# UPI and the Transformation of Business Payment Models in India


## Abstract

The rapid digitization of financial transactions in India has positioned the Unified Payments Interface (UPI) as a central pillar of the country's digital public infrastructure. Since its launch in 2016 by the National Payments Corporation of India under the regulatory oversight of the Reserve Bank of India, UPI has evolved into the dominant retail digital payment mechanism, accounting for more than 80% of digital transaction volumes. While prior research has primarily focused on user adoption, security perceptions, and financial inclusion, limited scholarly attention has been given to UPI's structural impact on business payment models. This study examines how UPI has transformed merchant economics, liquidity cycles, transaction cost structures, and competitive dynamics within India's payment ecosystem. Using secondary data from RBI reports, NPCI statistics, and peer-reviewed literature, the study analyzes the economic and institutional implications of UPI's growth. Findings suggest that UPI has significantly reduced transaction frictions, enhanced working capital efficiency, accelerated MSME formalization, and reshaped fintech competition through a platform-based ecosystem model. However, sustainability challenges related to zero Merchant Discount Rate (MDR), cybersecurity risks, and infrastructure scalability remain critical policy concerns The paper contributes to literature on digital financial infrastructure, platform economics, and emerging market fintech transformation.



**Keywords**: UPI, Digital Payments, Business Model Transformation, Platform Economics, Financial Inclusion, MSMEs



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## Introduction

India has experienced its fastest digital payment changes during the last ten years. The financial ecosystem of the country has undergone complete transformation through the combination of policy initiatives and smartphone market expansion and fintech advancements and the development of digital public infrastructure. The Unified Payments Interface (UPI) serves as the main driver for this transformation which the National Payments Corporation of India (NPCI) launched in 2016 under Reserve Bank of India (RBI) regulatory authority. UPI functions as a real-time payment system that enables users to transfer funds between their bank accounts by using mobile apps with virtual payment addresses and mobile numbers and QR codes as simple methods of identification. The UPI system enables banks and fintech companies and merchants and consumers to operate together within a unified digital payment system because it was developed as an open system that enables different systems to work together.

The introduction of UPI marked a paradigm shift from card-dominated and wallet-based digital transactions toward account-to-account instant payments. The system required no special configuration because its design enabled instant payments which took only three seconds to complete and reduced merchant operating expenses. UPI has developed into a digital public infrastructure system which provides essential support for India's national digital economy initiatives. Recent data indicate exponential expansion in both transaction volume and value. In 2025 UPI completed 228 billion transactions which represented 80 to 85 percent of India's total digital retail payment transactions.

The digital retail payment system now processes billions of transactions monthly, which demonstrates the strength of network effects that enable the system to reach all areas and industries. The payment system development shows more than technological progress because it demonstrates a fundamental change in how people make payments and how companies conduct their financial transactions.

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The rapid adoption of UPI can be attributed to multiple interrelated factors. First, the system's interoperability across banks and third-party applications reduced entry barriers for both consumers and merchants. Small retailers and micro-enterprises adopted digital payments through the zero or minimal Merchant Discount Rate (MDR) policy which eliminated extra transaction costs. Second, its design simplicity—replacing complex banking details with simple virtual IDs and scanning QR codes—enabled near-instant, 24/7, peer-to-peer (P2P) and person-to-merchant (P2M) transactions. Third, increased smartphone ownership together with low-cost internet services brought digital connectivity to both semi-urban areas and rural locations. Government initiatives which promote financial inclusion through Jan Dhan accounts and Direct Benefit Transfers (DBT) have established a digitally competent population that can use official payment systems. The conditions which enable these benefits created a rapid UPI adoption process that spread across all economic groups.

The implementation of UPI has transformed standard payment processes through its impact on businesses. Businesses used to depend on cash payments or card payment systems which required them to pay high processing costs and experienced slow payment processing times and had to set up point-of-sale terminals in their operations. UPI disrupted this structure by offering instant settlement, reduced transaction friction, and QR-code-based merchant acceptance requiring minimal hardware. The system enables micro, small, and medium enterprises (MSMEs) to manage their working capital cycles while improving liquidity control and enhancing transparency during financial transactions.

The real time reconciliation (Digital treasury management) has achieved better operational results through its ability to confirm credit instantly and perform bank account reconciliation in real time while digital transaction records enable banks to document their financial records which they need to access formal credit. The UPI system has created new competitive dynamics between automated bank system reconcilation platforms and financial technology companies in India. Google Pay, PhonePe, and BHIM operate their payment applications through UPI but they compete with each other by offering different user experiences and cashback programs and additional services instead of using their own payment networks. Infrastructure providers of NPCI and banks create an environment where fintech companies can develop their applications through their platform-based business model. The digital payment ecosystem allows competing systems to interact with one another which creates a unique market situation that exists in no other markets

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around the world. UPI enables people to use banking services who had previously faced barriers to accessing these services, which results in higher banking system efficiency. The adoption of

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QR-based merchant systems and biometric authentication linkages together with simplified onboarding procedures have created a steady increase in rural and semi-urban areas. UPI enables small vendors and farmers and informal workers to conduct digital transactions through formal channels which require no advanced financial knowledge. The field faces multiple challenges which include cybersecurity threats, digital literacy deficiencies, infrastructure limitations during peak transaction periods, and fraud risk factors. The UPI system must establish new security protocols because its operations require ongoing improvements to combat fraud through detection systems and regulatory control and cybersecurity protection systems.

The United Payments Interface (UPI) regulatory framework exists because the Payment and Settlement Systems Act of 2007 establishes it while the Reserve Bank of India (RBI) provides policy control and the National Payments Corporation of India (NPCI) handles system operations. The regulatory authorities have implemented different measures to secure systems through two-factor authentication while maintaining transaction limits and following data localization standards and protecting consumer rights. The current policy discussions investigate the sustainability impacts which arise from the zero-MDR system because it limits banks revenue potential while increasing their operational expenses. The UPI ecosystem needs three elements to achieve long-term sustainability because the system requires affordable solutions which can grow and maintain institutional stability.

UPI has started its international expansion through cross-border partnerships with Singapore and Bhutan and France which show that UPI can become a worldwide digital payment system. The expansion demonstrates how India has developed its digital public infrastructure system which establishes UPI as an example of government-backed financial technology development. The system has evolved through its integration of new technologies which include AI-based fraud detection systems and voice payment capabilities and UPI123Pay offline(offline-capable digital payment system) payment methods and biometric security measures. Research on UPI has mostly studied how people use the system and their views about it and its impact on financial access despite the existing research about UPI growth data and its technical system. UPI research has majorly focused on studying its effect on business payment systems and merchant financial processes and working capital practices and market competition within India’s payment sector.

**Literature Review**

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### *Evolution of Digital Payments in India*

India's transition toward a digital payment ecosystem has been shaped by regulatory reforms, financial inclusion initiatives, and technological innovation. Prior to the introduction of the Unified Payments Interface (UPI), digital transactions were largely dominated by card-based systems, mobile wallets, and Real Time Gross Settlement (RTGS) or National Electronic Funds Transfer (NEFT) mechanisms. These systems, although effective, were limited by interoperability constraints, higher transaction costs, and delayed settlement cycles (Reserve Bank of India [RBI], 2023).

The launch of UPI in 2016 by the National Payments Corporation of India marked a structural shift in India's payment architecture. Unlike previous instruments, UPI was designed as a real-time, interoperable, and open payment system enabling direct bank-to-bank transfers through mobile platforms. According to the Reserve Bank of India (2023), UPI's transaction growth has consistently outpaced other digital instruments, accounting for over 80% of retail digital payment volumes in recent years.

Scholars argue that UPI represents a model of "digital public infrastructure" where state-supported technological platforms enable private innovation (Srinivas & Mathew, 2021). This approach contrasts with proprietary payment networks common in developed markets, positioning India as a leading example of platform-enabled financial modernization in emerging economies.

### *Technology Acceptance Model (TAM)*

The adoption of digital payment technologies has frequently been examined through the Technology Acceptance Model (TAM) proposed by Davis (1989), which emphasizes perceived usefulness and perceived ease of use as primary determinants of technology adoption. In the context of UPI, empirical studies indicate that ease of transaction, real-time settlement, and interoperability significantly enhance perceived usefulness, thereby accelerating user adoption (Kumar & Nair, 2022).

Additionally, trust and perceived security play critical moderating roles in digital financial adoption. Given the sensitivity of financial transactions, users' confidence in encryption protocols, authentication systems, and regulatory oversight strongly influences behavioral intention to use UPI platforms (Joshi, Pathak, & Kulkarni, 2023).

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2.1 Network Effects and Platform Economics

UPI's rapid expansion can also be explained through network effect theory. As more consumers and merchants adopt the system, the value of participation increases for all stakeholders, generating positive feedback loops (Katz & Shapiro, 1985). The interoperability across banks and fintech applications strengthens indirect network effects by expanding acceptance points and increasing transaction convenience.

From a platform economics perspective, UPI operates as a two-sided market connecting consumers and merchants while banks and third-party application providers function as intermediaries. Unlike traditional proprietary platforms, UPI's open architecture reduces entry barriers and promotes competition at the application layer. This layered structure reflects a hybrid governance model in which infrastructure remains centrally managed while innovation remains decentralized (Srinivas & Mathew, 2021).

***UPI Adoption and User Behaviour***

Empirical literature has extensively examined determinants of UPI adoption. Kumar and Nair (2022) find that perceived convenience, transaction speed, and cost efficiency significantly influence usage frequency. The elimination of beneficiary addition requirements and simplified QR-code payments reduce cognitive and procedural friction, increasing behavioral intention.

Joshi et al. (2023) emphasized the importance of security perception in sustaining adoption. Their study indicates that multi-factor authentication mechanisms, UPI PIN verification, and device binding enhance trust, although concerns regarding phishing and fraud remain prevalent. The authors argue that sustained adoption depends not only on technological efficiency but also on awareness and digital literacy.

Recent RBI (2023) reports highlight demographic expansion in UPI usage, including rural and semi-urban penetration. Government-backed financial inclusion initiatives such as Jan Dhan accounts and Direct Benefit Transfers (DBT) have indirectly facilitated UPI adoption by expanding bank account ownership. However, digital literacy gaps and connectivity constraints continue to moderate adoption in less-developed regions.

***Business Model Transformation***

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While adoption literature is extensive, fewer studies critically analyze UPI's impact on business payment models. Traditional payment systems often involve multiple intermediaries, higher Merchant Discount Rates (MDR), and settlement delays. In contrast, UPI enables instant account-to-account transfers with minimal infrastructure requirements, primarily QR codes.

Srinivas and Mathew (2021) argue that interoperable payment systems reduce transaction costs and improve liquidity cycles for merchants. Instant confirmation of payment enhances working capital efficiency and reduces dependency on credit-based sales. For micro and small enterprises, digital transaction records also improve financial transparency and creditworthiness.

Moreover, UPI has influenced competitive dynamics within the fintech ecosystem. Application providers such as Google Pay and PhonePe compete primarily on user experience and value-added services rather than proprietary infrastructure. This shifts competition from payment processing to ecosystem services such as lending, insurance distribution, and bill payments.

However, sustainability concerns have emerged regarding the zero-MDR framework. While beneficial for merchant adoption, zero MDR limits revenue streams for banks responsible for maintaining infrastructure. RBI (2023) notes ongoing policy discussions regarding balancing affordability with institutional sustainability.

***Financial Inclusion and Digital Formalization***

UPI's role in financial inclusion has been widely acknowledged in policy literature. By lowering transaction costs and simplifying onboarding, UPI enables participation of informal sector actors in digital transactions. RBI (2023) highlights that digital payments contribute to improved transparency, reduced cash dependency, and formalization of economic activities.

Studies suggest that digital transaction trails enhance access to formal credit by generating verifiable financial histories (Kumar & Nair, 2022). For rural users, QR-based payments reduce dependency on cash handling and mitigate risks associated with physical currency storage.

Nevertheless, inclusion remains uneven. Challenges include limited internet access, digital illiteracy, fraud susceptibility, and grievance redressal delays. Joshi et al. (2023) emphasize that without strengthening consumer protection mechanisms, trust erosion could undermine long-term adoption sustainability.

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### *Regulatory and Governance Framework*

UPI operates under the Payment and Settlement Systems Act, 2007, with RBI providing oversight and NPCI managing operational execution. Regulatory interventions focus on two-factor authentication, transaction limits, cybersecurity audits, and data localization requirements (RBI, 2023).

Recent developments also include enhanced information security compliance frameworks and proposals for strengthening digital payment governance. The layered governance model—combining centralized infrastructure management with decentralized innovation—has been recognized as a distinctive feature of India's digital payment architecture.

However, scholars caution that increasing transaction volumes pose scalability risks. System outages or peak-time failures may undermine user trust. Therefore, infrastructure resilience and cybersecurity capacity-building remain critical areas of policy focus.

## Research Gap

Although prior literature extensively examines UPI adoption determinants, security perceptions, and financial inclusion outcomes, limited scholarly attention has been devoted to analyzing how UPI has structurally transformed person to merchant P2M, QR based, UPI autopay, B2B, micropayments business payment models in India. Most existing studies focus on consumer behavior, technology acceptance factors, or policy-level financial inclusion metrics. However, there is insufficient investigation into how UPI has altered merchant cost structures, working capital cycles, liquidity management practices, and competitive dynamics within the payment ecosystem. Furthermore, the long-term sustainability implications of the zero Merchant Discount Rate (MDR) policy and its impact on institutional incentives remain underexplored. Therefore, a comprehensive secondary data-based analysis examining UPI's structural impact on business payment models is warranted.

## Research Methodology

This study adopts a descriptive and analytical research design based exclusively on secondary data sources. The objective is to examine the structural transformation of business payment models in India following the introduction and expansion of the Unified Payments Interface (UPI). Secondary data were collected from official publications of the Reserve Bank of India (RBI),

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transaction statistics released by the National Payments Corporation of India (NPCI), annual banking trend reports, policy documents, and peer-reviewed academic studies related to digital payments and fintech ecosystems. The study covers the period from FY 2017–18 to FY 2024–25 to capture the post-adoption growth phase of UPI.

A trend analysis approach was employed to examine growth in transaction volume, transaction value, and UPI's share in total digital payments. Comparative analysis was conducted to evaluate cost structures between traditional card-based systems and UPI-based transactions. Additionally, thematic content analysis was applied to scholarly literature to identify patterns related to business model transformation, financial inclusion, and platform governance. The study does not employ primary data collection; instead, it synthesizes institutional data and existing empirical findings to derive analytical insights. This methodological approach enables macro-level evaluation of UPI's structural impact on India's business payment ecosystem.

## Findings

### *Growth and Network Expansion*

The analysis indicates exponential growth in UPI transactions, with annual volumes surpassing 200 billion transactions in recent years and accounting for over 80% of digital retail payments. This rapid expansion demonstrates strong positive network externalities, where increasing participation by consumers and merchants enhances overall system value.

UPI exhibits strong network effect characteristics, reinforcing its dominance within India's digital payment ecosystem.

### *Reduction in Transaction Costs*

Comparative evaluation reveals that traditional card-based systems involve Merchant Discount Rates (MDR), point-of-sale infrastructure costs, and delayed settlement cycles. In contrast, UPI offers QR-based acceptance, zero or minimal MDR for small merchants, and instant settlement.

UPI significantly reduces variables transaction costs, particularly for MSMEs and micro-retailers, improving profit margins and operational efficiency.

### *Improvement in Working Capital Efficiency*

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Instant fund settlement reduces payment delays and improves cash flow predictability. Merchants receive immediate confirmation, reducing credit dependency and enhancing liquidity management.

UPI shortens working capital cycles and strengthens liquidity management for small and medium enterprises.

***Business Formalization and Transparency***

Digital transaction trails generated through UPI contribute to improved financial documentation. This enhances tax compliance, credit eligibility, and financial transparency.

UPI indirectly supports business formalization and integration of informal sector participants into the formal economy.

***Competitive Restructuring of the Payment Ecosystem***

UPI's interoperable structure has shifted competition from infrastructure ownership to service innovation. Fintech firms compete through user experience enhancements and value-added services rather than proprietary networks.

UPI has restructured competitive dynamics by enabling platform-based innovation within a regulated infrastructure framework.

***Sustainability and Policy Challenges***

Despite efficiency gains, concerns remain regarding:

- Zero MDR sustainability
- Cybersecurity risks
- Infrastructure scalability
- Data governance

Long-term sustainability of UPI requires policy recalibration balancing affordability, institutional incentives, and infrastructure resilience.

## Conclusion

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The rapid expansion of the Unified Payments Interface (UPI) represents a structural transformation in India's digital financial architecture and business payment ecosystem. Since its introduction in 2016 by the National Payments Corporation of India under the regulatory oversight of the Reserve Bank of India, UPI has evolved from a technological innovation into the backbone of India's retail digital payments system. Its exponential growth in transaction volume and value reflects not merely increased adoption, but a systemic shift in transactional behavior across consumers, merchants, and financial institutions.

This study sought to move beyond the conventional adoption-centric discourse by examining how UPI has transformed business payment models in India. The findings indicate that UPI has substantially reduced transaction frictions through instant settlement, interoperability, and minimal infrastructure requirements. By eliminating dependency on costly point-of-sale devices and reducing merchant discount rates, UPI has lowered marginal transaction costs, particularly benefiting micro, small, and medium enterprises (MSMEs). This cost efficiency has enhanced profit retention and strengthened operational sustainability for small merchants.

Moreover, UPI's real-time payment confirmation has significantly improved working capital management and liquidity cycles. Immediate fund settlement reduces receivables uncertainty and enhances inventory turnover efficiency. For businesses operating in cash-constrained environments, this shift represents a critical improvement in financial management practices. The generation of digital transaction trails has further contributed to improved transparency, tax compliance, and creditworthiness, thereby supporting the gradual formalization of informal sector enterprises.

At the ecosystem level, UPI has restructured competitive dynamics within the fintech and banking landscape. Its interoperable, open-platform architecture has shifted competition from proprietary infrastructure ownership to service-layer innovation. Payment application providers now compete through value-added services, user experience optimization, and embedded financial offerings rather than exclusive network control. This layered governance model reflects an effective blend of centralized infrastructure oversight and decentralized innovation, offering a replicable framework for digital public infrastructure development in emerging markets.

However, the sustainability of UPI's growth trajectory is contingent upon addressing several structural challenges. The zero Merchant Discount Rate (MDR) framework, while beneficial for

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merchant adoption, raises concerns regarding long-term revenue incentives for banks and payment service providers responsible for maintaining the payment's infrastructure. Additionally, rising cybersecurity risks, fraud vulnerabilities, data governance complexities, and infrastructure scalability pressures necessitate continuous regulatory vigilance and technological upgrades. As transaction volumes continue to grow, maintaining system resilience and public trust becomes increasingly critical.

In conclusion, UPI represents more than a digital payment tool; it embodies a transformative institutional innovation reshaping business payment models, merchant economics, and financial inclusion pathways in India. By reducing transaction costs, accelerating liquidity flows, enabling platform-based competition, and supporting economic formalization, UPI has established itself as a cornerstone of India's digital economy. Future research may further explore sector-specific impacts, sustainability models, and cross-country comparisons to assess the broader applicability of India's digital public infrastructure approach. As digital payment ecosystems continue to evolve globally, the UPI model offers valuable insights into how state-supported technological platforms can drive inclusive and scalable economic transformation.

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