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UPI REVOLUTION IN INDIA: EXAMINING THE GROWTH AND TRANSFORMATION OF THE DIGITAL PAYMENT ECOSYSTEM

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ABSTRACT

This paper analyzes the expansion of the Unified Payments Interface (UPI) within India's digitized payment ecosystem from April 2016 to December 2021 using secondary data, official data, and contemporary literature. Results indicate that UPI grew from a modest payment interface system to a substantial payment infrastructure system. The number of monthly transactions surged from 0.09 million in July 2016 to 4,566.30 million in December 2021, and the number of banks on the system grew from 21 to 282. According to official data, in the fiscal year 2025–26, UPI accounted for 24,161.69 crore transactions valued at ₹ 314 lakh crore and was responsible for approximately 85% of digital transactions in India. This study states that UPI's boom can be attributed to a combination of factors that include interoperability, mobile access, QR-based payments, low cost, direct bank access, public-private collaboration, and network effects. For sustained growth, UPI must address fraud, ensure access and resilience, intensify competition, and establish the system with sustainable network effects.

KEYWORDS: Unified Payments Interface, UPI, digital payments, fintech, digital public infrastructure, financial inclusion, India

1. INTRODUCTION

1.1 Background of Digital Payments in India

India's retail payment systems saw immense growth during the last decade. UPI revolutionized how people made payments. Retail payments involved a lot of cash, while options for electronic payments were very fragmented and involved cards, NEFT, RTGS, IMPS and various mobile banking applications. Each of these payment systems had their own merits, but they did not meet the needs of a simple, affordable, instantaneous and seamless payment system which could be used by consumers

and small-scale traders. UPI added a unique dimension by allowing bank-to-bank transfers and multiple payment systems using virtual payment addresses, mobile numbers, and QR codes. UPI is a system that integrates multiple bank accounts into a single mobile application and makes payment routing and merchant payments easy (Digital India, 2026)

1.2 Emergence of UPI and Research Problem

The importance of UPI goes beyond the sheer number of transactions. UPI also helped organize the fragmented payments market. Under UPI's structure, NPCI runs the system, banks provide the payment and settlement system, and all the competing third-party applications provide the user interface. This has made the payment system both public and innovative. According to official reports, UPI made great strides in how many banks adopted the service and the number of transactions processed, going from 21 banks using the service and very few transactions in 2016, to over 700 banks and in excess of 24,161 crore transactions in FY 2025-26 (Ministry of Finance, 2026a). UPI captures the great extent to which digital public payment infrastructures can transform a country's economy.

Here are the research gap findings, purpose, and potential contribution of the study. This work aims to address the research topic in studies that concentrate only on the record monthly statistics of UPI. This focus on the record statistics does not consider consumer behavioral change, merchant or fintech digitization, competition, inclusion, risk and governance. This work aims at the growth of UPI in India and the impact of UPI on the digital payment system. This work combines dataset-based trend analysis with policy and literature interpretation.

2. REVIEW OF LITERATURE

2.1 Adoption theories and payment behavior

The dominant forms of payment system can be categorized as possessing both behavioral and technological aspects. With respect to the technology acceptance model, the main elements of adoption are both the perceived and actual usefulness and ease of use of the technology (Davis, 1989). The unified theory of acceptance and use of technology (UTAUT) identifies performance expectancy, effort expectancy, social influence and facilitating conditions (Venkatesh et al., 2003).

The ease of use, security, reliability, and social acceptance of UPI payments encourage the adoption of the technology. UPI payment systems benefit from the network effect: the larger the community of users and merchants that accept UPI payments, the greater the utility of the payment system.

2.2 UPI as Digital Public Infrastructure

Rather than viewing UPI as just another consumer app, it is more appropriate to think of it as digital public infrastructure. Built on top of the IMPS infrastructure, UPI facilitates interoperable transactions

across banks and third-party app providers. Some of the drivers of UPI's progress include open architecture, easy-to-use interfaces, regulation, and public-private partnerships, as well as the absence of any cost to the end user (Cornelli et al., 2024). Unlike closed wallets, where money is trapped in a specific app, UPI's open architecture ensures that users do not have to maintain a balance in a particular app as the payment can be electronically transferred from one bank account to another.

2.3 Payment Behavior and Responsible Interface Design

Digitization of payment systems is likely to impact consumer behavior as well as payment, credit, and lending systems. Many Indian respondents believe that UPI has resulted in more spending because digital payments, as opposed to cash payments, give users a diminished perception of money (Dev et al., 2024). However, it is important to note that this is not an adverse effect of UPI. Instead of focusing on the impact of the convenience of payments, UPI should be implemented with a responsible design framework. Digital payment systems are likely to create credit histories, which, in turn, provide a basis for a credit score. However, there are concerns with privacy, data protection, and the design of financial products with consumer safeguards.

2.4 Inclusion, Risk, and Governance

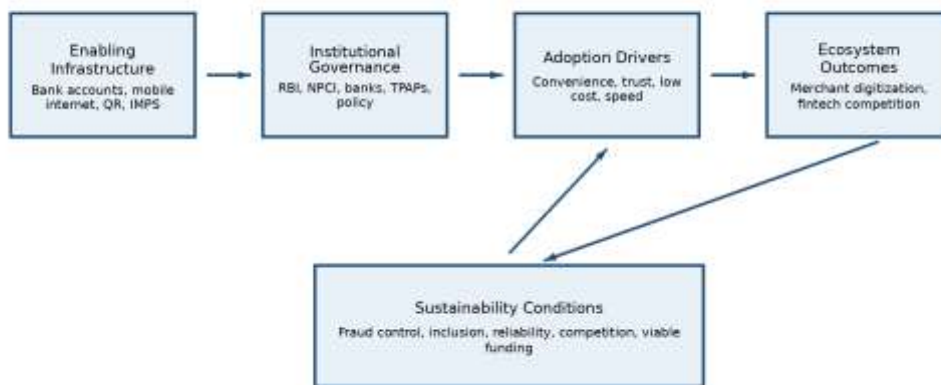
Financial inclusion is one of the key objectives of the Unified Payments Interface (UPI). The introduction of QR Code payment acceptance means that businesses, vendors, and service workers, who otherwise would not be able to use digital payment methods due to the high cost of point-of-sale (POS) payment terminals, can implement digital payments. However, inclusion does not mean accessibility. There is accessibility on the basis of the individual's access to a smartphone, reliable internet, comfort with the language, digital literacy, disabilities, design, and efficient grievance redress. Issues with trust and safety arise in digital payments, as users of the digital payment system become the target of scams and social engineering (Dahiphale et al., 2024). Thus, the change that the UPI represents must be considered both in terms of the scope and balancing.

3. Objectives, Research Questions, and Conceptual Framework

This study aims to analyze the growth of UPI with respect to transaction volume, value, and the number of banks participating; discover the behavioral, policy, technological, and institutional factors of adoption; study the effects of ecosystem changes on consumers, merchants, banks, fintech, and regulatory bodies; and analyze the threats posed by fraud, gaps in inclusion, risk, and UPI monetization, as well as the implications of concentration and reliability. Based on this, the author will be developing some strategies for sustainable growth. The study aims to answer the following questions: What was the growth trajectory of UPI during the period of 2016-2026? What explains the rapid adoption of UPI? In what ways did UPI impact consumers and merchants? What risks does UPI pose in order to ensure safe and secure growth, as well as open up opportunities for UPI to push the

innovation and inclusion thresholds?

Figure 1
Conceptual Framework of UPI-Led Digital Payment Transformation
Conceptual Framework of UPI-Led Digital Payment Transformation



Note. Author-created framework based on the literature and official descriptions of UPI governance, adoption drivers, ecosystem outcomes, and risk conditions.

Description. The framework explains UPI transformation as a connected ecosystem rather than a single payment application. It links enabling infrastructure, institutional governance, and adoption drivers with ecosystem outcomes, while sustainability conditions show the controls required for long-term growth.

4. METHODOLOGY

4.1 Research Design and Data Sources

This study applies a descriptive-analytical framework using secondary data. The quantitative part accesses the Excel sheet titled ‘UPI payments India.xlsx’, which has 69 month-based data records (April 2016 to December 2011). The variables are month, number of banks live on UPI, transaction volume (in millions), and transaction value (in crores). The qualitative part analyses official reports and recent publications to examine policy design, the impact of UPI, and risks.

4.2 Variables and Analytical Techniques

The analysis began by cleaning the month variable, ordering records by date, changing the volume and value variables to numbers, and summing the months to the Indian Financial Year. The descriptive analysis, together with growth comparison and graphs, documented the initial rapid growth of UPI. Since the data stops in December 2021, this study cites the latest UPI growth data from the Ministry of Finance and the benchmarks of the NPCI for FY 2025-26 to guide the policy context for the UPI data for December 2021. This data also provided an endpoint for the UPI growth data since the Ministry of Finance has not released official data for the subsequent years.

4.3 Scope and Limitations

The study has several limitations. User-level microdata has not been analyzed, and therefore, demographic, rural-urban, app-based market share, report-ghost, fraud, and cash displacement analyses have not been conducted. The analyzed dataset is secondary and stops before the most recent UPI expansion. Nevertheless, this dataset is useful for analyzing descriptive UPI trends, as it captures the phase where UPI transitioned from its launch to mainstream adoption.

Table 1
Data Sources and Analytical Use

Source	Period	Variables/Content	Use in the Paper
Uploaded Excel dataset	Apr. 2016-Dec. 2021	Month, banks live, UPI volume, UPI value	Trend analysis, financial-year aggregation, figures and descriptive interpretation
Ministry of Finance/PIB and NPCI	FY 2025-26 and recent releases	Annual volume/value, bank participation, P2P/P2M split, global share	Latest policy context and validation of scale
BIS, IMF, Digital India, and academic literature	2019-2026	Interoperability, adoption, public infrastructure, risk and safety themes	Literature synthesis and policy discussion

Note. The uploaded dataset is used for early monthly and financial-year trend analysis; official public sources are used for current scale and policy interpretation.

Description. The table identifies the main secondary data sources used in the study and explains how each source supports the analysis. It separates dataset-based trend analysis from policy, official statistics, and literature-based interpretation.

5. Results and Analytical Discussion: Growth and Transformation of UPI

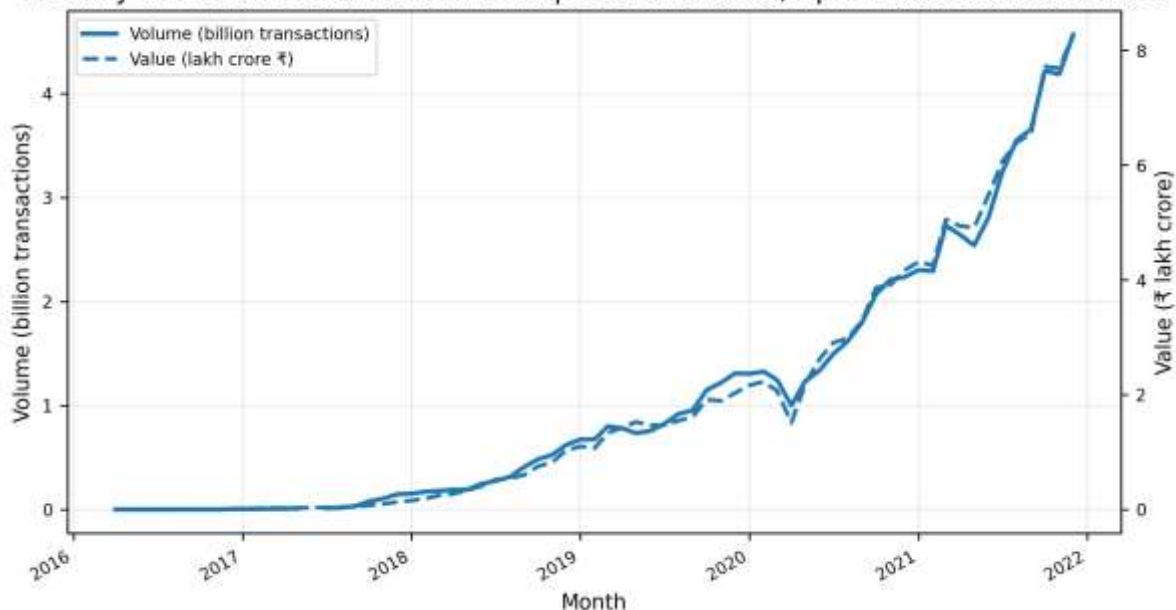
5.1 Dataset-Based Growth Trajectory

The provided data indicates an unprecedented growth trajectory for UPI during its first five and a half years of operation. The first month with a non-zero value in the data set is July 2016, when UPI recorded 0.09 million transactions amounting to ₹ 0.38 crore. By December 2021, this data set recorded a staggering 4,566.30 million transactions valued at an enormous ₹ 826,848.22 crore. The number of banks live on UPI also increased from 21 in April 2016 to 282 in December 2021. UPI did not merely add a digital variant to the already existing offerings. The growth of UPI demonstrates that it provided all banks and apps a standard and integrated payment system.

Figure 2

Monthly UPI Volume and Value in the Uploaded Dataset, April 2016-December 2021

Monthly UPI Volume and Value in the Uploaded Dataset, April 2016-December 2021



Note. Analyzed from the Excel data files. In order to keep the chart readable, the volume has been captured in billions of transactions, and the value has been captured in ₹ lakh crore.

Description. In the chart, both the volume and value of UPI transactions show steep growth from the early adoption phase up to December 2021. The growth depicts UPI's emergence as a predominant payment channel for not just small-value transactions, but also for large-value account-to-account transfers.

5.2 Financial-Year Aggregation and Bank Participation

The matching trend for financial-year aggregation is shown again. For FY 2016-17, the dataset shows only 17.86 million transactions. FY 2020-21 shows 22,330.65 million transactions. Moreover, the early part of FY 2021-22, from April to December, shows 31,417.24 million transactions. Therefore, the first nine months of FY 2021-22 show greater bank transaction volumes than the entire FY 2020-21. Value growth exhibited the same trend and shows an increase from Rs 6,952.14 crore in FY 2016-17 to FY 2020-21, showing an increase to ₹ 41,03,653.58 crore, and to ₹ 57,98,154.71 crore for the early FY 2021-22. Based on these findings, it appears that early adoption progressed to routine, high-frequency participation.

Table 2
Financial-Year Growth of UPI Based on the Uploaded Dataset

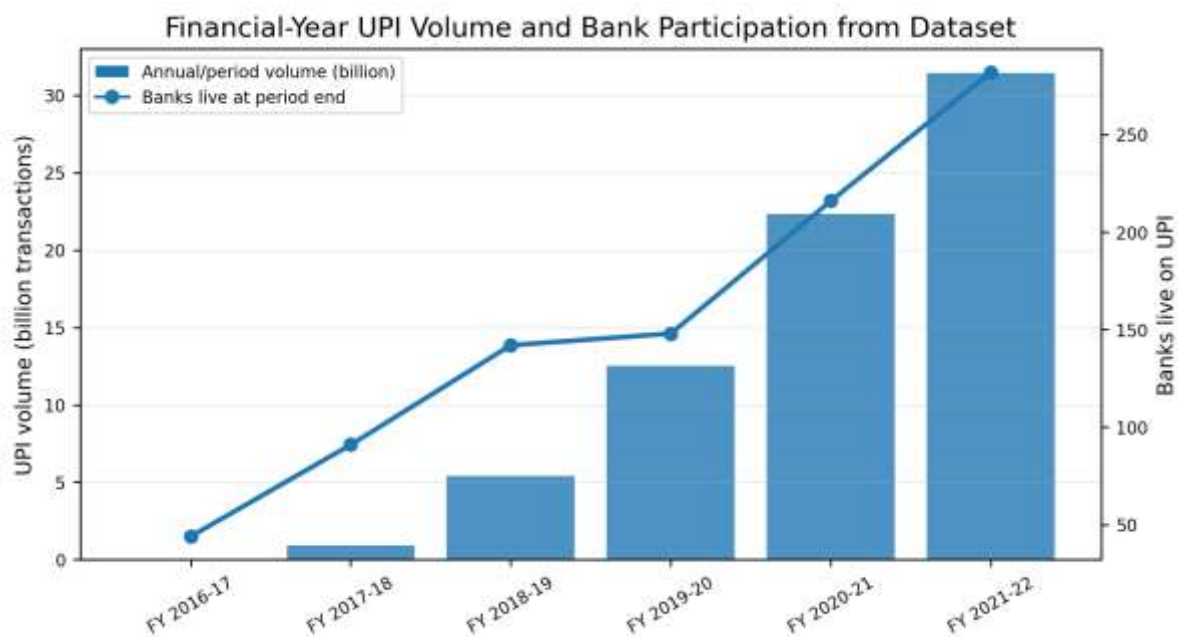
Financial year/period	Months	Volume (million)	Value (₹ crore)	Banks live at period end
FY 2016-17	12	17.86	6,952.14	44
FY 2017-18	12	904.87	109,831.80	91
FY 2018-19	12	5,391.52	876,970.72	142
FY 2019-20	12	12,518.61	2,131,730.14	148
FY 2020-21	12	22,330.65	4,103,653.58	216
FY 2021-22 (Apr.-Dec.)	9	31,417.24	5,798,154.71	282

Note. FY 2021-22 is partial because the uploaded dataset ends in December 2021.

Description. The table presents financial-year growth in UPI volume, transaction value, and bank participation. It shows that UPI expanded rapidly between FY 2016-17 and the partial FY 2021-22 period, with both usage and institutional reach rising sharply.

Figure 3

Financial-Year UPI Volume and Bank Participation from Dataset



Note. Calculated from the uploaded Excel dataset. The last period is partial FY 2021-22, April to December 2021.

Description. The figure compares annual UPI volume with the number of banks live on UPI. It shows that transaction growth and bank participation increased together, suggesting that wider institutional participation supported mainstream adoption.

5.3 Transaction Value, Merchant Digitization, and P2P/P2M Shift

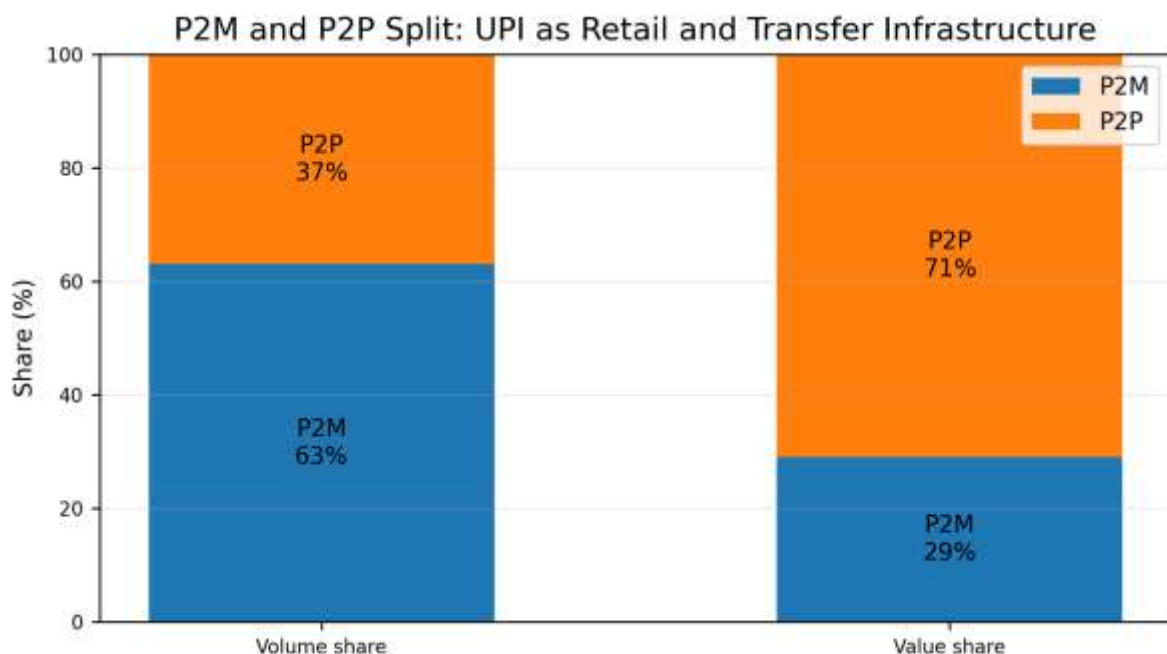
The value trend shows UPI's importance in both small and large payment transfers. In the data, an average ticket size in December 2021 was about ₹ 1,811. While this amount is too rough to justify all payments classifications, it shows the system was likely able to process both large peer transfer as well as normal retail payments. Later, official numbers support this statement. Of the reported segmentation, P2M transfers were 63% of the UPI volume, while P2P transfers were 71% of the UPI value (Ministry of Finance, 2026a). Thus, in the volume of UPI transactions, merchants were the main drivers, while the value of the transactions was dominated by transfers between persons.

One of the strongest ecosystem changes is the transformation of merchant payments. The introduction of QR codes meant that small merchants could accept digital payments without needing to install card terminals. This greatly reduced the cost of acceptance and made digital payments possible for kirana

stores, street vendors, small service providers, local transport and food sellers and micro-enterprises. UPI equally influenced consumer expectations. Users' expectations of convenience and instantaneous payment have quickly extended across all banks and apps and negated the need for cards. The dataset used in this report indicates that P2M payments are the main payment mechanism used, and highlights that barriers to UPI usage are not challenging.

Figure 4

P2M and P2P Split: UPI as Retail and Transfer Infrastructure



Note. P2M/P2P shares are based on official segmentation (Ministry of Finance, 2026a).

Description. The chart separates UPI usage into P2M and P2P shares for volume and value. It indicates that merchant payments dominate transaction counts, while person-to-person transfers contribute a larger share of total value.

5.4 Institutional Ecosystem and Global Positioning

UPI shows the strengths of multi-tiered governance. RBI (Reserve Bank of India) exercises regulatory control while the National Payments Corporation of India (NPCI) operates the platform. Banks offer accounts and settlement interfaces, while fintech companies compete for advantages in user interfaces and user/merchant onboarding. The design of UPI allows its expansion on an almost limitless basis, as it keeps transactions linked to bank accounts. As an indication of the system's reach, official estimates for FY 2025-26 show that UPI registered 24,161.69 crore transactions worth ₹314 lakh

crore, had 703 member banks, and processed 85% of all digital transactions in India (Ministry of Finance, 2026a).

UPI's global impact further enhances its significance. The IMF described UPI as the largest retail fast payment system in the world by transaction volume, and according to official Indian estimates, UPI contributes nearly 49% of all real-time payment transactions globally (Ministry of Finance, 2025). UPI has made significant cross-border headway by linking with the UAE, Singapore, Bhutan, Nepal, Sri Lanka, France, Mauritius, and Qatar (Ministry of Finance, 2026b). The global impact is demonstrable of the strength of the system and transcends the product export. The system illustrates a low-cost payment infrastructure with public protocols and its interoperable nature.

6. DISCUSSION

6.1 Interpreting UPI Growth Beyond Numbers

The findings suggest that UPI's revolution should be interpreted as ecosystem development rather than volume expansion. The data describe the formative period of UPI when the monthly transaction volume increased from close to zero to billions of transactions. Following this formative period, policy data indicate that UPI became the backbone of the Indian retail digital payment ecosystem. The development was the consequence of aligned infrastructure, regulation, app rivals, and user readiness. Each of these factors had a role to play in bringing UPI to life. UPI, as a truly innovative payment system, harnessed the power of bank accounts, mobile internet, QR codes, interoperability, and low friction of the payment, and offered a seamless solution to consumers.

The findings explain why UPI is unlike many of the preceding payment systems. The payment systems like NEFT, RTGS, IMPS, cards, and wallets have all addressed banking needs, but fall short for small payments to a universal merchant. UPI has minimized the gap for payments from a bank to one at a merchant. UPI also has not made the other systems of payment redundant. RTGS is required for high-value payments, cards are still required for payments on credit and for international payments, and wallets are needed for a closed-loop payment system. UPI excels at retail transactions that are frequent and at account-to-account payments.

6.2 Inclusion, Security, and Sustainability Tensions

The inclusion narrative remains a work in progress, but is positive overall. UPI has the potential to include small businesses, migrant workers, women-led businesses, rural workers, and informal service workers in the digital and financial formal economy. UPI also has the potential for exclusion. People lacking smartphones, reliable internet, and digital skills or who are afraid to use digital tools, may also be excluded. The next step for inclusion will be UPI, which can work offline and will include voice and local language assistance, guided payments, and easier access to complaints and support.

Rapid and widespread inclusion of UPI will mean that everyone has to deal with the same concerns regarding the safety and inclusion of UPI. Protection from digital social engineering scams, fake customer care numbers, request scams, shared screens, trust-eroding QR code scams, will be increasingly important, and UPI will erode trust just like every other system that is consolidating payment systems. If a limited number of applications dominate the payment system, it is impossible to redistribute payments. (Hota et al., 2026). For UPI governance, it will be imperative to achieve the right balance for user convenience, competition, reliability of the system, consumer protection, and sustainability.

7. POLICY AND MANAGERIAL IMPLICATIONS

7.1 Policy Implications

For regulators, the first priority is user trust. Threats can be managed without significant hindrance on day-to-day transactions through real-time fraud monitoring, device and intent verification, user alerts, and collaborative cyber defense. The second priority are outages, complaints, and the reporting of different types of fraud along with rural and urban access and demographic reporting. The third priority are the oversight of competition and careful monitoring of the level of application concentration, along with the open accessibility of the payment system and the creation of system redundancy.

7.2 Managerial Implications for Banks and Fintech Firms

For banks and fintech firms alike, infrastructure reliability and customer support must be central to strategy, not just viewed as compliance work. Banks require improved reconciliation, uptime, dispute resolution, and fraud analytics. Fintech applications need to create safe interfaces with regional language supports, highlight suspicious collect requests, and implement behavioral nudges to counteract payment requests made in error and/or impulsively. Merchants must be trained in QR-code security, as well as settlement verification and maintenance of electronic ledgers.

8. CONCLUSION

UPI exemplifies one of India's most successful innovations in the digitization of the economy. This paper employed the available dataset to showcase how UPI facilitated the surge from almost no activity in the period of its initial launching in 2016 to 4,566.30 million average monthly transactions by December 2021, as bank participation advanced from 21 to 282. It is shown in official records that the platform achieved 24,161.69 crore yearly transactions by FY 2025-26, thereby reaffirming that the initial phase of the platform represented the foundation of a National Payment System. UPI, through the integration of its components of public sector involvement, bank interoperability, app-layer innovation, QR-based merchant acceptance, and widespread user adoption, has catalyzed payment

system innovations on a large scale in India. However, its growth will be influenced by many other factors, including fraud risk management, the integration of users with poor connectivity and low levels of digital literacy, resilient systems and infrastructure, effective market competition, and well-defined models of funding. Subsequent research is encouraged to utilize primary data collection through surveys, app-level data, sample-based rural research focused on merchants, and relative studies of the systems.

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