusive digital development elsewhere.

6.1 Research Significance

The findings have direct relevance for regulators, financial institutions, and policymakers seeking to strengthen inclusive fintech governance, cybersecurity preparedness, and MSME credit ecosystems. The study also documents the growing international interest — augmented by India's bilateral UPI linkages and the G20 DPI Framework — in adapting India's DPI model to advance financial inclusion and resilience goals across other developing economies. India has entered UPI linkage agreements with Singapore, the UAE, France, Nepal, Bhutan, and Sri Lanka, and the G20 India Presidency's Framework for Systems of Digital Public Infrastructure has cemented India's leadership role in promoting DPI as a development tool worldwide, positioning the country's NPCI-anchored model as a template that other emerging economies are actively studying.

6.2 Scope for Future Research

This study offers a fairly comprehensive assessment of DPI's contribution to Atmanirbhar Bharat through India's banking and payments ecosystem, but several avenues remain open for deeper scholarly inquiry.

Future research could usefully examine:

- Long-term causal relationships between DPI adoption and household financial resilience, using longitudinal primary surveys rather than secondary aggregates.
- The growing role of AI and machine learning in credit underwriting and fraud detection within the DPI ecosystem.
- Cross-country comparative work on how India's DPI model might translate — or fail to translate — to Sub-Saharan Africa, Southeast Asia, and Latin America.
- The gender dimensions of DPI adoption, and how effectively it is closing (or not closing) financial access gaps between men and women.
- The convergence of CBDCs, Account Aggregator frameworks, and open banking architectures as they mature alongside one another.
- The interplay between digital financial systems and cybersecurity governance as India's data protection legislation continues to evolve.

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