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THE ROLE OF UNIFIED PAYMENTS INTERFACE (UPI) IN TRANSFORMING INDIA'S DIGITAL PAYMENT ECOSYSTEM: A SECTOR-WISE ANALYSIS

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Abstract

The Unified Payments Interface (UPI) has become a central component of India's retail digital-payment infrastructure. This study examines the expansion and sectoral application of UPI, with particular attention to banking, government bill payments, retail commerce and transport-related payment environments. The study adopts a descriptive and analytical design based on secondary data reported in the underlying project report and supplemented by official NPCI and Government of India publications. The period covered by the principal annual series is 2021–22 to 2025–26. The report-based UPI product series records an increase in transaction volume from 45,967.53 million in 2021–22 to 241,616.88 million in 2025–26, while transaction value rises from ₹8,417,572.48 crore to ₹31,423,249.71 crore. Retail merchant-category data also indicate substantial growth in reported UPI transactions, particularly in groceries, restaurants, fast-food outlets, pharmacies and bakeries. Government bill-payment data show an expansion in both volume and value. The analysis suggests that UPI's contribution is most clearly evidenced in payment convenience, interoperability, transaction digitisation and the participation of small merchants. However, the available data do not establish a direct causal effect on GDP or prove that every transaction in associated systems such as FASTag and metro networks is a UPI transaction. Cyber fraud, digital-literacy gaps, connectivity constraints, transaction failures and grievance-redressal delays remain important concerns. The paper concludes that UPI can support inclusive digital economic activity when accompanied by reliable infrastructure, consumer protection and effective dispute resolution.

Keywords: Unified Payments Interface; digital payments; fintech; financial inclusion; retail payments; digital economy; India

1. Introduction

Digital payment infrastructure has altered the way households, merchants, financial institutions and public agencies transfer and receive money. In India, the Unified Payments Interface (UPI), developed by the National Payments Corporation of India (NPCI), enables interoperable, real-time transfers through participating banks and payment applications. Users can initiate payments through identifiers such as a UPI ID or QR code without routinely sharing bank-account details with the recipient. This design has helped integrate person-to-person and person-to-merchant payments into everyday commercial activity.

UPI's significance is not limited to the replacement of cash at the point of sale. Its expanding use in merchant payments, bill payments and online commerce has created a common payment layer across multiple service settings. The National Payments Corporation of India publishes annual and monthly product statistics, while government publications provide consolidated information on the scale of UPI transactions. Official figures indicate that UPI processed 24,161.69 crore transactions valued at approximately ₹314.23 lakh crore in FY 2025–26. These figures demonstrate the scale of the system, although transaction growth alone should not be treated as proof of a corresponding increase in national output.

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This paper develops a sector-wise analysis from the underlying project report. It focuses on the growth of UPI transactions and the reported use of digital payments in banking, government bill payments and retail. Transport-related systems are considered cautiously because FASTag is an RFID-based toll collection system and metro payment data may include multiple payment modes; they should not automatically be classified as direct UPI transactions.

2. Review of Literature and Theoretical Background

The literature on digital payment adoption commonly examines perceived usefulness, ease of use, trust, compatibility, facilitating conditions and network effects. The Technology Acceptance Model proposed by Davis (1989) explains that perceived usefulness and perceived ease of use influence an individual's intention to adopt a technology. Applied to UPI, this perspective suggests that simple payment initiation, quick confirmation and reduced dependence on cash can encourage use.

Diffusion of Innovations theory (Rogers, 2003) provides a complementary explanation: adoption spreads through communication, observation and the perceived advantages of an innovation. UPI's interoperability and the growing number of participating merchants can reinforce network effects because the usefulness of the payment system increases as more users, banks and merchants participate.

The Bank for International Settlements' review of faster payment systems identifies potential benefits such as improved payment experience, access to financial services and domestic and cross-border interoperability. Its discussion of India's UPI experience places the system within the wider development of fast-payment infrastructure (Bank for International Settlements, 2024). The project report's review of prior studies similarly identifies convenience, low transaction friction and merchant access as adoption drivers, while repeatedly noting concerns about cybersecurity, digital literacy, connectivity and unequal adoption.

Taken together, the literature indicates that adoption is not explained by technology alone. It is shaped by users' confidence, access to devices and connectivity, merchant acceptance, institutional safeguards and the availability of support when transactions fail.

3. Research Gap

The project report notes that much of the existing discussion considers UPI adoption in general or focuses on selected user groups and payment settings. Comparatively less attention is given in the report to a consolidated sector-wise reading of transaction trends across retail, banking, government bill payments and transport-related payment environments. The present paper addresses this descriptive gap by organising the available secondary data across these settings and distinguishing direct UPI evidence from adjacent digital-payment infrastructure. The analysis is exploratory and does not claim to estimate the causal effect of UPI on GDP, employment or business profitability.

4. Objectives of the Study

- To examine the growth in UPI transaction volume and value during 2021–22 to 2025–26.
- To analyse the reported use of UPI across selected areas, particularly banking, government bill payments and retail commerce.
- To identify the operational and adoption-related benefits associated with UPI.
- To identify major constraints affecting the reliable and inclusive use of UPI.
- To suggest measures for strengthening the UPI ecosystem and its contribution to digital economic activity.

5. Research Methodology

The study follows a descriptive and analytical research design based on secondary data. The principal dataset is drawn from the uploaded project report, which identifies NPCI product statistics, Bharat Connect data,

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BMRCL information and other institutional sources. Official NPCI and Government of India publications have been used to contextualise the national transaction series.

The main period of analysis is FY 2021–22 to FY 2025–26. Retail merchant-category observations are presented for calendar years 2021–2025 as reported in the project report. The analysis uses year-wise comparison, percentage growth and descriptive interpretation. No primary survey, interview, experiment or econometric model is reported in the source material. Therefore, the findings are descriptive and should not be interpreted as causal estimates.

Data treatment and comparability: Values are retained in the units used in the project report. The annual UPI product series is reported in million transactions and ₹ crore. FASTag is treated as a related transport-payment ecosystem rather than a direct measure of UPI use. Bharat Connect bill-payment figures are treated as bill-payment ecosystem data unless the source specifically identifies UPI as the payment instrument. The metro series is not used for strong trend claims because the table in the project report contains duplicated and inconsistent date entries. These distinctions are necessary to avoid overstating UPI-specific adoption.

6. Data Analysis and Discussion

6.1 Growth in UPI transaction volume and value

Financial year	Volume (million)	Value (₹ crore)
2021–22	45,967.53	84,17,572.48
2022–23	83,751.14	1,39,20,676.35
2023–24	1,31,129.83	1,99,95,085.51
2024–25	1,85,866.02	2,60,56,954.65
2025–26	2,41,616.88	3,14,23,249.71

Source: UPI product-statistics series reproduced in the project report; figures are presented in million transactions and ₹ crore. The national FY 2025–26 totals are consistent in scale with the Government of India's published figure of 24,161.69 crore transactions and ₹314.23 lakh crore.

The reported series shows sustained expansion in both transaction volume and value over the five-year period. Volume increased from 45.97 billion transactions in FY 2021–22 to approximately 241.62 billion in FY 2025–26. The corresponding value rose from approximately ₹84.18 lakh crore to ₹314.23 lakh crore. The pattern indicates that UPI has become embedded in routine payment activity. The increase in transaction value is larger in absolute terms than the increase in volume, reflecting the combined effect of more transactions and the value of payments processed. However, these aggregate figures do not identify the share attributable to household consumption, business payments or transfers between individuals.

6.2 Banking sector

The project report compares UPI transaction activity across major banks and describes an increase in the reported transaction counts for the selected institutions. For example, the report records SBI-related UPI transactions rising from 11,061.24 million in 2021 to 61,499.84 million in 2025, and HDFC Bank-related transactions increasing from 3,441.51 million to 18,266.17 million over the same reported period. Bank-level transaction counts should be interpreted as indicators of participation and processing activity, not as a direct measure of bank profitability or customer welfare.

The banking sector's role is foundational: banks maintain customer accounts, authenticate and process payment instructions, and participate in settlement arrangements. UPI can reduce the need for manual cash handling and provide customers with an interoperable channel. At the same time, increased transaction intensity places demands on technology resilience, fraud monitoring, customer support and dispute management.

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6.3 Government bill payments

Financial year	Transaction volume (million)	Transaction value (₹ crore)
2021–22	196.48	31,525
2022–23	307.90	51,636
2023–24	389.83	93,627
2024–25	740.65	3,37,758
2025–26	790.89	4,04,063

Source: Bharat Connect series as reproduced in the project report. These figures relate to the bill-payment channel and should not be described as exclusively UPI-funded unless the underlying dataset confirms the payment instrument.

The reported number and value of government-related bill payments increased across the period. The rise suggests growing use of digital channels for recurring obligations such as electricity, water and other public-service payments. Digital bill-payment channels may improve convenience and traceability by reducing the need for physical visits and manual cash collection. Nevertheless, the sharp increase in reported value between FY 2023–24 and FY 2024–25 should be checked against the original source before journal submission, as it may reflect changes in coverage, classification or reporting as well as adoption.

6.4 Transport-related payment settings: FASTag and metro

Financial year	FASTag volume (million)	FASTag value (₹ crore)
2021–22	2,441.29	38,084.15
2022–23	3,397.12	54,143.89
2023–24	3,840.39	64,809.83
2024–25	4,209.10	72,930.83
2025–26	4,448.93	76,239.61

Source: NPCI/FASTag data as reproduced in the project report. FASTag is an electronic toll collection system based on radio-frequency identification. The figures demonstrate growth in electronic toll payments, but they are not a direct measure of UPI transactions. UPI may be used for certain FASTag recharge or related payments; this does not make every toll transaction a UPI transaction.

The project report also includes a BMRCL metro payment-value table. However, the table contains duplicated date labels and inconsistent sequences. It is therefore excluded from quantitative conclusions in this paper pending verification against the original BMRCL dataset. Metro systems remain relevant as examples of transport digitisation, but reliable mode-specific data are required before attributing metro payment growth to UPI.

6.5 Retail merchant categories

Merchant category	2021	2022	2023	2024	2025
Groceries and supermarkets	152,293	184,125	372,726	567,624	780,620
Eating places/restaurants	9,951	48,440	134,075	—	220,810
Fast food	9,581	—	—	—	177,834
Drug stores/pharmacies	7,026	—	—	—	134,729
Digital goods/games	22,208	50,347	95,990	130,510	90,354
Beauty and barber	23,859	17,807	20,895	20,204	26,866

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shops					
Drinking places/bars	18,960	20,525	32,640	67,543	41,424
Bakeries	1,914	9,513	43,273	30,369	46,349

Source: NPCI merchant-category data reproduced in the project report. Dashes indicate values not transcribed in the report extract and are not zero values.

Groceries and supermarkets record the highest transaction count in the displayed retail categories, increasing from 152,293 in 2021 to 780,620 in 2025. Restaurants rise from 9,951 to 220,810 over the same reported endpoints. Pharmacies, fast-food outlets and bakeries also show substantial increases between the available endpoint observations. Digital goods/games increase through 2024 but fall in 2025, while beauty and barber shops and drinking places show more variable patterns. The category-level evidence suggests that QR-based and app-based payments have become relevant to a broad range of merchant activities. Because the report does not provide complete annual values for every category in the reproduced table, growth rates should be calculated only where both endpoint values are available and should be checked against the original NPCI dataset.

7. Key Findings

- The annual UPI product series shows sustained growth in transaction volume and value between FY 2021–22 and FY 2025–26.
- Retail merchant-category observations indicate wider use of digital payments in groceries, restaurants, fast-food outlets, pharmacies and bakeries.
- The banking sector provides the account, authentication, processing and settlement infrastructure required for UPI transactions.
- Government bill-payment channel data show increasing transaction volume and value, indicating the growing relevance of digital channels for recurring payments.
- FASTag data show expansion in electronic toll collection; however, FASTag transaction totals must not be presented as UPI transactions.
- The project report identifies convenience, speed, QR-code acceptance and lower dependence on cash handling as important practical advantages.
- Cyber fraud, phishing, weak connectivity, limited digital literacy, transaction failures, refund delays and grievance-redressal difficulties remain adoption constraints.
- The available secondary data support conclusions about payment digitisation and adoption trends, but do not independently establish a causal effect on GDP, employment or business profitability.

8. Implications and Suggestions

For banks and payment service providers, system uptime, real-time fraud monitoring, clear transaction notifications and faster complaint resolution should remain priorities. Payment applications should make the reporting of fraudulent or failed transactions simple and visible, and customers should receive clear guidance on safe payment practices.

For government agencies and ecosystem participants, digital-literacy programmes should be designed for first-time users, senior citizens, rural communities and small merchants. Such programmes should explain PIN confidentiality, collect-request risks, QR-code verification and the correct process for reporting unauthorised transactions.

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For merchants, QR acceptance should be supported by basic reconciliation practices, staff training and clear confirmation procedures. Merchants should verify successful receipt through their payment application or bank statement rather than relying solely on a customer's screen.

For policymakers, the next phase of digital-payment expansion should focus not only on transaction scale but also on reliability, accessibility, consumer protection, data privacy and effective grievance redressal. Public reporting should clearly distinguish UPI transactions from other digital payment systems and should provide consistent definitions, periods and units to support academic and policy analysis.

9. Limitations of the Study

- The study relies on secondary data reproduced in the project report and does not include primary survey responses or interviews.
- The source report combines data from different institutions and payment channels. Definitions, coverage periods and units may therefore differ.
- The FASTag and Bharat Connect figures are not treated as exclusively UPI transactions; metro data are excluded from quantitative interpretation because the reproduced table is internally inconsistent.
- The study is descriptive and does not use econometric methods to test whether UPI causes changes in GDP, productivity, employment or business performance.
- Some merchant-category observations are incomplete in the report extract. Missing entries are not interpreted as zero and category growth should be verified against the original dataset.
- Bibliographic details for several studies listed in the project report are incomplete or inconsistent and require verification before submission.

10. Conclusion

The evidence examined in this study indicates that UPI has become a major part of India's digital-payment infrastructure. The reported national transaction series records substantial growth in both volume and value between FY 2021–22 and FY 2025–26. The sectoral observations further suggest that digital payment acceptance has expanded across everyday retail categories and that digital channels are increasingly used for recurring bill payments. Banks remain central to the system's operation, while QR-based acceptance provides a relatively accessible entry point for many small merchants.

The broader economic significance of UPI lies in the way it can reduce payment friction, improve the convenience of transactions and support traceable digital exchange. These mechanisms may contribute to formalisation and financial inclusion, but the present descriptive dataset does not quantify their independent effect on economic growth. The distinction between UPI and adjacent systems such as FASTag is also essential for sound measurement. Sustained progress will depend on stronger cybersecurity, accessible user education, dependable connectivity, transparent data reporting and timely grievance redressal. UPI's long-term contribution should therefore be assessed not only by transaction growth but also by the safety, reliability and inclusiveness of the payment experience.

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