



# A Study on Bharat Digital Payment System in Economy

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**Abstract-** India has witnessed a remarkable transformation in its financial landscape owing to the rapid proliferation of digital payment systems under the umbrella of the Bharat Digital Payment initiative. This study comprehensively examines the architecture, evolution, adoption patterns, and economic impact of digital payment platforms in India, with a specific focus on the Unified Payments Interface (UPI), Bharat Interface for Money (BHIM), Aadhaar-enabled Payment System (AePS), and the National Electronic Funds Transfer (NEFT) and Real-Time Gross Settlement (RTGS) mechanisms. The research employs a mixed-methods approach combining secondary data analysis and descriptive statistics to evaluate the growth trajectory of digital transactions from 2016 to 2024. Findings reveal that India processed over 13,000 crore digital transactions in FY 2023-24, reflecting an exponential growth compared to the pre-demonetization era. The study further investigates the socioeconomic implications of digital payment adoption, particularly regarding financial inclusion, reduction of black money, enhancement of tax compliance, and promotion of economic formalization. The role of government policies, including the Digital India Mission, Jan Dhan Yojana, and the National Payments Corporation of India (NPCI) initiatives, is critically analyzed. Despite the transformative progress, the study also identifies persistent challenges such as cybersecurity vulnerabilities, limited digital literacy in rural areas, inconsistent internet connectivity, and concerns regarding data privacy. The paper concludes by offering recommendations for policymakers, financial institutions, and technology service providers to strengthen the digital payment ecosystem and ensure its sustainable growth within the broader Indian economy.

**Keywords-** Digital Payments, UPI, Financial Inclusion, Indian Economy, NPCI, Cashless Transactions, Fintech

## I. INTRODUCTION

The emergence of digital payment systems has fundamentally altered the economic and financial fabric of nations across the globe. In India, this transformation has been particularly pronounced, driven by a combination of government-led policy interventions, technological innovation, and a rapidly growing mobile-internet user base. The Bharat Digital Payment System represents a comprehensive ecosystem of interoperable digital payment platforms designed to facilitate seamless, secure, and instantaneous financial transactions for over a billion citizens.

Prior to 2016, India was predominantly a cash-driven economy, with physical currency accounting for more than 90% of all consumer transactions. The landmark demonetization initiative announced in



November 2016 served as a pivotal inflection point, compelling both individuals and businesses to adopt digital alternatives almost overnight. This structural shift was further reinforced by the government's Digital India Mission, which aimed at transforming India into a digitally empowered society and knowledge economy.

The National Payments Corporation of India (NPCI), established in 2008 under the aegis of the Reserve Bank of India (RBI), has been instrumental in designing and deploying the infrastructure underlying the Bharat digital payment ecosystem. Its flagship product, the Unified Payments Interface (UPI), launched in 2016, has emerged as one of the most successful real-time payment systems globally, processing over 1,000 crore transactions per month by 2024. The BHIM (Bharat Interface for Money) application, Aadhaar Pay, FASTag, RuPay card network, and the e-RUPI voucher system further constitute the multifaceted Bharat digital payment architecture.

The economic implications of this digital payment revolution are far-reaching. At the macro level, digital transactions improve the traceability and accountability of financial flows, thereby curbing tax evasion and reducing the parallel black economy. At the micro level, they empower marginalized communities, particularly women and rural populations, by providing access to formal financial services through mobile devices and Aadhaar-linked accounts. The Jan Dhan-Aadhaar-Mobile (JAM) trinity has been pivotal in linking social welfare disbursements directly to beneficiaries, minimizing leakages and corruption.

However, the rapid digitization of payments is not without its challenges. Cybersecurity threats, including phishing, vishing, SIM swapping, and UPI fraud, have risen in tandem with the expansion of digital transaction volumes. Furthermore, the digital divide, characterized by disparities in smartphone penetration, internet bandwidth, and digital literacy, continues to limit the inclusivity of digital payment adoption, particularly in remote rural areas.

This study seeks to address the following key objectives: (1) to trace the historical evolution and current state of the Bharat digital payment ecosystem; (2) to quantitatively assess the growth and adoption of digital payment instruments in India; (3) to analyze the macroeconomic and socioeconomic impacts of digital payment adoption; (4) to identify the principal challenges and barriers to universal digital payment adoption; and (5) to propose evidence-based recommendations for the sustainable growth of the digital payment ecosystem in India.

The novelty of this research lies in its integrated analytical framework that simultaneously examines technological, regulatory, economic, and social dimensions of the Bharat digital payment system, providing a holistic understanding of its transformative role in the Indian economy.

## II. MATERIALS AND EQUIPMENT

### Data Sources and Secondary Databases

This study is based exclusively on secondary data gathered from authoritative and publicly available sources. The primary data repositories utilized include:

- Reserve Bank of India (RBI) Annual Reports and Payment System Reports (2016-2024)
- National Payments Corporation of India (NPCI) Transaction Volume Statistics
- Ministry of Electronics and Information Technology (MeitY) Digital India Progress Reports
- World Bank Financial Inclusion (Global Findex) Database
- Statista India Digital Payment Market Insights
- NASSCOM Fintech India Reports (2020-2024)
- Published peer-reviewed journal articles from databases including Scopus, Web of Science, and Google Scholar



#### Software and Analytical Tools

- **Microsoft Excel 2021:** Tabulation, graphical analysis, and trend modeling of transaction data
- **SPSS Version 26:** Descriptive statistics and correlation analysis
- **Tableau Public:** Data visualization and dashboard creation for payment trend analysis
- **NVivo 12:** Qualitative content analysis of policy documents and research literature

### III. EXPERIMENTAL DATA

#### Research Design

This study employs a descriptive-analytical research design to examine secondary data on digital payment transactions in India. A longitudinal analysis spanning 2016 to 2024 was undertaken to capture the growth trajectory of digital payments pre- and post-demonetization, and in the wake of the COVID-19 pandemic, which served as another major accelerator of digital adoption.

#### Data Collection Methodology

Quantitative secondary data pertaining to transaction volumes, values, user adoption rates, and instrument-wise breakdowns were extracted from the RBI and NPCI databases. Qualitative insights were gathered through systematic literature review of 45 peer-reviewed articles, 12 government policy documents, and 8 industry reports published between 2016 and 2024. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework was adapted to ensure rigor and transparency in the literature selection process.

#### Data Analysis Framework

The collected data were analyzed using the following framework: (a) trend analysis to identify growth patterns in digital payment volumes; (b) comparative analysis across different digital payment instruments; (c) geographic and demographic disaggregation to assess the differential impact across regions and population groups; and (d) policy impact analysis to correlate government interventions with shifts in digital payment adoption.

### IV. RESULTS AND DISCUSSIONS

#### Growth of Digital Payment Transactions in India

The data reveal an extraordinary trajectory of growth in digital payment transactions in India over the study period. Table 1 presents a summary of UPI transaction volumes and values from 2017-18 to 2023-24.

Table 1: UPI Transaction Volume and Value (2017-2024)

| Financial Year | No. of Transactions<br>(Crore) | Transaction Value<br>(Lakh Cr) | YoY Growth (%) |
|----------------|--------------------------------|--------------------------------|----------------|
| 2017-18        | 9.19                           | 1.10                           | -              |
| 2018-19        | 535.98                         | 8.77                           | 5730%          |
| 2019-20        | 1252.90                        | 21.32                          | 133%           |
| 2020-21        | 2233.00                        | 41.04                          | 78%            |
| 2021-22        | 4596.00                        | 84.17                          | 106%           |
| 2022-23        | 8376.00                        | 139.20                         | 82%            |
| 2023-24        | 13113.00                       | 199.68                         | 57%            |

Source: National Payments Corporation of India (NPCI), 2024



The data demonstrate a phenomenal increase in UPI transactions, growing from a mere 9.19 crore transactions in 2017-18 to over 13,113 crore in 2023-24, representing a compound annual growth rate (CAGR) of approximately 118%. The total transaction value correspondingly surged from Rs. 1.10 lakh crore to Rs. 199.68 lakh crore, underscoring the deepening penetration of UPI as the preferred mode of payment across consumer segments.

### Instrument-Wise Analysis of Digital Payments

Beyond UPI, the Bharat digital payment ecosystem encompasses a diverse array of instruments. Table 2 presents a comparative overview of the major digital payment instruments by transaction volume in 2023-24.

Table 2: Comparative Overview of Digital Payment Instruments in India (2023-24)

| Payment Instrument                        | Volume (Crore) | Market Share (%) |
|-------------------------------------------|----------------|------------------|
| UPI (Unified Payments Interface)          | 13,113         | 68.4%            |
| IMPS (Immediate Payment Service)          | 643            | 3.4%             |
| NEFT (National Electronic Funds Transfer) | 422            | 2.2%             |
| Debit/Credit Card Transactions            | 2,980          | 15.5%            |
| Aadhaar-enabled Payment System (AePS)     | 1,190          | 6.2%             |
| Prepaid Payment Instruments (PPI/Wallets) | 780            | 4.1%             |
| FASTag (NETC)                             | 480            | 2.5%             |

Source: RBI Payment System Report, 2024

UPI dominates the digital payment landscape with a market share of 68.4% by volume. The AePS system has proven particularly significant for rural financial inclusion, enabling banking transactions through biometric authentication at Common Service Centres (CSCs), thereby serving the unbanked and underbanked population segments.

### Socioeconomic Impact of Digital Payment Adoption

The proliferation of digital payments has engendered significant socioeconomic transformations across multiple dimensions. From a financial inclusion perspective, the number of Jan Dhan accounts, which serves as the foundational banking layer for digital payment adoption, surpassed 53.13 crore by March 2024, with approximately 56% of these accounts held by women. This represents a historic expansion of formal financial access to previously excluded segments of the population.

Tax compliance and revenue enhancement constitute another crucial economic dimension. The GST Council data indicates that the formalization of the economy facilitated by digital transactions has contributed to a consistent increase in GST collections, which crossed Rs. 2 lakh crore in a single month for the first time in April 2024. The direct correlation between digital payment adoption and enhanced tax compliance has been documented in multiple RBI working papers.

Digital payments have also catalyzed the growth of the digital economy, including e-commerce, digital lending, and InsurTech sectors. The total digital economy contribution to India's GDP is estimated at



approximately 11.4% for 2023-24, with projections indicating growth to 20% by 2026, as per the NASSCOM Digital Economy Report (2024).

### **Challenges and Barriers**

Despite remarkable progress, several systemic challenges continue to impede the universal adoption of digital payments in India. Cybersecurity and fraud remain the most critical concerns. The Indian Cyber Crime Coordination Centre (I4C) reported a 300% increase in UPI-related fraud cases between 2020 and 2023. Social engineering attacks, phishing, and screen-sharing scams disproportionately affect elderly and first-time digital payment users.

The digital divide presents another formidable structural challenge. As of 2024, approximately 700 million Indians remain without smartphone access, and broadband penetration in rural areas remains below 45%, severely constraining the scalability of app-based payment solutions. The quality and reliability of internet connectivity, particularly in geographically remote areas, continues to hamper the user experience and trust in digital payment platforms.

Data privacy and digital sovereignty concerns have gained increasing prominence with the volume of sensitive financial data generated by digital transactions. The implementation of the Digital Personal Data Protection Act, 2023, while providing a legislative framework, remains a work-in-progress in terms of enforcement and technical compliance by payment service providers.

## **V. FUTURE PERSPECTIVE**

The trajectory of Bharat's digital payment system points toward several transformative developments in the coming years. The introduction of the Central Bank Digital Currency (CBDC), or the Digital Rupee (e-Rupee), by the Reserve Bank of India marks a paradigmatic shift in the architecture of money itself. The CBDC pilot, launched in December 2022, holds the potential to further reduce transaction costs, enhance financial traceability, and promote cross-border payment interoperability.

Artificial intelligence and machine learning are poised to revolutionize fraud detection and prevention in digital payment systems, enabling real-time anomaly detection and adaptive risk scoring. The integration of UPI with credit systems, including the UPI-linked credit card feature and credit line on UPI, is expected to democratize access to credit for small merchants and informal sector workers. The expansion of the UPI network to international markets, including Singapore, UAE, France, and Bhutan, reflects India's growing influence in global fintech and has implications for enhancing remittance flows and bilateral trade.

Future research should focus on longitudinal impact assessments of CBDC adoption, the behavioral economics of digital payment trust-building in low-income demographics, and the effectiveness of cybersecurity policy frameworks in mitigating digital financial fraud. Comparative studies with other emerging economy digital payment systems, such as Brazil's PIX and China's Alipay ecosystem, could yield valuable policy insights for further optimizing the Bharat digital payment infrastructure.

## **VI. CONCLUSION**

This study has undertaken a comprehensive examination of the Bharat Digital Payment System and its multifaceted impact on the Indian economy. The findings unequivocally establish that India's digital payment revolution, anchored by the UPI framework and supported by a robust ecosystem of complementary instruments, has achieved remarkable scale and depth within a relatively short timeframe. From processing a negligible volume of transactions in 2017, the UPI system has evolved



into a global benchmark, processing over 13,000 crore transactions annually and contributing substantially to the formalization and digitization of the Indian economy.

The macroeconomic benefits of this digital transformation are clearly evident: enhanced tax compliance, reduced transaction costs, improved financial inclusion, decreased reliance on cash, and the creation of a rich digital financial identity for millions of previously unbanked citizens. The JAM trinity -- Jan Dhan, Aadhaar, and Mobile -- has served as a powerful infrastructure for ensuring that the benefits of digital payments reach the last mile of the population, contributing to more equitable economic participation.

However, the study also highlights significant challenges that must be systematically addressed to ensure the long-term sustainability and inclusivity of digital payment adoption. Cybersecurity threats require coordinated action from regulators, payment service providers, and law enforcement agencies. The digital divide necessitates targeted public investments in digital infrastructure, device affordability, and digital literacy programs, particularly in rural and semi-urban areas. Data privacy frameworks need to be robustly implemented and enforced to sustain user trust.

Policymakers should prioritize creating an enabling regulatory environment that balances innovation with consumer protection, fosters interoperability across payment platforms, and ensures that the gains of digital payment adoption are equitably distributed across income groups and geographic regions. Financial institutions and fintech companies must invest in user-centric design, vernacular language interfaces, and robust customer grievance redressal mechanisms to expand the digital payment user base. The Bharat Digital Payment System, with sustained policy support and technological innovation, is well-positioned to serve as a transformative engine of inclusive economic growth for India in the decades to come.

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