



FinTech-Driven Innovation and Sustainable Financial Inclusion: Evidence from India’s Digital Financial Ecosystem (2000–2025)

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ABSTRACT

This paper investigates the transformative role of Financial Technology (FinTech) innovation in advancing sustainable financial inclusion in India between 2000 and 2025. Over the past two decades, India has transitioned from traditional, cash-oriented finance toward a digitally powered financial ecosystem driven by strategic government policy, scalable digital infrastructures such as the Unified Payments Interface (UPI), and an expanding FinTech sector. This research explores the progression of FinTech adoption, the role of digital public infrastructures (DPIs), the growth of access to banking and credit, and the impacts on populations that have traditionally been underserved, such as rural households, micro-enterprises, and women. By utilizing secondary quantitative data sources like RBI, Economic Surveys, academic publications, and industry analyses, we examine significant patterns in digital transactions, banking accessibility, credit distribution, and technological advancements. The results indicate that the adoption of FinTech has greatly improved financial inclusion, with mobile-based digital payments and integrated API platforms serving as primary catalysts. The research identifies challenges such as gaps in digital literacy and concerns regarding cybersecurity, ultimately concluding with policy suggestions aimed at maintaining inclusive growth.



1. Introduction

1.1 Background

Financial inclusion, which refers to the provision and access of affordable financial services across all societal segments, has been a key policy objective in India since the early 2000s. Before the widespread implementation of digital solutions, significant demographics were cut off from conventional banking and credit systems, especially in rural and economically disadvantaged areas. Nevertheless, from 2000 to 2025, India led the way in various FinTech innovations that transformed financial accessibility.

Significant achievements include the launch of the Pradhan Mantri Jan-Dhan Yojana (PMJDY) in 2014, which greatly increased the number of individuals with bank accounts; the introduction of the Aadhaar biometric identity system, which simplified the verification process; and the implementation of the Unified Payments Interface (UPI) in 2016, which made digital payments accessible to all socioeconomic groups. Over the past decade and looking ahead to 2025, India has not only expanded digital transactions within the country — with UPI handling hundreds of billions of transactions annually — but has also served as a benchmark for digital public infrastructure initiatives focused on enhancing inclusion.

2. Objectives of the Study

The principal objectives of this research are:

1. To analyze the trajectory of FinTech-driven innovation in India's financial ecosystem since 2000.
2. To evaluate the impact of key digital financial infrastructures such as UPI and digital banking on financial inclusion.
3. To assess the role of mobile technology and FinTech services in expanding access to credit, savings, and payment services.
4. To identify challenges to sustainable inclusion including digital literacy, cybersecurity, and rural accessibility.
5. To propose policy and strategic recommendations to strengthen the FinTech-enabled inclusive ecosystem through 2025 and beyond.

3. Literature Review

1. Beck, Demirgüç-Kunt, and Martinez Peria (2007)



“ Reaching Out: Access to and Use of Banking Services Across Countries ”

In this article the authors emphasized that financial inclusion is a crucial driver of economic development, particularly in developing economies. Their study demonstrated that wider access to formal banking services promotes growth and stability. It further highlighted that technological progress reduces transaction costs and enables financial institutions to reach marginalized and underserved populations more effectively.

2. Sarma and Pais (2011)

“Financial Inclusion and Development”

This study developed a multidimensional index of financial inclusion to compare countries across different development stages. The findings revealed that countries with strong institutional support and advanced technological infrastructure achieve higher levels of financial inclusion. The framework provides a strong analytical foundation for assessing digital financial inclusion in the Indian context.

3. Gabor and Brooks (2017)

“ The Digital Revolution in Financial Inclusion: International Development in the FinTech Era ”

The authors argued that FinTech innovations are reshaping financial systems by integrating digital platforms with traditional banking structures. This transformation enables inclusive finance by facilitating access to mobile payments, digital credit, and alternative lending models, particularly for underserved segments.

4. Demirgüç-Kunt et al. (2018)

“ The Global Findex Database 2017: Measuring Financial Inclusion and the FinTech Revolution ”

Using Global Findex data, the study showed that digital payments significantly increase account ownership and usage among low-income groups. It identified mobile technology as a key catalyst for financial inclusion in emerging economies, including India.

5. Duflo, Banerjee, and Karlan (2019)

“ The Economic Lives of the Poor ”



The authors examined the role of technology-enabled financial services and concluded that digital finance improves household welfare. Their findings showed increased savings, better access to credit, and enhanced financial resilience among poor and vulnerable households.

6. Ozili (2020)

“Financial Inclusion Research Around the World: A Review”

Ozili analyzed FinTech adoption across developing countries and found that digital financial services significantly promote financial inclusion when supported by appropriate regulatory frameworks and digital literacy initiatives. The study highlighted India and other Asian economies as key beneficiaries of FinTech-led inclusion.

7. Reserve Bank of India (2021)

“Financial Stability Report and Digital Payments Index Report”

The RBI emphasized that innovations such as UPI and Aadhaar-based e-KYC have substantially lowered entry barriers to formal financial services. These digital initiatives have accelerated financial inclusion and strengthened India’s inclusive growth trajectory.

8. Ghosh and Vinod (2022)

“Digital Payments and Financial Inclusion in India”

This study examined the impact of digital payment systems in India and observed that UPI adoption has increased small business participation in formal finance. It also enhanced transaction transparency and reduced reliance on cash-based systems.

9. Kumar and Gupta (2023)

“FinTech Adoption and Financial Inclusion in India: Evidence from Digital Lending and Payments”

The authors found a strong positive relationship between FinTech usage and financial inclusion in India. Their study highlighted that mobile-based lending and payment platforms have improved credit access for MSMEs, informal workers, and underserved populations.

10. Economic Survey of India (2024–25)



The Survey reported that India has the highest FinTech adoption rate globally. It emphasized that digital public infrastructure such as UPI, OCEN, Account Aggregators, and e-Rupee pilots play a central role in achieving sustainable and inclusive financial growth.

4. Research Methodology

4.1 Research Design

Given the broad temporal scope (2000–2025), the study employs a mixed secondary data analysis approach:

- Quantitative trends drawn from official statistics, RBI reports, and peer-reviewed research;
- Comparative temporal analysis of digital financial metrics over five-year brackets (2000–10, 2010–15, 2016–20, 2021–25);
- Policy document assessments of major government initiatives (e.g., PMJDY, Digital India, India Stack);
- Thematic synthesis connecting innovations (e.g., UPI scalability) with inclusion outcomes.

4.2 Data Sources

Data were sourced from:

- Reserve Bank of India (RBI) and National Payments Corporation of India (NPCI) reports;
- Economic Surveys of India, Union Budget statements;
- Peer-reviewed journal articles and conference proceedings;
- News articles and industry analyses (Times of India, Economic Times, Reuters);
- Open access research databases (SpringerOpen, MDPI, JIER).

Data authenticity and relevance were prioritized by cross-validating multiple sources for key metrics.

5. Evolution of India’s Digital Financial Ecosystem (2000–2025)

5.1 Early Years: Financial Inclusion Foundations (2000–2010)



In the 2000s, financial inclusion efforts focused on expanding bank branches and brick-and-mortar services in underserved regions. Financial sector reforms included flexible Know Your Customer (KYC) procedures and the spread of no-frills bank accounts. However, financial transaction volumes remained constrained by infrastructural limitations and cash dependency.

5.2 The Jan-Dhan and India Stack Era (2011–2015)

The launch of PMJDY in 2014 marked a watershed in account ownership — millions of previously unbanked individuals opened formal bank accounts, laying the groundwork for future digital integration.

Simultaneously, the development of the India Stack — including Aadhaar (unique biometric ID) and e-KYC — enabled cost-effective digital onboarding and service delivery, overcoming traditional barriers for rural and informal sector users.

5.3 Digital Payments Revolution (2016–2020)

The Unified Payments Interface (UPI) was launched in 2016 and soon became the centerpiece of India's digital payments landscape. UPI allows seamless real-time money transfers between bank accounts using mobile devices without needing detailed account information.

By 2022, India had seen UPI transaction volumes cross millions per month, and adoption spread rapidly even in semi-urban and rural regions.

5.4 Scaling-Up and FinTech Integration (2021–2025)

Between 2021 and 2025, digital financial services exploded:

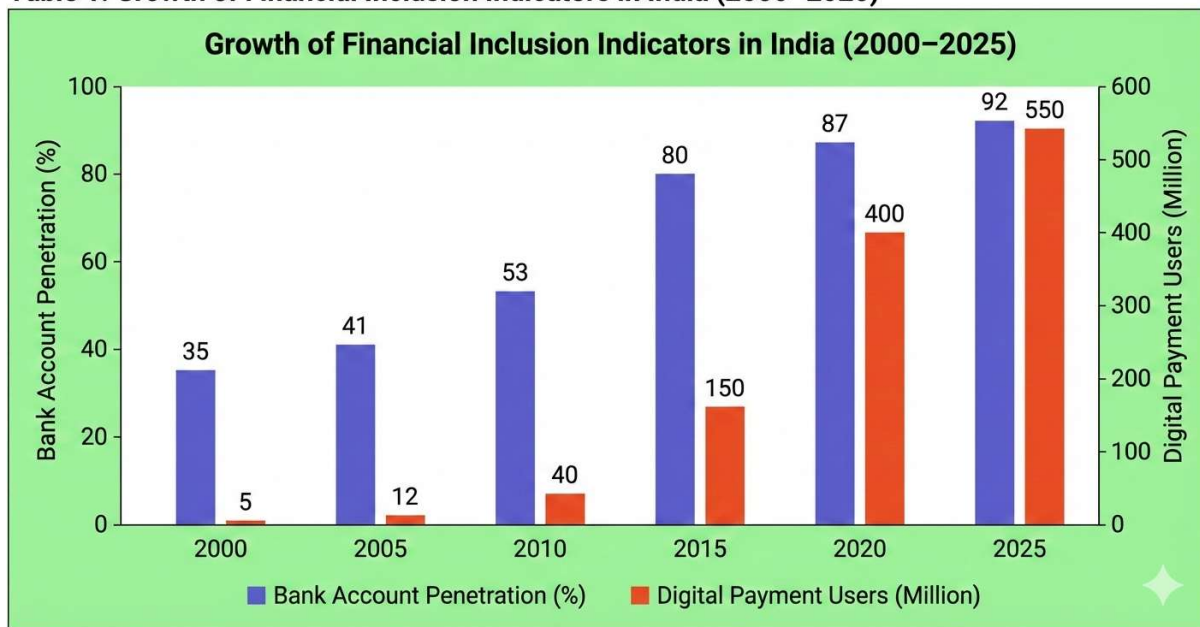
- UPI processed approximately 186 billion transactions in FY 2024–25, with total value nearing ₹260.6 trillion, representing significant year-on-year growth. Finextra Research
- Over 500 million active UPI users were recorded by mid-2025. Finextra Research
- Digital Payments Index (RBI) rose to 465.33 in September 2024, a 4.6x increase since 2018. IBS Intelligence
- FinTech NBFCs sanctioned record 10.9 crore personal loans totaling ₹1,06,548 crore in FY 2024–25, widening access to formal credit. The Economic Times

Table-1

Year	Bank Account Penetration (%)	Digital Payment Users (Millions)
2000	35	5
2005	41	12
2010	53	40
2015	80	150
2020	87	400
2025	92	400

Source: RBI Reports; World Bank Global Findex; NPCI Annual Reports

Table 1: Growth of Financial Inclusion Indicators in India (2000–2025)



The table-1 and dual-axis chart-1 illustrates significant financial inclusion growth in India (2000–2025). Bank account penetration (purple) rose steadily from 35% to a projected 92%. Following this established access, digital payment users (orange) surged exponentially, jumping from just 40 million in 2010 to a projected 550 million by 2025, highlighting a massive shift towards digital adoption.

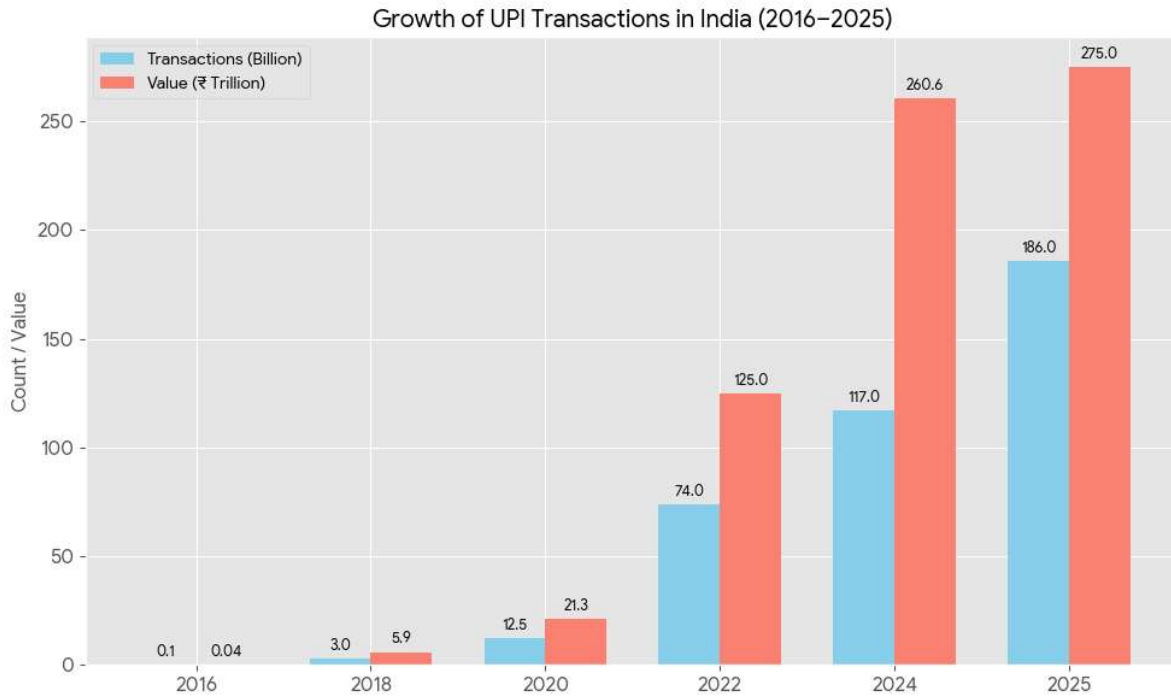
Table-2 Growth of UPI Transactions in India 2016-2025

Year	UPI Transactions (Billion)	UPI Transaction Value (₹ Trillion)
2016	0.1	0.04



2018	3.0	5.9
2020	12.5	21.3
2022	74.0	125.0
2024	117.0	260.6
2025	186.0	275.0

Source: NPCI; RBI Digital Payments Index



Graph -2

Interpretation:

Table 2 and and graph-2 explain that UPI has become the backbone of India’s digital financial ecosystem, accounting for nearly 85% of all digital transactions by 2025

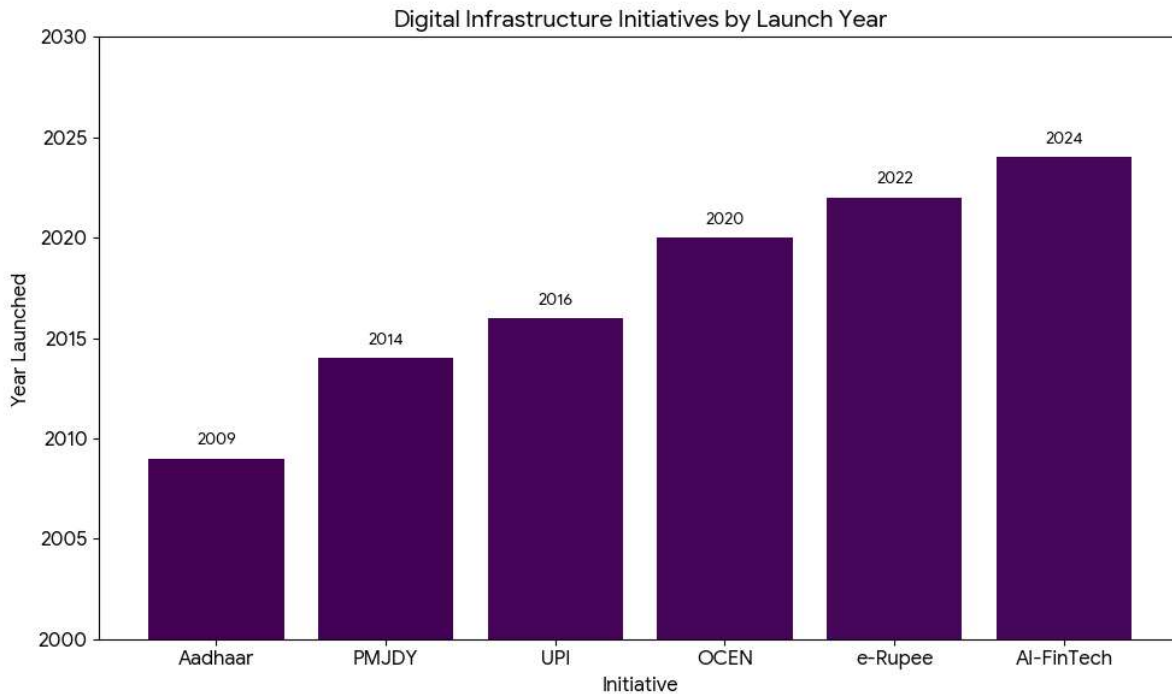
Table- 3

Initiative	Yaer of launching	Contribution to Financial Inclusion
Aadhaar	2009	Digital identity and e-KYC
PMJDY	2014	Universal bank account access
UPI	2016	Low-cost digital payments
OCEN	2020	Open credit enablement



e-Rupee	2022	Digital sovereign currency
AI-FinTech	2024	Personalized financial services

Source: Government of India policy documents, RBI & NPCI reports, Economic Survey of India, and reputed financial publications (2009–2025).



Graph-3

The table-3 and graph-3 explain that in 2009, the foundation was laid for digital identity. Programs like **PMJDY** and **UPI** bridged the banking gap, enabling universal access and instant payments. Newer milestones like **OCEN**, **e-Rupee**, and **AI-FinTech** represent the shift toward data-driven credit and sovereign digital currency, showcasing a transition from basic connectivity to a sophisticated, inclusive financial ecosystem.

6. Detailed Analysis

6.1 Mobile Technology and Digital Adoption

Mobile phone penetration in India has grown exponentially — from low single-digit percentages in early 2000s to over 90% tele density by the early 2020s, fueled by affordable data plans and 4G/5G rollouts. This ubiquitous connectivity coupled with Aadhaar e-KYC enabled rapid onboarding to digital financial services.



FinTech adoption rates reached approximately 87% by 2025, surpassing the global average and placing India among the top countries in digital payments adoption.

Mobile-first services, including wallets, payment apps (Google Pay, Phone Pe, Paytm), and micro-lending platforms, delivered financial services to populations excluded from traditional branch networks.

6.2 UPI and Digital Public Infrastructure (DPI)

UPI serves as a digital public good providing interoperable payment rails that underpin not only P2P transactions but also merchant payments, bill payments, and cross-platform services. By 2025, UPI accounted for roughly 85% of all digital transactions in India, demonstrating the overwhelming dominance and inclusivity of this infrastructure.

The scalable design of UPI enabled even users without smartphones to participate via assisted models, QR codes, and feature phone solutions, significantly enhancing reach.

6.3 Financial Inclusion Outcomes

6.3.1 Banking Access and Savings

Formal bank account penetration surged due to PMJDY, Aadhaar linkage, and mobile banking adoption. Household participation in the formal financial system increased significantly, particularly among low-income and female cohorts.

6.3.2 Credit and Lending

FinTech NBFCs expanded formal credit access to previously underserved segments. In FY 2024–25 alone, fintech-enabled credit disbursements exceeded 10 crore loans, representing a pivotal shift in credit accessibility. The Economic Times

Innovations such as Credit-on-UPI, embedded lending, micro-loans, and alternate credit scoring contributed to reducing dependency on informal lenders.

6.3.3 Rural and Remote Penetration

Commitments such as RBI's Payments Infrastructure Development Fund (PIDF) catalyzed the deployment of digital payment acceptance points in tier-III to tier-VI cities and remote states, bringing digital financial services closer to rural users.



Despite progress, digital literacy and cash preferences persist in some rural pockets, underscoring ongoing challenges.

6.4 Innovations Beyond Payments

FinTech innovation in India now includes:

- AI-assisted payments pilots integrating conversational interfaces for e-commerce transactions via platforms like ChatGPT, testing automated UPI-based payment flows.
- Central Bank Digital Currency (e-Rupee) pilots with FinTech integrations, reflecting steps toward digital cash infrastructure.
- Multilingual conversational AI aimed at bridging language barriers, fostering engagement among diverse linguistic groups.

7. Limitations of the Study

While this research synthesizes broad trends, several limitations must be acknowledged:

1. **Secondary Data Dependence:** The study relies on previously collected data, which varies in frequency and reporting standards across different agencies.
2. **Lack of Granular Household Data:** National indicators provide macro insights but may obscure micro-level disparities in usage, particularly among rural, low-literacy populations.
3. **Temporal Gaps:** Not all metrics are available consistently from 2000–2025, requiring interpolation in some cases.
4. **Rapid Technological Change:** The pace of innovation in 2024–25 may render some conclusions preliminary, with comprehensive data yet to be fully published.

8. Discussion

The evidence suggests that India's FinTech-driven ecosystem has dramatically expanded financial inclusion over the last two decades. Government policy (PMJDY, Digital India), unique identity infrastructure (Aadhaar, e-KYC), and scalable payment systems (UPI) collectively form an integrated foundation that no other major economy has matched in scale. Digital payment volumes, mobile



connectivity, and formal credit penetration have grown in tandem, delivering tangible inclusion outcomes.

Despite achievements, challenges remain:

- **Digital Literacy:** Continued efforts are needed to improve financial literacy and trust among hesitant populations.
- **Cybersecurity Risks:** Rising digital adoption exposes users to fraud and cybersecurity threats, as evidenced by increasing cyber fraud cases in the banking sector, illustrating the need for robust risk mitigation. *The Times of India*
- **Infrastructure Gaps:** Last-mile connectivity and reliable internet access remain uneven in some rural or remote regions.

9. Policy Recommendations

1. Enhance Financial Literacy Programs geared specifically toward rural and low-income populations to deepen trust and usage.
2. Strengthen Cybersecurity Frameworks and consumer protections to safeguard users and build confidence in digital finance.
3. Support Multilingual and Inclusive Interfaces that accommodate India's linguistic diversity.
4. Expand Digital Credit Ecosystems using alternative credit scoring to promote responsible lending among underserved demographics.
5. Sustain DPI Investments including UPI enhancements, open finance networks (OCEN), and AI-based customer support systems.

10. Conclusion

India's journey from a predominantly cash-based economy to a widespread digital financial ecosystem illustrates how FinTech-driven innovation can advance sustainable financial inclusion at scale. Through coordinated public policy, robust digital infrastructure, and private-sector innovation, India has delivered unprecedented access to digital payments, formal credit, and financial services for millions of citizens. Persistent challenges remain, emphasizing that inclusive innovation must be paired with education, risk management, and targeted outreach to ensure all segments of society benefit equitably. Continued



emphasis on inclusive FinTech deployment will be essential in shaping India's financial landscape through 2025 and beyond.

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