

The Impact of UPI on Micro and Small-Scale Enterprises (MSEs) in India: Opportunities, Challenges, and Future Prospects

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ABSTRACT

The Unified Payments Interface (UPI) has profoundly reshaped India's digital payment landscape, exerting a significant influence on Micro and Small-Scale Enterprises (MSEs). This comprehensive report examines UPI's pivotal role in accelerating financial inclusion, enhancing transaction efficiency, and fostering business growth for MSEs across the nation. Beyond merely streamlining financial transactions, UPI has emerged as a powerful catalyst for broader socio-economic transformation, fundamentally altering economic participation and opportunities, particularly for marginalized groups and in rural areas. By enabling seamless, low-cost digital payments, it has facilitated the formalization of previously informal economic activities, contributing to a more equitable and inclusive economic landscape. The report also critically explores persistent challenges that impede widespread adoption, such as the pervasive digital literacy gap, evolving cybersecurity risks, and fundamental infrastructure disparities. Drawing upon extensive secondary data from government reports, financial institutions, and industry analyses, this study highlights UPI's transformative potential while concurrently proposing strategic policy and technological interventions essential for its sustainable and inclusive adoption. The findings underscore UPI's capacity to empower the MSE sector, thereby accelerating India's ambitious vision for a \$5 trillion digital economy.

Executive Summary

This research dissects the diverse ways the Unified Payments Interface (UPI) affects Micro and Small-Scale Enterprises (MSEs) across India, exploring its multifaceted benefits, inherent complexities, and promising trajectory. Without question, UPI stands as a groundbreaking innovation for MSEs, enabling effortless, economical digital transactions that considerably reduce reliance on physical cash and broaden market reach. Its rapid uptake has undeniably

democratized access to financial services, allowing even the smallest street vendors to engage actively in the digital economy.

However, significant hurdles remain on the path to universal digital adoption. Pervasive digital illiteracy, sophisticated cybersecurity threats, and persistent infrastructure limitations represent formidable obstacles, continuing to constrain UPI's full potential. A pivotal insight here reveals the intricate interplay between UPI's advantages and disadvantages. For instance, while UPI's user-friendliness and swift expansion might inadvertently enlarge the cyber fraud attack surface, actively promoting digital literacy directly enhances financial inclusion. Similarly, certain policy decisions, such as the Merchant Discount Rate (MDR) waiver, though initially boosting adoption, can introduce complications regarding service quality and merchant tax compliance.

Structural Overview of This Study

This paper is structured into six key sections:

Introduction: This initial segment delineates the study's objectives and underscores UPI's significance for MSEs within India's dynamic economic framework.

UPI's Evolution in India: This section chronicles UPI's remarkable trajectory, pinpointing its core features and pivotal moments that cemented its status as the world's premier real-time payment system.

Opportunities for MSEs: Here, we examine the tangible advantages, encompassing enhanced financial inclusion, substantial cost savings, expanded business avenues, streamlined access to formal credit, and accelerated formalization processes.

Challenges to Adoption: This part identifies critical impediments such as the digital literacy divide, cybersecurity vulnerabilities, inadequate infrastructure, and the intricate repercussions of tax compliance.

Future Outlook & Recommendations: This section highlights prospective technological advancements and forward-thinking policy measures aimed at maximizing UPI's benefits and fostering enduring growth.

Conclusion: The final section summarizes the principal findings, reiterating UPI's revolutionary contribution to India's digital economy and its potential as a potent driver for small business growth.

By integrating government statistics, compelling real-world case studies, and incisive industry reports, this paper provides a comprehensive and nuanced perspective on UPI's transformative

influence on MSEs. It promotes targeted, collaborative interventions to dismantle existing barriers and fully harness UPI's capacity to empower India's vast and critically important MSE sector.

1. Introduction

The year 2016 was a major turning point for India's financial system, largely due to the introduction of the Unified Payments Interface (UPI). The National Payments Corporation of India (NPCI), under the careful supervision of the Reserve Bank of India (RBI), developed UPI to open up digital payments to everyone in the country ([Cornelli et al., 2024](#)). Suddenly, people could make instant, cashless transactions right from their phones. This revolutionary tool came about in a payment landscape that was still heavily dependent on cash. In fact, before UPI's widespread adoption, an astonishing 90% of all financial transactions were made with physical money ([Kavitha et al., 2024](#)).

Before UPI, the digital payment systems we had – like IMPS, RTGS, and NEFT – each came with their own set of drawbacks. Take NEFT, for instance: even though you could use it 24/7 starting in December 2019, it still processed payments in batches. That often meant waiting for up to two hours for a transaction to go through ([Dev et al., 2024](#)). Similarly, RTGS, though expediting high-value transactions (typically those surpassing ₹2 lakh), lacked continuous 24/7 availability until December 2020 and frequently levied higher fees. IMPS, conversely, facilitated immediate 24/7 transfers, yet its transaction ceilings were generally confined to ₹5 lakh ([Mahesh & S., 2022](#)). While those older systems certainly had their uses, they clearly missed the mark when it came to offering cost-efficiency, universal interoperability, and true user-friendliness—qualities that UPI would eventually master, especially crucial for smaller transactions. Even early mobile wallets like Paytm and PhonePe struggled with slower adoption ([Pillai et al., 2019](#)), facing constant hurdles with different platforms not working together and the RBI's new Know Your Customer (KYC) rules at the time. Importantly, UPI's meteoric ascension received further impetus from the demonetization drive enacted in November 2016, an event that sharply illuminated the urgent necessity for readily available, supremely efficient, and scalable non-cash payment alternatives.

The Indispensable Economic Contribution of India's MSEs

Micro and Small-Scale Enterprises (MSEs) constitute an unequivocally indispensable cornerstone of the Indian economy. These companies put over 110 million people to work and make up a hefty 30% of India's entire economy ([Pandey & Chaudhary, 2024](#)). Beyond those impressive figures, Micro and Small-Scale Enterprises (MSEs) are actually responsible for almost half of everything India exports, they're constantly generating new jobs across countless

sectors, and they're a huge force for innovation. They skilfully use local resources and cater to local markets, playing a crucial, multi-faceted role in building entrepreneurship from the ground up, narrowing the urban-rural economic gap, strengthening local supply chains, and vigorously promoting economic inclusion. Keeping this sector strong and healthy is essential for India to achieve its ambitious "Viksit Bharat by 2047" goal; so, any innovation that boosts their operations and market presence will have a truly transformative effect.

Research Objectives

This paper investigates:

- The **opportunities** UPI presents for MSEs, including enhanced cost efficiency, deeper financial inclusion, and expanded business avenues.
- The **challenges** that continue to hinder widespread adoption of UPI among MSEs, such as the digital divide, cybersecurity vulnerabilities, and infrastructural limitations.
- The **future prospects** for UPI in strengthening India's dynamic MSE sector, identifying key policy and technological pathways for sustainable growth.

Methodology

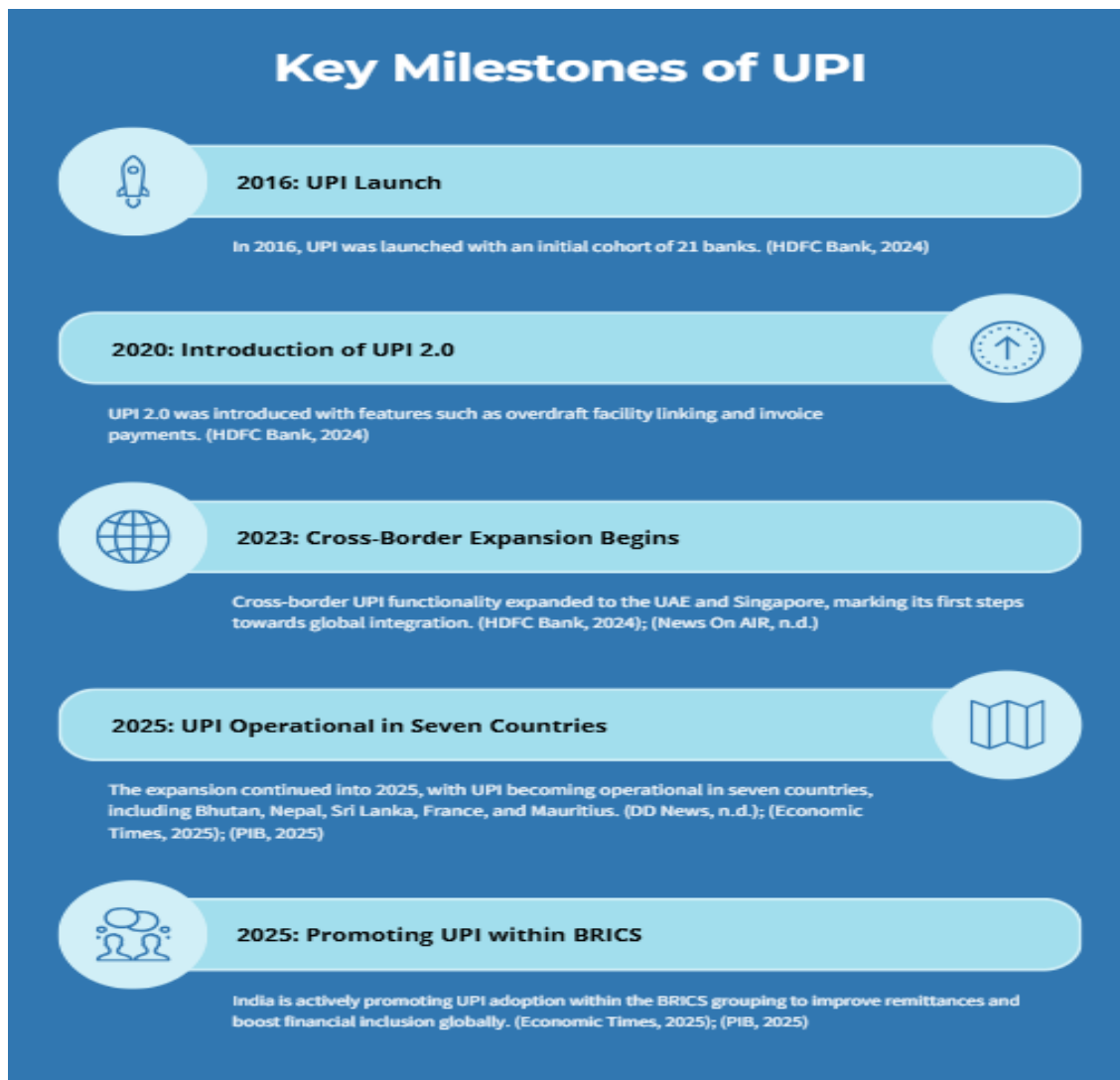
The study primarily relies on **secondary data** researched from a diverse range of authoritative sources. These include official government reports from entities such as the Press Information Bureau ([PIB, 2024](#)) and the Reserve Bank of India ([Economic Times BFSI, 2024](#)), comprehensive analyses from leading financial institutions (e.g., [HDFC Bank, 2024](#)), and in-depth industry reports from organizations like [NASSCOM \(2024\)](#) and the [Kansas City Fed \(n.d.\)](#). To provide a nuanced and practical understanding of UPI's real-world impact, the research also incorporates qualitative insights from **case studies** of small businesses that have successfully integrated UPI into their operations ([YourStory, 2023](#)). This multi-source approach ensures a holistic and well-substantiated analysis of UPI's transformative influence on the MSE sector.

2. UPI and Its Growth in India

2.1 Evolution of UPI

The Unified Payments Interface (UPI) was officially launched in **2016** by the National Payments Corporation of India (NPCI) with the ambitious goal of promoting a less-cash economy, particularly in the wake of demonetization ([HDFC Bank, 2024](#)); ([IJSRT Journal, 2025](#)). Starting with just 21 banks and a modest 93,000 transactions worth ₹3 crore in August 2016, UPI's

growth trajectory has been nothing short of exponential ([HDFC Bank, 2024](#)). By March 2019, transactions had surged to 80 crore, amounting to ₹1.3 lakh crore, reflecting its rapid acceptance ([Open, n.d.](#)). By **2024**, UPI had cemented its position as the world's largest real-time payment system, processing an astounding 14 billion monthly transactions ([HDFC Bank, 2024](#)). More recent data from June 2025 indicates UPI processed over 18 billion transactions monthly, accounting for 85% of India's total digital payments and a value of ₹24.03 lakh crore, marking a 32% increase from the previous year ([Times of India, 2024](#)). This remarkable scale is underscored by its surpassing of Visa in daily transactions, handling over 640 million transactions per day compared to Visa's 639 million, a feat achieved in just nine years ([PIB, 2025](#)).



2.2 How UPI Works

At its core, UPI operates on an incredibly robust, seamlessly connected, and lightning-fast payment system. What's truly ingenious about it is how it pulls all of a user's bank accounts into a single mobile app. This means users no longer face the hassle of memorizing those complex IFSC codes or cumbersome bank account numbers. Instead, making a payment becomes wonderfully straightforward, whether one is using a Virtual Payment Address (VPA), phone number, or just scanning a QR code. Key operational characteristics include:

1. **Instant Money Movement:** Unlike older banking methods that often leave you waiting, UPI lets money zip between accounts in real-time. It's truly instantaneous (Cornelli et al., 2024). This ability to move funds right away is a game-changer for businesses, giving their cash flow a significant boost.
2. **Surprisingly Low Cost:** A major reason UPI has caught on so widely, especially with smaller shops, is the zero Merchant Discount Rate (MDR)(Malladi et al., 2021). The RBI has kept this policy in place since 2019. Essentially, this means these businesses don't pay any transaction fees, making digital payments incredibly attractive and affordable for them.
3. **Robust Security:** UPI comes with a strong Two-Factor Authentication (2FA) system built right in. You need to enter a unique UPI PIN for every single transaction, which ensures strong security and prevents anyone from getting unauthorized access(Kavitha et al., 2024) (Razorpay, n.d.; EnKash, n.d.). Plus, your transaction data is protected through device binding and AES-256 encryption, and sensitive details like bank account numbers are replaced with secure, random codes using tokenization (EnKash, n.d.).

Regardless of whether a transaction is initiated by the sender (a "push" transaction) or requested by the recipient (a "pull" transaction), the core participants in the transactional flow encompass the payer's application/PSP, the NPCI (responsible for routing and validating requests), the issuing bank (the sender's financial institution), the acquiring bank (the recipient's financial institution), and the payee's PSP(Razorpay,EnKash) (Alamleh et al., 2023). This multi-layered architecture collectively assures reliability, security, and speed.

2.3 UPI's Dominance in Digital Payments

UPI's Dominance in Digital Payments

UPI's strategic design and widespread acceptance have propelled it to a dominant position within India's digital payment ecosystem.

- **Market Share:** UPI accounts for an overwhelming **75% of all digital transactions in India** as of RBI data in 2024 ([HDFC Bank, 2024](#)). More broadly, it powers nearly **50% of global real-time digital payments**, underscoring its international significance ([Economic Times, 2025](#)).
- **User Base:** The platform boasts an impressive user base of over **300 million active users**(C, 2024) ([HDFC Bank, 2024](#)), with **491 million individuals and 65 million merchants** onboarded as of June 2025 ([Times of India, 2024](#)). This widespread adoption is further supported by its connectivity with **675 banks** through a single digital framework ([Times of India, 2024](#)).
- **Transaction Trends:** In July 2024, UPI transactions soared to **₹20.64 trillion**, representing a **45% year-on-year growth**. The average daily transaction value stood at **₹466 million**, or approximately **₹66,590 crore** ([Paytm, n.d.](#)). The rapid increase in transaction volume and value, coupled with a decrease in the average ticket size, demonstrates UPI's pervasive use for small-value retail transactions, significantly enhancing financial inclusion and convenience ([Economic Times BFSI, 2024](#)); ([BIS, 2024](#)).

Case Study: A compelling illustration of UPI's impact comes from a **street vendor in Mumbai** who reported a **30% increase in sales** after adopting UPI ([YourStory, 2023](#)). This surge was directly attributable to customers' growing preference for cashless payments, highlighting how UPI addresses a critical market demand. This observation aligns with broader trends indicating that **73% of small businesses** in semi-urban and rural India have seen increased income or improved operational efficiency through digital tools, with UPI being the most preferred method ([Economic Times, 2022](#)). The ability to accept digital payments without expensive Point-of-Sale (POS) systems has empowered even the smallest vendors, driving their integration into the formal financial system ([ResearchGate, n.d.](#)).

3. Opportunities for MSEs

The Unified Payments Interface has unlocked a myriad of opportunities for Micro and Small-Scale Enterprises in India, fundamentally altering their operational dynamics and market reach. These benefits extend beyond mere transactional convenience, fostering deeper financial inclusion, significant cost efficiencies, and avenues for business expansion.

3.1 Financial Inclusion

UPI has been a powerful instrument in advancing financial inclusion, particularly for previously underserved segments of the Indian economy.

- **Rural Penetration:** UPI has enabled small kirana stores in villages to embrace digital transactions, bringing formal financial services to areas with limited traditional banking infrastructure ([NASSCOM, 2024](#)); ([IJABMR, n.d.](#)). This is a significant step towards democratizing financial access. The increasing penetration of affordable smartphones and cheaper internet data plans in rural areas has been a key driver, allowing even remote villages to access UPI ([Highland Post, n.d.](#)).
- **Jan Dhan Accounts:** The Pradhan Mantri Jan Dhan Yojana, a government initiative to bring millions into the formal banking system, has been a crucial enabler for UPI's success ([Times of India, 2024](#)). These zero-balance accounts, linked to UPI, have empowered unbanked merchants and individuals to receive payments digitally, fostering digital financial habits ([HDFC Bank, 2024](#)); ([Open, n.d.](#)); ([Times of India, 2024](#)); ([Highland Post, n.d.](#)). As of July 2025, over 55.83 crore Jan Dhan accounts have been created, providing a foundational platform for UPI adoption ([Times of India, 2024](#)); ([PIB, 2025](#)).
- **Bridging the Divide:** The accessibility of UPI through smartphones has brought financial inclusion to areas with limited banking infrastructure, allowing small businesses to accept digital payments as a secure, fast, and cost-effective alternative to cash ([ResearchGate, n.d.](#)). This has been particularly impactful in bridging the urban-rural divide, addressing the disparity where rural internet penetration significantly lagged urban rates ([CSR Universe, n.d.](#)). The availability of vernacular language support and simplified user interfaces in UPI-enabled apps has further catered to the linguistic and educational needs of rural users, enhancing accessibility ([Highland Post, n.d.](#)); ([InstantPay, 2025](#)). This systematic approach to inclusion transforms financial literacy and access, moving beyond mere numbers to reflect trust, convenience, and speed in economic interactions ([Times of India, 2024](#)).

3.2 Cost Efficiency

Cost Efficiency Through UPI

UPI offers substantial cost savings and improved financial fluidity for MSEs, moving them away from traditional, often expensive, payment infrastructure.

- **Elimination of POS Machine Costs:** MSEs can save an estimated ₹10,000–15,000 **annually** by eliminating the need for expensive Point-of-Sale (POS) machines ([ResearchGate, n.d.](#)). This significant saving directly impacts their bottom line, making digital payment acceptance accessible even for the smallest vendors ([IJFMR, 2025](#)); ([ResearchGate, n.d.](#)).

- **Faster Cash Flow:** The instant settlement nature of UPI transactions, as opposed to the 2-3 days required for traditional banking methods, dramatically improves MSEs' cash flow management ([HDFC Bank, 2024](#)); ([Kinara Capital, n.d.](#)). This immediate access to funds enhances their liquidity, enabling:
 - Quicker inventory replenishment
 - Timely supplier payments
 - Better overall working capital management ([Kinara Capital, n.d.](#)).

The reduction in cash handling and accounting costs further improves operational efficiency ([ResearchGate, n.d.](#)); ([IJPREMS, 2025](#)).

3.3 Business Expansion

UPI facilitates significant business expansion for MSEs by broadening their customer base and integrating them into larger digital commerce ecosystems.

- **E-commerce Integration:** Small sellers leveraging platforms like Meesho, Amazon, and Flipkart extensively utilize UPI for receiving payments, seamlessly integrating into the burgeoning e-commerce landscape ([Razorpay, n.d.](#)). This allows them to reach customers beyond their immediate physical vicinity, expanding their market significantly. The integration of UPI with global platforms like PayPal World further enables Indian users to make international payments, potentially opening new avenues for MSEs engaged in cross-border trade ([Economic Times, 2025](#)).
- **Social Commerce:** The rise of platforms like WhatsApp Pay, powered by UPI, enables MSEs to conduct sales directly through social media channels ([De, 2024](#)). This form of social commerce lowers entry barriers for small businesses, allowing them to tap into vast online communities and conduct transactions effortlessly.
- **Attracting New Customer Segments:** The ease of use and ubiquity of UPI attract new customer segments, including those who prefer cashless transactions or are international tourists ([MarketCentral, n.d.](#)).
 - **Case Study:** A handicraft seller in Jaipur successfully doubled sales by accepting UPI payments from international tourists ([Kansas City Fed, n.d.](#)). This illustrates how UPI's global recognition and ease of use can directly translate into increased revenue by catering to a diverse customer base, including those accustomed to digital payment systems in their home countries ([Kansas City Fed, n.d.](#)). The widespread display of QR codes at physical shops also

makes it convenient for customers to make payments from any UPI app, further boosting transactions ([MarketCentral, n.d.](#)).

3.4 Access to Formal Credit

One of the most profound impacts of UPI on MSEs is its role in bridging the traditional credit gap, which has historically hindered their growth.

- **Digital Footprint for Credit Assessment:** By facilitating digital transactions, UPI helps MSEs create a verifiable digital footprint of their financial activities ([Kinara Capital, n.d.](#)); ([BIS, 2024](#)). This digital record, which includes transaction history and business performance, is invaluable for lenders to assess creditworthiness more accurately, especially for informal businesses that previously lacked comprehensive financial records or credit scores ([Kinara Capital, n.d.](#)); ([BIS, 2024](#)). This data-driven approach reduces information asymmetry, a common challenge for MSMEs seeking formal credit ([BIS, 2024](#)).
- **Integration with Digital Lending Platforms:** UPI's integration with digital lending platforms and its role in the Unified Lending Interface (ULI) initiative are transforming access to finance for MSEs([Uncia.ai, n.d.](#)). These platforms leverage technologies like Artificial Intelligence (AI) and Machine Learning (ML) to analyze UPI transaction data, enabling faster and more accurate credit assessments and loan approvals ([Kinara Capital, n.d.](#)); ([Kinara Capital, n.d.](#)). This means MSEs can get quick access to funds without lengthy approval processes or the need for extensive collateral, addressing a major bottleneck in traditional lending.
- **Pre-sanctioned Credit Lines:** The RBI has expanded the scope of UPI to include pre-sanctioned credit lines from banks, allowing users to access and utilize credit directly through their UPI-enabled apps ([Decentro, n.d.](#)). This innovation enables MSEs to link their business loan accounts, credit lines against fixed deposits, shares, or property to UPI, facilitating seamless payments for operational needs, supplier payments, and even cash withdrawals ([Economic Times, 2025](#)). This integration provides immediate access to funds, improving cash flow management and reducing reliance on informal, high-interest lending ([Kinara Capital, n.d.](#))
- **Supply Chain Finance:** While not explicitly detailed as a direct UPI feature, the broader digital payment infrastructure, including UPI, supports the formalization and efficiency of B2B transactions, which is crucial for supply chain finance ([BVP, n.d.](#)). UPI's instant fund transfers and low transaction fees make it ideal for frequent small-value transactions within supply chains, enhancing cash flow management for MSMEs. Platforms like the

Trade Receivables and Discounting System (TReDS), promoted by the RBI, further aid MSMEs in raising finance against their receivables, reducing delayed payments and improving liquidity.

3.5 Formalization and Tax Compliance

UPI's widespread adoption has a significant, albeit sometimes complex, impact on the formalization of MSEs and their adherence to tax regulations.

- **Bringing Businesses into the Formal Fold:** By encouraging digital transactions, UPI naturally creates a digital record of business activities, pushing previously informal micro-enterprises towards formalization ([ResearchGate, n.d.](#));([Kinara Capital, n.d.](#)). Registering on platforms like the Udyam Portal and filing GST returns becomes more feasible and transparent when transactions are digitized. This formalization enhances their credibility with financial institutions, potentially qualifying them for priority sector lending and government schemes([BIS, 2024](#)). As of March 2025, over 6.2 crore MSMEs were registered on Udyam, a significant increase from 2.5 crore the previous year, with platforms like Udyam Assist onboarding millions of informal micro-enterprises.
- **Enhanced Tax Compliance and Revenue:** Studies indicate a strong positive correlation between UPI usage and tax revenues ([ResearchGate, 2024](#)). Increased UPI adoption among Small and Medium Enterprises (SMEs) has been linked to a rise in GST filings and higher direct tax revenue, suggesting that digital payments enhance taxpayer reporting and reduce tax evasion. For instance, one study found that SMEs using UPI reported 18% higher GST filings and 22% higher revenue growth compared to non-UPI businesses, demonstrating how UPI promotes better financial transparency. This dual benefit of formalization not only helps MSEs access more resources and opportunities but also contributes to the government's tax collection efforts, supporting overall economic growth.

4. Challenges in UPI Adoption

Despite its potential, UPI's widespread and equitable adoption among MSEs in India faces several significant challenges, particularly in rural and underserved areas. These barriers are often interconnected, creating a complex landscape that requires multi-faceted interventions.

4.1 Digital Literacy Gap

Digital Literacy Gap

A major impediment to UPI adoption is the digital literacy gap, especially prevalent in rural India.

- **Rural MSEs Struggle:** A concerning statistic reveals that only 40% of small vendors in rural areas fully understand UPI security protocols (A Study on Challenges and Solutions for Implementing Digital Literacy Programmes in India's Rural Areas, 2024). This lack of understanding extends to basic digital financial concepts, making them hesitant or vulnerable to fraud. The implication is that even with accessible technology, a lack of foundational knowledge prevents full and confident participation in the digital economy.
- **Language Barriers:** Many UPI applications and digital communications are predominantly in English, posing a significant challenge for a large segment of the rural population that primarily speaks regional languages. This linguistic barrier limits comprehension and comfortable interaction with digital payment systems. While some apps now offer vernacular language support, the gap remains substantial ([Highland Post, n.d.](#)); ([IBS Intelligence, n.d.](#)). The lack of understanding among decision-makers in rural areas about the importance of digital literacy further contributes to a lack of investment in relevant training and resources.

Cybersecurity Risks

The rapid proliferation of digital payments, while beneficial, has concurrently amplified cybersecurity risks, impacting user trust and adoption.

- **Prevalence of Scams:** MSEs are increasingly vulnerable to sophisticated fraud schemes. Common tactics include phishing scams, where fake UPI IDs or deceptive emails trick merchants into unauthorized transactions or revealing sensitive information([Razorpay, n.d.](#)); ([Quick Heal, n.d.](#)). QR Code fraud is another prevalent issue, where criminals replace legitimate merchant QR codes with their own, diverting payments. Other methods include vishing (impersonating bank representatives), fake payment screenshots, and malicious screen monitoring apps.
- **Impact on Merchants:** These frauds lead to direct financial losses for MSEs, as exemplified by a tea stall owner in Bihar who lost ₹5,000 to UPI fraud due to a lack of awareness([Razorpay, n.d.](#)). Beyond monetary losses, such incidents erode trust in digital payment systems, causing reputational damage and discouraging further adoption. The surge in UPI frauds, with over 13.4 lakh cases reported in FY 2023-24 leading to losses exceeding ₹1,087 crore, underscores the severity of this challenge. The underlying vulnerability often stems from design-level flaws in earlier UPI specifications and social

engineering attacks that exploit user behaviour rather than inherent system weaknesses ([USENIX, n.d.](#)); ([IJRASET, n.d.](#)).

Infrastructure Issues

Fundamental infrastructural limitations continue to pose significant hurdles to the seamless adoption of UPI, particularly in remote and rural areas.

- **Poor Internet Connectivity:** A considerable proportion of MSEs, particularly 25% of rural MSEs, face persistent connectivity problems. This issue is systemic, with reports indicating that only 38% of villages have stable 4G connectivity. Intermittent connectivity makes real-time digital transactions unreliable, forcing a continued reliance on cash ([Highland Post, n.d.](#)).
- **Inconsistent Electricity Supply:** Beyond internet access, the lack of reliable electricity supply in many remote areas is a major bottleneck ([Highland Post, n.d.](#)). Digital payment devices and smartphones require consistent power, and frequent outages disrupt transaction capabilities, further hindering the shift away from cash.
- **Smartphone Affordability:** While smartphone penetration is increasing, the affordability of devices for low-income groups in rural areas remains a challenge ([Yale, n.d.](#)). This limits access to UPI-enabled applications, as a significant percentage of rural users may not even own a smartphone. Although 71% of MSME respondents cite smartphones as their primary business device, and this figure is even higher for women entrepreneurs (84%), the digital divide persists for those who cannot afford or access these devices ([Economic Times, 2022](#)); ([Banking Frontiers, n.d.](#)). These infrastructural gaps fundamentally limit the reach and reliability of digital payment systems, preventing full economic participation in the digital realm.

Merchant Discount Rate (MDR) and Tax Overreach

While the waiver of MDR for UPI transactions was initially a significant incentive for adoption, its long-term implications and the subsequent use of UPI data for tax assessment have introduced new challenges.

- **Disincentivizing Service Providers:** The zero-MDR policy for UPI and RuPay transactions, while beneficial for merchants, has disincentivized traditional public sector banks and payment processors from updating their systems and implementing new tech platforms in India([C, 2024](#)). This is because processing these transactions no longer generates revenue for them, potentially leading to a decline in the quality of service

offered. This creates a tension between promoting free transactions for users and ensuring the commercial viability and innovation of the payment ecosystem.

- **Tax Compliance Concerns and Merchant Resistance:** A more recent and significant challenge stems from the government's use of UPI transaction data to assess and levy Goods and Services Tax (GST) on small merchants. Many small and medium physical merchants (SMPMs) who were initially drawn to UPI by its free services now face unexpected tax bills, leading to feelings of betrayal and resistance. Anecdotal evidence, such as "No UPI, Only Cash" signboards in Bengaluru, points to a worrying trend of merchants rejecting UPI payments in favour of cash to avoid perceived tax obligations. This situation highlights a critical unintended consequence: using a tool meant for financial inclusion as a means of aggressive tax enforcement can undermine the very trust and adoption it initially fostered, slowing user growth and merchant onboarding. The complexities of technological integration, compliance requirements, and working capital challenges associated with monthly GST bills further deter many qualifying merchants from fully embracing digital transactions ([Economic Times, 2025](#)).

5. Future Prospects & Recommendations

The continued success and inclusive growth of UPI for MSEs in India hinge on strategic interventions that address current challenges while leveraging emerging opportunities. A multi-pronged approach encompassing policy, technology, and ecosystem collaboration is essential.

5.1 Policy Interventions

Government and regulatory bodies play a crucial role in shaping a supportive environment for UPI adoption and mitigating associated risks.

- **Targeted Digital Literacy Drives:** It is imperative that the RBI and NPCI intensify their efforts to conduct merchant training camps, particularly in rural and semi-urban areas ([The Secretariat, 2025](#)). These campaigns should be culturally sensitive, offering training in vernacular languages and focusing on practical aspects of UPI usage, security awareness, and basic financial management ([Highland Post, n.d.](#); [CSR Universe, n.d.](#); [IBS Intelligence, n.d.](#)). This direct engagement can bridge the digital literacy gap, building trust and confidence among small vendors ([Economic Times, 2022](#)).
- **Stronger Fraud Prevention Mechanisms:** To combat the rising tide of cybersecurity threats, the government has initiated significant measures. The Department of Telecommunications (DoT), in collaboration with financial and cybercrime stakeholders, has launched the Financial Fraud Risk Indicator (FRI). This real-time intelligence

mechanism assigns a dynamic risk score to mobile numbers based on aggregated data from various sources, including cybercrime reports and banking red-flag data ([TechCircle, 2025](#)). This system, managed under the Digital Intelligence Platform (DIP), allows financial institutions and payment platforms to query a real-time fraud risk signal (low, medium, high) before authorizing a transaction, enabling early detection and prevention. PhonePe has already piloted integration with FRI, demonstrating its potential to block high-risk interactions in milliseconds. Furthermore, the RBI, in collaboration with public and private sector banks, is developing the Digital Payment Intelligence Platform (DPIP), which will aggregate data from multiple channels using AI and ML to detect risks and combat digital fraud ([CoinGeek, 2025](#)). The RBI also introduced [MuleHunter.AI](#) in December 2024 to identify and track mule accounts used for money laundering. Implementing two-factor authentication for high-value transactions is another critical step to bolster security. These initiatives, coupled with public education campaigns and a dedicated helpline (1930), are vital for rebuilding public trust and ensuring a secure digital finance landscape.

- **Rationalizing Tax Incentives and Compliance:** To address merchant resistance due to GST overreach, the government should consider rationalizing GST rates for small and medium physical merchants (SMPMs) ([Economic Times, 2025](#)). This could involve creating a low and automatically deducted tax amount, possibly reducing GST threshold criteria, to make the levy more palatable and near-universal. Furthermore, providing financial incentives to promote digital modes of payment, as seen with the allocation of INR 1,500 crores in Union Budget 2021, can encourage adoption without creating a perception of betrayal ([PwC, n.d.](#)). Relaxations on audit rules for businesses transacting digitally (increasing the tax audit limit from ₹5 crore to ₹10 crore turnover) also incentivize digital usage by reducing compliance burden.

5.2 Technological Innovations

The continuous evolution of UPI's technological capabilities is crucial for expanding its reach and addressing specific user needs, particularly in challenging environments.

- **Offline UPI Solutions:** NPCI's UPI Lite X is a significant innovation designed to facilitate offline transactions, specifically targeting areas with low or intermittent internet connectivity ([InstantPay, 2025](#)). Leveraging Near Field Communication (NFC) technology, UPI Lite X enables seamless money transfers between on-device wallets without requiring an active internet connection. This is particularly beneficial for small merchants and vendors in rural or semi-urban areas who deal primarily in small amounts, ensuring cashless payments are possible even in network-deprived zones. UPI Lite,

introduced in September 2022, already allows small-value payments (up to ₹500 per transaction, ₹2,000 daily) without a PIN, reducing load on bank systems and improving reliability.

- **Voice-Based UPI (UPI 123Pay):** To assist non-literate and feature phone users, NPCI launched UPI 123Pay in 2022. This innovative solution allows users to make digital payments through various methods without an internet connection, including Interactive Voice Response (IVR) calls, missed call-based payments, feature phone apps, and proximity sound-based payments ([Paytm, n.d.](#)). UPI 123Pay supports multiple national and regional languages, making digital transactions accessible to millions who previously faced barriers due to smartphone ownership or literacy levels .
- **Integration with Emerging Technologies:** UPI is poised for further evolution through integration with cutting-edge technologies. NPCI is developing an Internet of Things (IoT)-compatible UPI system that would support automatic payments from smart appliances, wearables, and connected vehicles ([CoinGeek, n.d.](#)). This "UPI Circle" framework, expected to be unveiled in late 2025, will enable seamless transactions directly from devices via delegated payment capabilities. Furthermore, interoperability between UPI and Central Bank Digital Currency (CBDC) wallets is anticipated by the end of 2025, allowing for "programmable money" where rules can be embedded into transactions ([Economic Times BFSI, 2025](#)). These advancements promise to enhance security, streamline transactions, and foster trust, solidifying India's leadership in the cashless economy.

5.3 Sustainable Growth

Ensuring UPI's sustainable growth for MSEs requires fostering a collaborative ecosystem and innovative financial solutions.

- **Fintech Collaborations for Custom Solutions:** Partnerships between banks and fintech companies are crucial for developing custom UPI solutions tailored to the specific cash flow needs of MSEs ([AMLEGALS, n.d.](#); [Kinara Capital, n.d.](#)). Fintechs can leverage advanced technologies like AI, machine learning, and big data analytics to assess credit risk more efficiently, enabling faster and more accurate lending decisions for a wider range of MSEs, including those traditionally overlooked by formal banking. This collaboration facilitates "embedded finance," where lending services are seamlessly integrated within business platforms, providing quick access to funds and flexible repayment options.

- **Leveraging Data for Creditworthiness:** UPI-generated transaction data is a powerful tool for assessing creditworthiness and tailoring loan products to MSEs. This digital record, which includes transaction history and business performance, is invaluable for lenders to assess creditworthiness more accurately, especially for informal businesses that previously lacked comprehensive financial records or credit scores ([BIS, 2024](#)). This data-driven approach reduces information asymmetry, a common challenge for MSMEs seeking formal credit. Initiatives like the Open Credit Enablement Network (OCEN) are expected to further facilitate smoother credit access by leveraging diverse data sources, including Aadhaar and GST data.
- **Promoting Digital Confidence and Skills:** Beyond mere adoption, fostering digital confidence among MSEs is key. This involves continued investment in training programs that empower businesses to use digital tools effectively, not just for payments but also for inventory management, automated billing, and customer engagement ([IBS Intelligence, n.d.](#)). The shift from passive adoption to active learning, with small businesses showing increasing interest in building digital skills, is vital for long-term success and scaling in a competitive market.

6. Conclusion

The Unified Payments Interface has undeniably democratized digital payments for Micro and Small-Scale Enterprises in India, serving as a powerful catalyst for efficiency, financial inclusion, and economic formalization. Its seamless, low-cost, and instant transaction capabilities have empowered millions of small businesses, from street vendors to rural kirana stores, to participate in the digital economy, significantly enhancing their operational efficiency and expanding their market reach. The ability to generate a digital footprint through UPI transactions has also been instrumental in improving MSEs' access to formal credit, a long-standing challenge for the sector.

However, the journey towards universal and equitable adoption is marked by persistent hurdles. The pervasive digital literacy gap, particularly in rural areas, continues to limit confident engagement with UPI, while evolving cybersecurity risks erode trust and lead to financial losses. Fundamental infrastructure gaps, including unreliable internet connectivity and inconsistent electricity supply, remain critical barriers that digital solutions alone cannot overcome. Furthermore, the complex interplay between the zero-MDR policy and the use of UPI data for tax assessment has, in some instances, led to merchant resistance, highlighting the unintended consequences of policy decisions.

To fully unleash UPI's potential and ensure its sustainable impact, these challenges must be addressed through targeted policies and technological innovations. Continued investment in localized digital literacy programs, robust fraud prevention mechanisms like the Financial Fraud Risk Indicator, and a nuanced approach to tax compliance that balances revenue generation with merchant incentives are paramount. Simultaneously, technological advancements such as Offline UPI (UPI Lite X), Voice-Based UPI (UPI 123Pay), and future integrations with IoT and CBDC will be crucial for expanding reach and usability, especially for underserved populations. Fostering deeper collaborations between fintechs and traditional financial institutions will also enable the development of customized solutions and data-driven credit assessments, further empowering MSEs.

More than just a payment tool, UPI is a growth engine for India's small businesses, driving their formalization, enhancing their competitiveness, and accelerating the nation's ambitious \$5 trillion digital economy vision. Its continued success will be a testament to India's commitment to inclusive economic growth and digital empowerment at the grassroots level.

References

- Alamleh, H., AlQahtani, A. A. S., & Smadi, B. A. (2023). Secure Mobile Payment Architecture Enabling Multi-factor Authentication. 19. <https://doi.org/10.1109/sieds58326.2023.10137778>
- AMLEGALS. (n.d.). Enhancing MSME Performance Through Financial Technology. <https://amlegals.com/enhancing-msme-performance-through-financial-technology/>
- Banking Frontiers. (n.d.). 73% of rural MSMEs report growth with mobile and UPI adoption: Report. <https://bankingfrontiers.com/73-of-rural-msmes-report-growth-with-mobile-and-upi-adoption-report/>
- BIS. (2024). Speech by Deputy Governor T Rabi Sankar: MSME Sector – Opportunities and Challenges. <https://www.bis.org/review/r241126v.htm>
- BVP. (n.d.). The emergence of B2B marketplaces in India. <https://www.bvp.com/atlas/the-emergence-of-b2b-marketplaces-in-india>
- C, Mr. V. S. (2024). The Impact of India's Digital Economy on Economic Growth and Employment A Contemporary Analysis. International Journal of Research Publication and Reviews, 5(9), 937. <https://doi.org/10.55248/gengpi.5.0924.2508>
- CoinGeek. (2025). Banks, RBI unite to launch digital fraud detection platform. <https://coingeek.com/banks-rbi-unite-to-launch-digital-fraud-detection-platform/>

- CoinGeek. (n.d.). UPI charts next chapter: Global reach, local reinvention. <https://coingeek.com/upi-charts-next-chapter-global-reach-local-reinvention/>
- Cornelli, G., Frost, J., Gambacorta, L., Sinha, S., & Townsend, R. M. (2024). The organisation of digital payments in India - lessons from the Unified Payments Interface (UPI). https://www.bis.org/publ/bppdf/bispap152_e_rh.pdf
- Cornell University. (2024). India's Unified Payments Interface Has Revolutionized Its Digital Payments Market. <https://business.cornell.edu/hub/2024/12/20/indias-unified-payments-interface-has-revolutionized-its-digital-payments-market/>
- CSR Universe. (n.d.). Bridging the Digital Divide in Rural India through Financial Inclusion. <https://thecsr universe.com/articles/bridging-the-digital-divide-in-rural-india-through-financial-inclusion>
- DD News. (n.d.). UPI transactions may reach 25 billion by 2025. <https://ddnews.gov.in/en/upi-transactions-may-reach-25-billion-by-2025/>
- De, A. (2024). A Situated-Infrastructuring of WhatsApp for Business in India. 1. <https://doi.org/10.1145/3613905.3651034>
- Decentro. (n.d.). UPI on Credit and Debit Cards: A Game-Changer for India's Payment Landscape. <https://decentro.tech/blog/upi-credit-debit-cards/>
- Dev, H., Gupta, R., & Kumar, D. (2024). From Cash to Cashless: UPI's Impact on Spending Behavior among Indian Users. arXiv (Cornell University). <https://doi.org/10.48550/arXiv.2401.09937>
- DNB. (n.d.). The Crucial Role of MSMEs in Economic Development Journey of India. <https://www.dnb.co.in/blog/crucial-role-of-msmes-in-economic-development>
- Economic Times. (2022). 73% MSMEs report business growth via digital adoption, led by UPI and smartphones: Survey. <https://m.economictimes.com/small-biz/sme-sector/73-msmes-report-business-growth-via-digital-adoption-led-by-upi-and-smartphones-survey/articleshow/122124007.cms>
- Economic Times. (2025). India tops global fast payments with UPI processing 18 billion transactions monthly. <https://m.economictimes.com/news/economy/finance/india-tops-global-fast-payments-with-upi-processing-18-billion-transactions-monthly/articleshow/122795213.cms>

- Economic Times. (2025). Indian users can now pay abroad and on foreign e-commerce sites using UPI via PayPal World. <https://m.economictimes.com/nri/latest-updates/indian-users-can-now-pay-abroad-and-on-foreign-e-commerce-sites-using-upi-via-paypal-world/articleshow/122852976.cms>
- Economic Times. (2025). Loan via UPI: Soon you can use UPI to withdraw money from credit line taken against property, gold, FD, share, MFs, others. <https://m.economictimes.com/wealth/spend/loan-via-upi-soon-you-can-use-upi-to-withdraw-money-from-credit-line-taken-against-property-gold-fd-share-mfs-others/articleshow/122781736.cms>
- Economic Times. (2025). Unexpected taxes: Are small merchants in India rejecting UPI due to GST overreach? <https://m.economictimes.com/opinion/et-commentary/unexpected-taxes-are-small-merchants-in-india-rejecting-upi-due-to-gst-overreach/articleshow/122799660.cms>
- Economic Times BFSI. (2024). From UPI to e-Rupee: RBI's Annual Report showcases India's digital payment advancements. <https://bfsi.economictimes.indiatimes.com/news/fintech/from-upi-to-e-rbis-annual-report-showcases-indias-digital-payment-advancements/110559961>
- Economic Times BFSI. (2025). India's Mobile Payments Revolution: Innovations, Challenges, and the Road Ahead. <https://bfsi.economictimes.indiatimes.com/blog/indias-mobile-payments-revolution-innovations-challenges-and-the-road-ahead/117267808>
- EnKash. (n.d.). How Unified Payments Interface Works. <https://www.enkash.com/resources/blog/how-unified-payments-interface-works/>
- HDFC Bank. (2024). Six Advantages of UPI for Small Businesses. <https://www.hdfcbank.com/personal/resources/learning-centre/sme/six-advantages-of-upi-for-small-businesses>
- Highland Post. (n.d.). The Future of UPI and Digital Payments in Rural India. <https://highlandpost.com/the-future-of-upi-and-digital-payments-in-rural-india/>
- ICICI Bank. (n.d.). NEFT/RTGS/IMPS Charges, Timings, Limits. <https://www.icicibank.com/personal-banking/online-services/funds-transfer/neft-rtgs>
- IJABMR. (n.d.). Assessing the Role of UPI and Digital Payment Systems in Enhancing Financial Inclusion and Economic Participation in Rural India. <https://ejournal.svgacademy.org/index.php/ijabmr/article/download/25/63>

- IJFMR. (2025). THE TRANSFORMATIVE IMPACT OF INDIA'S UNIFIED PAYMENTS INTERFACE (UPI) ON ITS DIGITAL ECONOMY: A MULTI-DIMENSIONAL ANALYSIS. <https://www.ijfmr.com/papers/2025/3/45688.pdf>
- IJPREMS. (2025). The Impact of Digital Payments on Small Businesses in India: A Comprehensive Study. [https://www.ijprems.com/uploadedfiles/paper/issue_4_april_2025/40244/final/fin_ijprems174550%20SIDBI,%20n.d.\)9.pdf9.pdf](https://www.ijprems.com/uploadedfiles/paper/issue_4_april_2025/40244/final/fin_ijprems174550%20SIDBI,%20n.d.)9.pdf9.pdf)
- IJRASET. (n.d.). Cyber Security in UPI Payments. <https://www.ijraset.com/research-paper/cyber-security-in-upi-payments>
- IJSRT Journal. (2025). Digital Payments in India: The Rise of UPI, Decline of Cash and Emerging Challenges. <https://www.ijrtjournal.com/article/Digital-Payments-in-India-The-Rise-of-UPI-Decline-of-Cash-and-Emerging-Challenges>
- InstantPay. (2025). UPI Lite X: Your Guide to Offline Payments. <https://www.instantpay.in/blog/2025/01/17/upi-lite-x/>
- InstantPay. (2025). What is UPI 123Pay? <https://www.instantpay.in/blog/2025/02/21/what-is-upi-123pay/>
- IBS Intelligence. (n.d.). The Deep Dive: UPI drives MSME growth in India. <https://ibsintelligence.com/ibsi-news/the-deep-dive-upi-drives-msme-growth-in-india/>
- Kansas City Fed. (n.d.). The Role of Nonbanks and Fintechs in Boosting India's UPI Person-to-Merchant Transactions. <https://www.kansascityfed.org/research/payments-system-research-briefings/the-role-of-nonbanks-and-fintechs-in-boosting-indias-upi-person-to-merchant-transactions/>
- Kapoor, S., & Bfsi, E. (2024, May 30). From UPI to e₹: RBI's Annual Report showcases India's digital payment advancements. ETBFSI.com. <https://bfsi.economicstimes.indiatimes.com/news/fintech/from-upi-to-e-rbis-annual-report-showcases-indias-digital-payment-advancements/110559961>
- Kavitha, K., Arun, B. S., & Kiran, M. S. (2024). The Emergence of UPI: In P2M Payments. <https://doi.org/10.2139/ssrn.4933784>
- Kinara Capital. (n.d.). Banks & Fintech Collaboration in MSME Lending. <https://kinaracapital.com/banks-fintech-collaboration-msme-lending/>

- Kinara Capital. (n.d.). Impact of UPI and AI on MSME Lending in India. <https://kinaracapital.com/impact-of-upi-and-ai-on-msme-lending-in-india/>
- Kinara Capital. (n.d.). Will formalisation of the MSME sector reduce bottlenecks and streamline digital lending? <https://kinaracapital.com/will-formalisation-of-the-msme-sector-reduce-bottlenecks-and-streamline-digital-lending/>
- Mahesh, A., & S., G. B. (2022). A Systematic Review and Research Agenda of Digital Payment System with reference to Unified Payment Interface [Review of A Systematic Review and Research Agenda of Digital Payment System with reference to Unified Payment Interface]. *International Journal of Management Technology and Social Sciences*, 679. <https://doi.org/10.47992/ijmts.2581.6012.0245>
- Malladi, C. M., Soni, R. K., & Srinivasan, S. (2021). Digital financial inclusion: next frontiers—challenges and opportunities. *CSI Transactions on ICT*, 9(2), 127. <https://doi.org/10.1007/s40012-021-00328-5>
- MarketCentral. (n.d.). Here's How UPI Can Help Your Business Grow. <https://www.marketcentral.in/market/viewpoint/47/how-UPI-can-help-you-grow-business>
- NASSCOM. (2024). UPI in Rural Financial Inclusion. <https://community.nasscom.in/communities/it-services/how-upi-payments-are-boosting-financial-inclusion-rural-areas>
- News On AIR. (n.d.). NPCI International Accelerates UPI Adoption Across UAE to Support Cashless Economy Vision. <https://www.newsonair.gov.in/npci-international-accelerates-upi-adoption-across-uae-to-support-cashless-economy-vision/>
- NPCI. (n.d.). UPI FAQs. <https://www.npci.org.in/what-we-do/upi/faqs>
- Open. (n.d.). From Cash to Clicks: India's Digital Payment Evolution. <https://open.money/blog/indias-digital-payment-evolution/>
- Pandey, P., & Chaudhary, A. K. (2024). The Role of Micro, Small, and Medium Enterprises in India's Economic Development: A Critical Analysis. *Asian Journal of Economics Business and Accounting*, 24(7), 366. <https://doi.org/10.9734/ajebe/2024/v24i71416>
- Paytm. (n.d.). UPI 123PAY: Uses, Benefits, & Methods. <https://paytm.com/blog/payments/upi/upi-123pay-uses-benefits-methods/>

- Paytm. (n.d.). UPI Transactions Soar: ₹20.64 Trillion in July, 45% Yearly Growth. <https://paytm.com/blog/news/upi-transactions-soar-45-percent-growth-july/>
- PIB. (2024). UPI's Impact on Digital Payments. <https://www.pib.gov.in/PressNoteDetails.aspx?NoteId=154912&ModuleId=3>
- PIB. (2025). India Emerges as Global Leader in Fast Payments: IMF. <https://www.pib.gov.in/PressNoteDetails.aspx?NoteId=154912&ModuleId=3>
- Pillai, S. S., Sandhya, G., & Rejikumar, G. (2019). Acceptance of mobile payments and UPI technology - Indian context. *International Journal of Business Forecasting and Marketing Intelligence*, 5(3), 371. <https://doi.org/10.1504/ijbfmi.2019.104049>
- PwC. (n.d.). Union Budget 2021: Implications on Digital Payments. <https://www.pwc.in/industries/financial-services/fintech/dp/union-budget-2021-implications-on-digital-payments.html>
- Quick Heal. (n.d.). Avoid UPI Fraud Payment Scams: Guide. <https://www.quickheal.co.in/knowledge-centre/avoid-upi-fraud-payment-scams-guide/>
- Razorpay. (n.d.). Difference Between NEFT vs RTGS vs IMPS. <https://razorpay.com/blog/difference-between-neft-rtgs-and-imps/>
- Razorpay. (n.d.). UPI Frauds: Types & Tactics. <https://razorpay.com/blog/upi-frauds-types-tactics/>
- Razorpay. (n.d.). What is Digital Payments? <https://razorpay.com/learn/what-is-digital-payments/>
- Razorpay. (n.d.). What is UPI and How it Works? <https://razorpay.com/blog/what-is-upi-and-how-it-works/>
- Razorpay. (n.d.). What is UPI Lite? <https://razorpay.com/blog/what-is-upi-lite/>
- ResearchGate. (2023). CHALLENGES IN DIGITAL PAYMENT ADOPTION IN INDIA. https://www.researchgate.net/publication/375610457_CHALLENGES_IN_DIGITAL_PAYMENT_ADOPTION_IN_INDIA
- ResearchGate. (2024). The Influence of UPI on Tax Revenue and Economic Formalization.

<https://www.researchgate.net/publication/391208693> The Influence of UPI on Tax Revenue and Economic Formalization

- ResearchGate. (n.d.). Assessing the Role of UPI and Digital Payment Systems in Enhancing Financial Inclusion and Economic Participation in Rural India. <https://www.researchgate.net/publication/393704109> Topic Assessing the Role of UPI and Digital Payment Systems in Enhancing Financial Inclusion and Economic Participation in Rural India
- ResearchGate. (n.d.). Impact of Digitization and UPI on Small Informal Businesses in India. <https://www.researchgate.net/publication/391917602> Impact of Digitization and UPI on Small Informal Businesses in India
- ResearchGate. (n.d.). Impact of UPI among Micro businesses in Rural India. <https://www.researchgate.net/publication/389533768> Impact of UPI among Micro businesses in Rural India
- SIDBI. (n.d.). Understanding Indian MSME sector: Progress and Challenges. https://www.sidbi.in/uploads/Understanding_Indian_MSME_sector_Progress_and_Challenges_13_05_25_Final.pdf
- TechCircle. (2025). UPI moment in cyberfrauds: Why India's Financial Fraud Risk Indicator is a turning point. <https://www.techcircle.in/2025/06/26/upi-moment-in-cyberfrauds-why-india-s-financial-fraud-risk-indicator-is-a-turning-point>
- The Secretariat. (2025). Rural Trumps Urban As Youth Lead UPI Adoption Surge. <https://thesecretariat.in/article/rural-trumps-urban-as-youth-lead-upi-adoption-surge>
- Times of India. (2024). UPI surge: India leads the world in fast payments, 18 billion monthly transactions power growth. <https://timesofindia.indiatimes.com/business/india-business/upi-surge-india-leads-the-world-in-fast-payments-18-billion-monthly-transactions-power-growth/articleshow/122797610.cms>
- Uncia.ai. (n.d.). How MSME Credit Is Powering The Indian Economy Quietly, Steadily, And Now Boldly. <https://www.uncia.ai/how-msme-credit-is-powering-the-indian-economy-quietly-steadily-and-now-boldly/>
- USENIX. (n.d.). Security analysis of the Unified Payments Interface (UPI). https://www.usenix.org/system/files/sec20summer_kumar_prepub.pdf

- Wikipedia. (n.d.). Unified Payments Interface. https://en.wikipedia.org/wiki/Unified_Payments_Interface
- Yale. (n.d.). Understanding Barriers to Women's Mobile Use in Low-Income Settings. <https://ie.yale.edu/understanding-barriers-womens-mobile-use-low-income-settings>
- YourStory. (2023). UPI Success Stories. <https://yourstory.com/tag/upi>