

Digital Payment Systems in India: Evolution, Growth, Financial Inclusion and Emerging Challenges

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Abstract

India's payment ecosystem has undergone a significant transformation with the expansion of information and communication technologies, mobile connectivity, digital banking and financial technology. The development of Unified Payments Interface (UPI), mobile banking, QR-code payments and other digital-payment platforms has increasingly shifted financial transactions from conventional channels towards real-time and interoperable digital systems. This study examines the evolution of digital payment systems in India, analyses recent trends in major payment channels, and discusses their implications for financial inclusion, digital financial literacy and consumer security. The study adopts a descriptive and analytical approach based primarily on secondary data obtained from the Reserve Bank of India (RBI), National Payments Corporation of India (NPCI), Government of India publications and recent academic literature. Particular attention is given to the period from 2019–20 to 2024–25, during which UPI experienced exceptionally rapid growth. The analysis indicates that India's digital-payment transformation has moved beyond the initial expansion of cards and mobile wallets towards a mobile-centred, interoperable payment ecosystem. However, increasing transaction volume should not automatically be interpreted as comprehensive financial inclusion. Digital literacy, cybersecurity awareness, trust, connectivity, affordability and socioeconomic inequalities continue to influence effective and sustained use. The study argues that the next stage of India's digital-payment development should therefore focus not only on expanding transactions but also on improving the quality, safety, accessibility and inclusiveness of digital financial participation.

Keywords: Digital payments; UPI; financial inclusion; digital financial literacy; mobile payments; cybersecurity; fintech; India.

1. INTRODUCTION

The framework and operation of India's financial system have been altered by digitalization. The rise of financial technology, mobile banking, internet banking, payment cards, and electronic banking has steadily decreased our reliance on traditional cash-based transactions. Enhanced telecommunications, smartphone penetration, banking infrastructure, and government initiatives promoting digital financial services have all contributed to this change.

The digital-payment ecosystem in India has developed through multiple phases. Debit and credit cards, mobile wallets, and mobile banking were extensively utilized after electronic fund transfer methods like NEFT, RTGS, and IMPS. The further structural transformation brought about by the introduction and quick expansion of UPI made it possible to conduct real-time account-to-account payments through mobile devices in an interoperable manner.

Public and institutional interest in digital payments increased as a result of the demonetisation of high-value banknotes in November 2016. The COVID-19 epidemic then bolstered the need for remote and contactless transactions. However, these two occurrences alone do not explain the growth of digital payments in India. The wider ecosystem for digital financial involvement has been created by the growth of digital public infrastructure, bank account penetration, smartphone use, QR code acceptance, and UPI interoperability.

This article's first iteration emphasized the growth of digital payment apps and the rising popularity of mobile transactions. However, a more thorough evaluation of the present payment environment is necessary. Fintech adoption, digital financial literacy, cybersecurity, and financial inclusion are all now tightly connected to digital payments.

Whether digital payments are growing is thus no longer the only key concern. It is about whether people and households can utilize these services securely, confidently, and continuously.

For those living in rural areas and those who are economically disadvantaged, this difference is especially significant. Despite having a smartphone, a UPI app, or a bank account, someone may not necessarily have the knowledge and skills needed to use digital

financial services effectively. Therefore, suitable digital financial literacy and consumer protection must be implemented alongside the growth of digital infrastructure.

2. OBJECTIVES OF THE STUDY

The study has the following objectives:

- To examine the evolution of digital payment systems in India.
- To analyse the recent trends in major digital-payment channels, particularly UPI, NEFT, IMPS and card-based payments.
- To examine the changing role of mobile-based digital payments in India's financial ecosystem.
- To assess the relationship between digital-payment expansion and financial inclusion.
- To identify major challenges associated with digital-payment adoption, including digital literacy, cybersecurity, trust and accessibility.
- To suggest measures for strengthening secure, accessible and inclusive digital-payment adoption in India.

3. METHODOLOGY

A review of relevant academic and institutional literature as well as secondary data served as the basis for the research. The Reserve Bank of India and the National Payments Corporation of India's official publications and statistical databases are the primary sources of quantitative data on digital payment trends. Supporting data is taken from approved institutional sources and publications from the Government of India.

The research examines the growth of India's digital-payment ecosystem across six financial years, from 2019–20 to 2024–25. The main indicators are UPI transaction volume and value, as well as IMPS, NEFT, and card-based payments. Trend analysis is utilized to analyze changes over time.

In particular, digital financial literacy, financial inclusion, rural adoption, digital trust, cybersecurity, and socioeconomic hurdles are highlighted in the thematic analysis of recent peer-reviewed research.

The study is primarily analytical and descriptive. It doesn't claim to establish a causal relationship between financial inclusion and the expansion of digital payments just from overall national payment statistics.

4. EVOLUTION OF DIGITAL PAYMENT SYSTEMS IN INDIA

India's digital-payment ecosystem has developed through several technological phases.

4.1 Electronic Fund Transfer

NEFT and RTGS established important foundations for electronic account-to-account payments. IMPS subsequently enabled instant interbank transfers and contributed to the transition towards real-time payments.

4.2 Cards and ATMs

Electronic payment acceptance grew thanks to the use of credit cards and debit cards through ATMs, point-of-sale terminals, and online commerce. The relative importance of various payment channels has been altered by the fast increase of mobile-based account-to-account payments, despite the fact that these instruments are still important.

4.3 Mobile Wallets

An important step in the evolution of India's digital payment environment was the introduction of mobile wallets. The rise of services like Mobikwik, Paytm, and other wallet platforms as well as the increasing usage of mobile applications for transactions are topics covered in the original report. The historical relevance of wallets must now be understood since the subsequent growth of interoperable UPI payments has revolutionized the landscape of digital payments.

4.4 UPI

The backbone of India's digital payment infrastructure is UPI. Customers may start transactions across participating banks and apps because of its interoperability. Additionally, QR-code payments and mobile-based authentication have increased its usefulness for both businesses and customers.

UPI's value extends beyond transaction volume to its capacity to connect payment transactions with India's larger digital financial architecture.

5. RECENT TRENDS IN DIGITAL PAYMENTS: 2019–20 TO 2024–25

The most significant development during the study period has been the rapid expansion of UPI.

Table 1. Trends in Selected Digital Payment Systems in India, 2019–20 to 2024–25

Financial Year	UPI Volume (billion)	UPI Value (₹ lakh crore)	IMPS Volume (billion)	NEFT Volume (billion)
2019–20	12.52	21.32	3.33	2.28
2020–21	22.28	41.04	3.26	2.62
2021–22	45.97	84.17	4.84	3.44
2022–23	83.71	139.07	5.89	4.63
2023–24	131.16	199.89	6.06	5.86
2024–25	185.87	260.56	6.46	~6.49

Source: Reserve Bank of India (RBI), Payment System Indicators/Handbook of Statistics on Indian Economy; National Payments Corporation of India (NPCI), UPI Product Statistics.

5.1 UPI Transaction Volume

From around 12.52 billion transactions in 2019–20, UPI transaction volume grew to roughly 185.87 billion in 2024–25. Over six years, this represents a rise of almost 15 times.

In 2020-21, 2021-22, 2022-23, 2023-24, and 2024-25, the approximate annual growth rates were 77.9%, 106.3%, 82.1%, 56.7%, and 41.7%, respectively.

The absolute increase remained considerable even if the percentage growth rate decreased as the transaction base grew. Thus, the evidence suggests continuous structural growth rather than a transient rise that is only connected to the pandemic.

5.2 UPI Transaction Value

The value of UPI transactions increased from about ₹21.32 lakh crore in 2019–20 to ₹260.56 lakh crore in 2024–25. The simultaneous increase in transaction volume and value shows that UPI has developed into a crucial element of India's ecosystem for retail digital payments.

5.3 IMPS

IMPS transactions increased from approximately 3.33 billion in 2019–20 to around 6.46 billion in 2024–25. Its growth has therefore been substantial but considerably slower than UPI.

5.4 NEFT

NEFT transactions increased from approximately 2.28 billion in 2019–20 to around 6.49 billion in 2024–25. NEFT continues to perform an important role in electronic account-to-account transfers.

5.5 Cards

Debit and credit cards remain important components of India's payment infrastructure. However, the rapid growth of UPI indicates a significant shift towards mobile-based, account-to-account retail payments. For future updates, debit-card and credit-card transactions should preferably be analysed separately because their usage patterns and growth trajectories differ.

6. DIGITAL PAYMENTS AND FINANCIAL INCLUSION

Financial inclusion might be improved by digital payments because they lower transaction expenses, increase accessibility, and allow people to participate in official financial systems.

Digital channels can help you do the following:

- remittances and payments;
- government-sponsored aid;
- savings;
- payments on official loans;
- insurance payments;
- contributions to pensions;
- merchant transactions; and
- further structured financial endeavors.

Nevertheless, the acceptance of digital payments shouldn't be automatically equated with complete financial inclusion.

A person might have a bank account that they don't use very frequently. UPI can only be used by a smartphone user for small retail purchases. Due to low digital literacy, another user may rely on family members or businesses to handle transactions.

As a result, financial inclusion must be considered in terms of its access, use, quality, and active involvement. This difference aligns with Khera et al.'s (2022) multidimensional approach to financial inclusion.

7. DIGITAL FINANCIAL LITERACY

The growing importance of digital financial literacy has been highlighted by the expansion of digital financial services.

Digital Financial Literacy includes the capacity to do the following:

1. comprehend digital financial goods and services;
2. carry out online transactions;
3. decode online financial data;
4. Safeguard your personal and financial data.
5. Recognize fraudulent communications;
6. be aware of transaction processes and risks;
7. use digital financial services on their own; and
8. make wise financial choices.

According to current research, digital financial literacy should not be considered as merely generalized financial literacy. Additional criteria for authentication, privacy, cybersecurity, and the usage of technology are introduced by the digital environment.

Gull, Floreani, and Velliscig (2025) highlight the value of tailored digital financial education for susceptible groups. This is particularly relevant for women and communities in rural areas who might have less access to financial information and digital gadgets.

8. RURAL DIGITAL FINANCIAL INCLUSION

The rapid growth of India's digital infrastructure does not automatically guarantee that all demographics will participate equally.

Rural families may face limits in terms of:

- internet access;
- ownership of a smartphone;
- education;

- money;
- speech;
- period of time;
 - gender;
- abilities in the digital world;
- self-assurance; and
- cybersecurity awareness.

Therefore, the presence of digital infrastructure should be separated from the capacity to use it effectively. Digital literacy, technical expertise, trust, and apparent security are some of the variables that have been recognized more and more in recent studies on rural India as influencing persistent digital-financial use.

9. CYBERSECURITY AND DIGITAL TRUST

The development of digital payments presents considerable opportunities but also highlights the need for cybersecurity.

Users may encounter the following:

- phishing communications;
- deceptive phone calls;
- phony customer-service numbers;
- malicious connections;
- unsolicited requests for money;
- social-engineering assaults; and
- attempts to get OTPs, passwords, or PINs.

Thus, an awareness of fundamental cybersecurity procedures must be included in digital financial literacy. Equally crucial is confidence. Users may be reluctant to embrace or consistently utilize digital financial services due to concerns about transaction security or the possibility of fraud. Meaningful digital financial inclusion requires access, use, confidence, and security.

10. SOCIOECONOMIC DIMENSIONS

Digital-payment adoption varies according to socioeconomic and demographic characteristics.

Gender: Women may face barriers related to smartphone ownership, financial autonomy, mobility and access to digital training.

Education: Education can influence the ability to understand digital interfaces, financial information and security warnings.

Age: Older users may experience greater difficulty adapting to rapidly changing digital technologies.

Income: Low-income households may experience greater constraints relating to smartphones, connectivity and digital-service costs.

Digital access: Smartphone ownership and reliable internet connectivity are fundamental prerequisites for many digital financial services.

These dimensions justify moving beyond aggregate national payment statistics towards household- and individual-level research.

11. RESEARCH GAP

There has been a lot written about the usage and technical infrastructure of digital payments due to their quick increase. However, there are still some holes.

- First off, several research concentrate on access, transaction volume, or technology adoption as opposed to the caliber and efficacy of financial engagement.
- Second, there has been relatively little research that looks at digital financial literacy and many different financial-inclusion outcomes among rural households at the same time.
- Third, there isn't always a good integration of digital financial inclusion metrics with cybersecurity awareness and digital trust.
- Finally, gender, age, income, education, and smartphone access might have an impact on digital financial involvement, but more research is needed to prove these correlations.
- Aggregate UPI data shows that India's digital infrastructure is growing, but it can't tell us if rural households have the expertise and skills to profit from it.

Thus, the current research plan should shift its emphasis from meaningful digital financial engagement to digital access.

12. POLICY IMPLICATIONS

The findings have several policy implications.

12.1 Strengthening Digital Financial Literacy

Financial-literacy programmes should increasingly incorporate practical digital-finance skills rather than focusing exclusively on conventional financial concepts.

12.2 Cybersecurity Education

Users should receive simple and locally accessible information on fraud prevention, OTP security, phishing and unauthorised transactions.

12.3 Rural Digital Infrastructure

Improving connectivity and digital access remains necessary for inclusive participation.

12.4 Women's Digital Financial Participation

Targeted interventions can improve women's independent access to smartphones, digital accounts and financial information.

12.5 Consumer Protection

Simple and accessible grievance-redress mechanisms are essential to maintaining confidence in digital-payment systems.

12.6 Inclusive Fintech

Fintech services should be designed with consideration for low-literacy, elderly and first-time users.

13. CONCLUSION

Over the past ten years, there has been a basic change in India's payment ecosystem. During the years 2019–20 to 2024–25, UPI experienced an exceptionally fast growth while IMPS, NEFT, and card-based payment systems continued to be developed.

The number of UPI transactions increased from about 12.52 billion in 2019–20 to about 185.87 billion in 2024–25, and the value of those transactions increased from roughly ₹21.32 lakh crore to ₹260.56 lakh crore. The degree to which digital payments have been incorporated into India's financial system is shown by these advances.

However, an increase in digital payments shouldn't be immediately interpreted as total financial inclusion. A person's capacity to utilize digital finance is determined by their digital literacy, financial understanding, access to technology, confidence, understanding of cybersecurity, and capacity to operate digital services on their own.

As a result, India's digital financial transition must advance from access to competence, from acceptance to meaningful use, and from transaction growth to inclusive financial results.

In particular, for rural India, increasing digital financial literacy can help households participate more effectively in formal financial systems while lowering their susceptibility to fraud and improper financial decisions.

Therefore, future studies should look at digital financial literacy at the household and individual levels and evaluate its connections with savings, credit, insurance, pensions, government transfers, digital payments, trust, and cybersecurity awareness. Policies that are more inclusive and targeted in the fields of digital finance and financial literacy might be supported by such studies.

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