Understanding UPI through User Experience: Insights from the Ground

The DPI Academy
Enabling Digital Transformation

An initiative of ARTHA GLOBAL and eGOV

Credits

This report has been authored by a team at Artha Global comprising
Nikita Kwatra (Principal)
Lakshay Narang (Former Senior Associate)
Neha Jain (Former Senior Analyst)
Khushi Baldota (Analyst)
Anushri Pundit (Consultant)

Designed by Radhika Murti

Edited by Veena Venkateshwaran at Sirius Interactive

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About The DPI Academy

The DPI Academy, an initiative of Artha Global and the eGov Foundation, works to close the capacity gap that many countries face in designing, implementing, and sustaining safe, inclusive digital public infrastructure (DPI). Drawing on lessons from India's experience with platforms such as Aadhaar and UPI, the Academy equips government and institutional leaders with the skills and insights needed to harness DPI for goals ranging from efficient public service delivery to financial inclusion.

Through capacity-building programmes, applied research, and convenings, the Academy strengthens institutional capabilities while generating knowledge on the governance, impact, and sustainability of DPI. Its work fosters communities of practice - first in India and eventually across a global network - so that countries can learn from each other, adapt proven approaches, and advance digital transformation that is scalable, sustainable, and inclusive.

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Glossary	
API: Application Programming Interface	NPCI: National Payments Corporation of India
BC: Business Correspondent	ONDC: Open Network for Digital Commerce
BHIM: Bharat Interface for Money	OTP: One-Time Password
BNPL: Buy Now, Pay Later	PIN: Personal Identification Number
CICO: Cash-in-Cash-Out	PMJDY: Pradhan Mantri Jan Dhan Yojana
DPI: Digital Public Infrastructure	PoS: Point of Sale
eKYC: Electronic Know Your Customer	PSP: Payment Service Providers
FGD: Focus Group Discussions	P2M: Person-to-Merchant
GRM: Grievance Redressal Mechanisms	P2P: Peer-to-Peer
IDI: In-Depth Interview	RBI: Reserve Bank of India
IMPS: Immediate Payment Service	RTGS: Real Time Gross Settlement
IVR: Interactive Voice Response	SHG: Self-Help Group
KII: Key Informant Interview	T+1: Trade + 1 Settlement Cycle
KYC: Know-Your-Customer	TPAP: Third-Party Application Provider
MDR: Merchant Discount Rate	UDIR: Unified Dispute and Issue Resolution
MMID: Mobile Money Identifier	UPI: Unified Payments Interface
NEFT: National Electronic Funds Transfer	VPA: Virtual Payment Address

INSIGHTS FROM THE GROUND: AT A GLANCE

Findings are based on samples from select districts in two Indian states and do not represent population-level trends.

A. Awareness and Access: Gaps in Reach and Readiness

1. Why some don't use UPI: Low awareness, limited digital ease, and lingering doubts

- **Unaware**: In our sample of non-users, **57%** had never heard of UPI.
- **Underequipped**: Of those aware, **60%** used shared phones or lacked confidence navigating digital interfaces.
- **Underconfident**: Among those who were both aware and digitally ready, unfamiliarity or a lack of trust in digital payments were common reasons for non-use.

Why this matters: The pool of non-users[1] in the country face barriers such as low awareness, shared device use, and digital hesitation. Ecosystem actors emphasise that adoption, especially in rural regions, is also shaped by the onboarding pace of local banks and institutions, which is steadily progressing. Bridging this last-mile gap therefore requires not only targeted interventions like awareness campaigns and assisted models such as UPI Circle, but also continued ecosystem alignment to expand reach in underserved areas.

2. Many personal users still don't know about the features built for inclusion: UPI Lite and UPI 123Pay

- At least **27%** of personal users were unaware of key features like UPI Lite and UPI 123Pay.

Why this matters: The limited visibility of features designed for inclusion suggests that product design alone is not enough, discoverability and trust are equally critical for their impact.

B. Utility: High Perceived Value, Broad Use, and Emerging Concerns

1. UPI is widely preferred but continues to coexist with cash

- **99%** of personal users reported using UPI regularly; **91%** used cash regularly.
- **82%** explicitly preferred UPI over other methods.

Why this matters: Cash continues to serve essential functions even among regular UPI personal users, signalling a durable mixed-payment landscape rather than a full shift to digital-only transactions.

2. UPI is widely used across both consumer and merchant transactions

- **80%** of personal users reported using UPI for at least three payment contexts including bill payments and online shopping.
- **73%** of merchants used it for back-end functions like supplier payments.

Why this matters: The spread of UPI into diverse personal and business payment contexts reflects its potential as infrastructure supporting broader forms of financial participation.

3. Merchants value UPI, but many struggle to onboard independently

- **84%** reported that UPI had a positive impact on their business
- **64%** needed help with onboarding; **34%** of unregistered merchants didn't know how to begin

Why this matters: Many merchants need help to complete formal registration. Without it, they may remain less visible in formal systems, limiting traceability and the ability to avail merchant-specific services.

4. UPI is perceived to enable better money management and improved financial visibility

- At least **52%** of personal users valued UPI for help in tracking and managing payments.

- **47%** of merchants said UPI has helped them improve transaction record-keeping[2].
- **27%** of merchants began separating business and personal accounts.
- **15%** of merchants said they believe UPI transaction records could improve their chances of accessing credit.

Why this matters: For many personal users and merchants, digital payments are becoming a means of self-documentation: a trail that enables tracking, budgeting, and in some cases to demonstrate creditworthiness[3]. But without clear norms on data use and recognition of informal transaction trails, this emerging value could remain fragmented or be misused.

5. Service reliability is an emerging concern

- **12%** of merchants would not recommend UPI, citing concerns around server downtimes, scams, and poor connectivity.
- **64%** of personal users and **60%** of merchants said transaction failures and system downtime were their top concern.

Why this matters: As UPI adoption deepens, both merchants and users increasingly prioritise consistent performance alongside novelty, making reliability a core enabler of long-term trust and confidence.

C. Safety Perceptions: Simplicity Aids Adoption, but Calls for Safeguards

1. Frictionless design is UPI's biggest strength, but can be targeted by bad actors

- **49.5%** of personal users had received suspicious messages on UPI apps.
- **4%** of personal users and **9%** of merchants reported monetary losses often due to authorised-but-unintended transactions including user errors, social engineering scams, deceptive requests. Most were unable to recover their funds, and only half reported the incident.

Why this matters: UPI's speed and mobile-linked convenience are core to its appeal—but these same features are also being exploited by bad actors who rely on quick user responses and limited reaction time to pressure users into acting without caution.

D. Redressal: Gaps in Awareness and Resolution Pathways

1 .When money is lost, few report

- **40%** of personal users and **42%** of merchants didn't know where or how to report issues. Of those who did, many had to try multiple channels.

Why this matters: Although based on a small sub-sample, these insights highlight how redressal pathways are experienced by affected users. Difficulty in knowing where to turn, or having to try multiple avenues, can create frustration and weaken confidence in the system's dependability. While not a measure of trust itself, reporting behaviour is an important part of how users assess reliability.

CHAPTER 1: INTRODUCTION

Whether it is paying a vegetable vendor, splitting a restaurant bill, or sending money home, millions of Indians now transfer funds instantly using their phones. Given India's longstanding reliance on cash, these everyday digital transactions mark a profound shift.

At the heart of this change is the Unified Payments Interface (UPI), which was launched in 2016 by the National Payments Corporation of India (NPCI) – a not-for-profit entity jointly owned by a consortium of Indian banks and regulated by the Reserve Bank of India (RBI). Designed as an instant, interoperable payment system, UPI now underpins India's digital payment ecosystem and is used by salaried workers, gig earners, migrants, and merchants alike. According to NPCI data[4], in FY 2024–25, UPI processed over 185 billion transactions worth ₹260 trillion, averaging about 509 million a day. Between FY 2017-18 and FY 2024-25, UPI experienced a compound annual growth rate of 114% in volume and 118% in value. As of FY 2023-24, UPI accounted for over 70% of India's total digital payment transactions[5] and nearly half of all real-time payment transactions globally[6].

1.1 Key component of India's digital public infrastructure

A key reason for UPI's rapid uptake is its frictionless, mobile-first design. Rooted in the principles of digital public infrastructure (DPI) – interoperability across apps and banks, strong regulatory oversight, and open application programming interfaces (APIs) – it addresses many of the limitations of earlier payment systems, including the need to input long account numbers. By allowing users to transact with just a phone number or QR code, it makes digital payments intuitive even for first-time users. This simplicity, combined with the network effect of shared infrastructure, has helped drive adoption across diverse segments.

But UPI's significance extends beyond ease of payments. Its deeper value lies in enabling meaningful financial participation, especially among low-income users, women, and rural residents.

This is particularly significant in a country like India where 89% of adults have a bank account, yet 16% remain inactive, highlighting that access alone does not ensure usage[7]. By simplifying bank-to-bank digital payments, UPI lowers the entry barrier for those on the margins of the formal financial system[8]. For micro-merchants, who make up much of India's informal economy,[9] UPI is much more than a digital payment tool: it helps build transactional histories and digital visibility[10], which can then enable access to formal credit and financial services in the future.

1.2 The need for this study

While UPI's widespread adoption owes much to its design, its long-term value as a piece of DPI depends on how it functions in practice. As a user-facing layer of DPI, UPI interfaces directly with citizens, yet there is limited evidence on how users experience the system. Does it work when the users need it to? Can they use it without confusion? Do they feel secure doing so? Understanding how UPI delivers value on the ground – across geographies, genders, and levels of digital literacy – is vital to assessing its role as a gateway to more inclusive and meaningful financial participation.

Trust in any public infrastructure must be built and sustained through transparent, responsive, and accountable systems. Much of the existing data on UPI focuses on transaction volumes or technical specifications, offering little insight into how governance performs at scale or how resilient and inclusive the infrastructure is from a user perspective. Grievance redress mechanisms (GRMs) and user-facing institutions are considered critical to the legitimacy of digital public systems[1112], yet we lack experience-based evidence on how UPI performs in these areas.

As UPI is increasingly referenced as a global model for digital payment infrastructure, it becomes imperative to ground the conversation in citizen experiences. Studying such experiences will enable early detection of frictions, real-time course correction, and more inclusive evolution. More broadly, such a bottom-up lens can offer insights into how large-scale digital systems can be designed, governed, and sustained for public value.

1.3 Study goal and design

By analysing the lived experiences of those who use UPI and those who currently don't, this study aims to generate insights that can help strengthen the inclusiveness, responsiveness, and long term resilience of user- facing DPI.

Conducted by the DPI Academy (a collaborative initiative of Artha Global and eGov Foundation), the study draws on primary data collected from 4805 individuals (non-users, personal users, and merchants) across select districts in two Indian states – Bihar and Maharashtra – that have varied levels of digital maturity, economic activity, and infrastructural access[13]. To capture the breadth of UPI's on-ground use, we developed an assessment framework consisting of five dimensions: awareness, accessibility, utility, safety, and redressal. This framework informed the design of a field survey, focus group discussions, and in-depth interviews, yielding rich quantitative and qualitative data.

1.4. Findings and implications

While the study is not designed to be nationally representative or statistically random, it offers valuable in-sample insights into how people interact with UPI and what it will take to ensure that the platform not only scales but serves the full spectrum of users it was designed to reach. Mainly, the findings suggest that UPI has become deeply embedded in the daily financial lives of a wide range of users, not just as a tool for convenience but as a system with business, behavioural, and credit implications. At the same time, there are several gaps that are not simply user-level frictions but signs of broader institutional and infrastructural challenges. These issues may not be immediately visible in top-line metrics, but they carry important signals for UPI's long-term sustainability, trustworthiness, and inclusive potential.

1.5 Report structure

The next chapter provides an overview of the context against which UPI emerged and how it has been designed for scale. **Chapter 3** details our study methodology and assessment framework, and **Chapter 4** presents the findings. **Chapter 5** discusses policy recommendations as well as directions for future research.

CHAPTER 2: BACKGROUND AND CONTEXT OF UPI'S EMERGENCE

2.1 Setting the stage for UPI

UPI did not emerge in a vacuum. Its architecture – interoperable, mobile-first, real-time – was made possible by two decades of layered reforms and digital infrastructure investments. While its stated aim was to make everyday payments faster and convenient, its design reflects a broader institutional ambition: to create a common digital payments rail that could serve both high-volume ecosystems and last-mile users. Conducive to UPI's emergence are key milestones in India's digital financial inclusion journey: expansion of rural banking, the launch of the business correspondent model, and the rollout of Aadhaar and the Pradhan Mantri Jan Dhan Yojana (PMJDY). In parallel, the rise of core banking, real-time interbank transfers, and rapid mobile phone penetration laid the groundwork for a platform like UPI to scale (*See Figure 1*).

2.2 Building UPI to scale

The financial inclusion reforms and infrastructure developments of the past decades expanded access to bank accounts, identity, and basic banking services. UPI's architecture built on this groundwork, translating long-standing inclusion goals into a real-time, interoperable payment system. This section outlines the design principles that underpinned that architecture. (*See Annex 1A for details on how these choices responded to limitations in earlier systems.*)

A public infrastructure approach

The NPCI provides the core switching infrastructure and offers standardised APIs to licensed banks and third-party application providers (TPAPs), who, in turn, develop their own apps, features, and interfaces, often in local languages or tailored to specific user groups and use cases. (*See Annex 1B for details on the role of key actors in the UPI ecosystem.*) This public infrastructure model, which supports innovation at the edges while maintaining stability at the core, has been cited as a global example of how open standards can enable scale, competition, and inclusion simultaneously.

Interoperability by design

UPI allows transactions between any two bank accounts through any supported application. Just as a Gmail user can email someone using Yahoo or Outlook, a UPI user can transact with anyone, regardless of which app or bank they use. They don't need to navigate app-specific systems or switch banks to join the network, which makes it easier for first-time users to transact digitally without feeling locked into proprietary services. UPI's interoperable architecture mirrors a public utility rather than a proprietary platform like that of mobile wallets.

Simplicity and mobile-first experience

UPI has replaced some of the complex requirements of earlier digital payments, such as entering long account numbers and IFSC codes or inputting a mobile money identifier (MMID) along with a mobile number, with simpler options like scanning QR codes or using phone numbers or virtual payment addresses (VPAs)[14]. Its mobile-first, app-based design has lowered entry barriers and made digital payments more intuitive, particularly for those with limited literacy or formal financial experience.

Concerns around exclusion resulting from the internet-centric nature of UPI have been addressed through solutions such as UPI123 (interactive voice support and voice-based flows for features phone users) and UPI Lite (on-device wallet for offline transactions), albeit the adoption of these alternatives has remained modest[15].

Real-time settlement with layered security

Another key feature of UPI is the combination of real-time settlement and embedded security protocols. For users with tight cash flows, such as gig workers or small vendors, the ability to receive funds instantly is crucial. Unlike National Electronic Funds Transfer (NEFT), which is settled in batches, or card payments with settlement lags, UPI transfers are immediate[16].

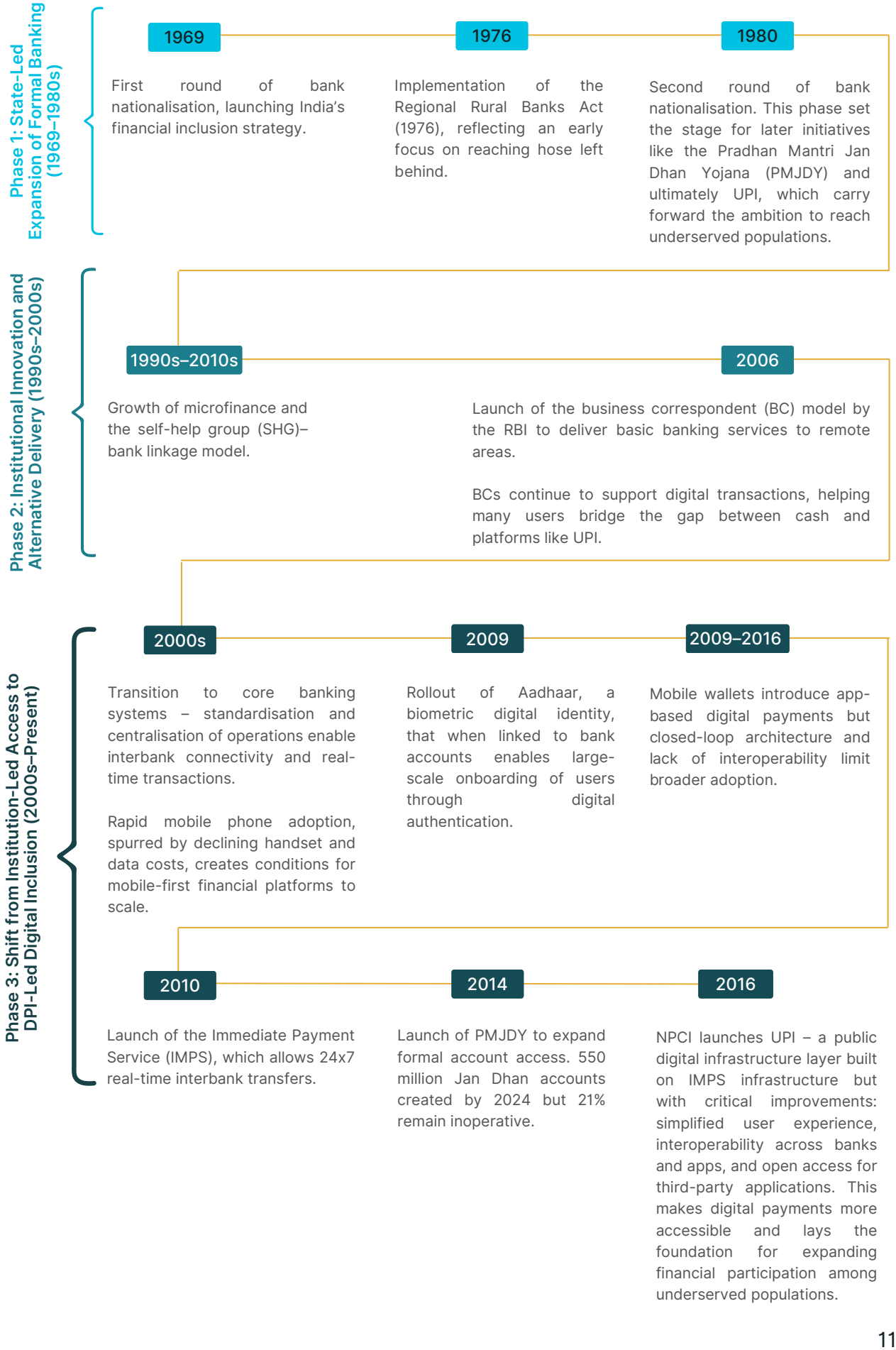
Security has been built into the architecture through device binding[17], encrypted channels[18], and two-factor authentication using UPI personal identification numbers (PINs)[19]. These features have helped build user trust while maintaining ease of use. Unlike traditional digital payments that relied heavily on one-time passwords (OTPs), often leading to a clunky, error-prone experience, UPI offers a streamlined flow, where users can authenticate transactions with a single PIN.

Beyond technical architecture, specific policy decisions have played a decisive role in UPI's scale-up. A key example is the government's zero merchant discount rate (MDR) mandate for personal users and merchants, introduced in January 2020. By eliminating transaction fees, the policy removed a major cost barrier for low-margin retail and informal sector adoption.

While UPI's design and policy choices have driven rapid adoption, they also carry trade-offs. The mobile-first, frictionless system makes payments fast and convenient but leaves little time to catch mistakes or deceptive prompts, creating openings for social engineering attacks and accidental transfers. Low-cost models, such as the zero MDR mandate, expand access but can strain the financial sustainability of service providers and limit investment in user safeguards. The same interoperability that enables wide reach can also magnify the impact of technical glitches, making system reliability a shared vulnerability. Managing these risks is central to sustaining UPI's scale and expansion.

The findings that follow are best understood in light of this broader context of a system that was built for convenience, scaled through public-private coordination, and is now navigating the hard questions of trust, reliability, and inclusion at scale.

Figure 1: Phases of India's Financial Inclusion Reforms



CHAPTER 3: METHODOLOGY AND ASSESSMENT FRAMEWORK

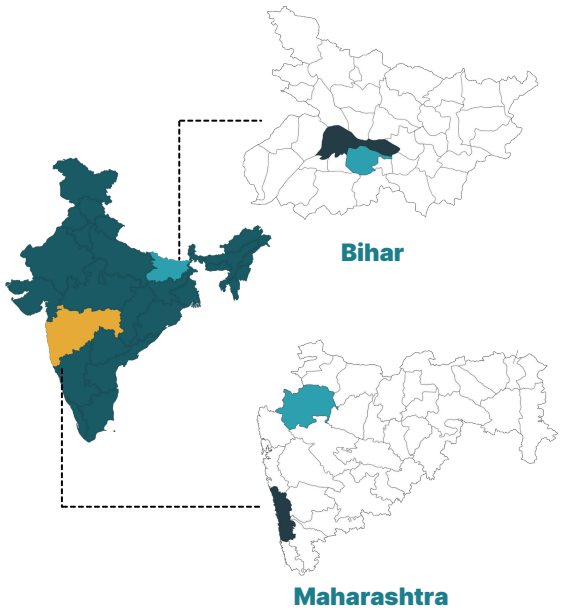
3.1 Research design

The core findings of this study[20] are based on field research conducted using a structured survey instrument and two qualitative tools: focus group discussions (FGDs) and in-depth interviews (IDIs). We also conducted a set of key informant interviews (KIIs) with ecosystem actors – banks, third-party application providers (TPAPs), and regulators – for inputs on study design, contextual framing, and the interpretation of the results.

The fieldwork was carried out between February and March 2025. We surveyed 780 non-users, 3,283 personal users, and 742 merchants[21] who accepted UPI payments (N = 4805) across urban and rural areas of two of India's most populated and socioeconomically diverse states: Bihar and Maharashtra. These states were selected for their contrasting levels of digital maturity[22] and UPI adoption[23]. Within each state, two districts were chosen – one with high UPI usage and one with low usage – based on per capita UPI transactions in Q2 2024[24] (*See Figure 2*). The selected districts in Bihar were Patna (high usage) and Nalanda (low usage), and those in Maharashtra were Nashik (high usage) and Ratnagiri (low usage).

The structured survey, which was based on an assessment framework (discussed below), was administered in local languages and yielded quantitative data on five key user experience dimensions: awareness, access, utility, safety, and redressal. Descriptive statistics were used to summarise this data. No statistical significance testing was conducted, as the analysis was intended to be illustrative rather than statistically conclusive. The survey was followed by FGDs (groups of three men or three women, or three merchants in rural and urban areas of each state) and IDIs to explore UPI behaviour, perception, and experiences. Thematic and narrative approaches were used to analyse such qualitative data and identify recurring patterns and variations across groups and geographies.

Figure 2: Study Sample Size and Distribution



Districts & UPI transactions per capita in Q2 2024

Patna
20.35

Nalanda
7.75

Nashik
25.86

Ratnagiri
5.40

780 Non-UPI Users (~200 per district)

Individuals who did not use UPI in the past three months

3283 Personal Users (~800 per district)

Individuals who used UPI at least once in the past three months

742 Merchants (~200 per district)

Merchants who accepted UPI payments

Source: Calculated from PhonePe Pulse data (Q2 2024) and population from Census projection 2024

3.2 Study limitations

The study used a pre-decided sample size of UPI users and non-users within the selected geographies not to estimate overall prevalence but to understand the experiences, barriers, and behaviours of both groups. The results should be interpreted at the sample level rather than as population-wide estimates. *(See Annex 2 for a detailed breakdown of our sample and recruitment strategy)*

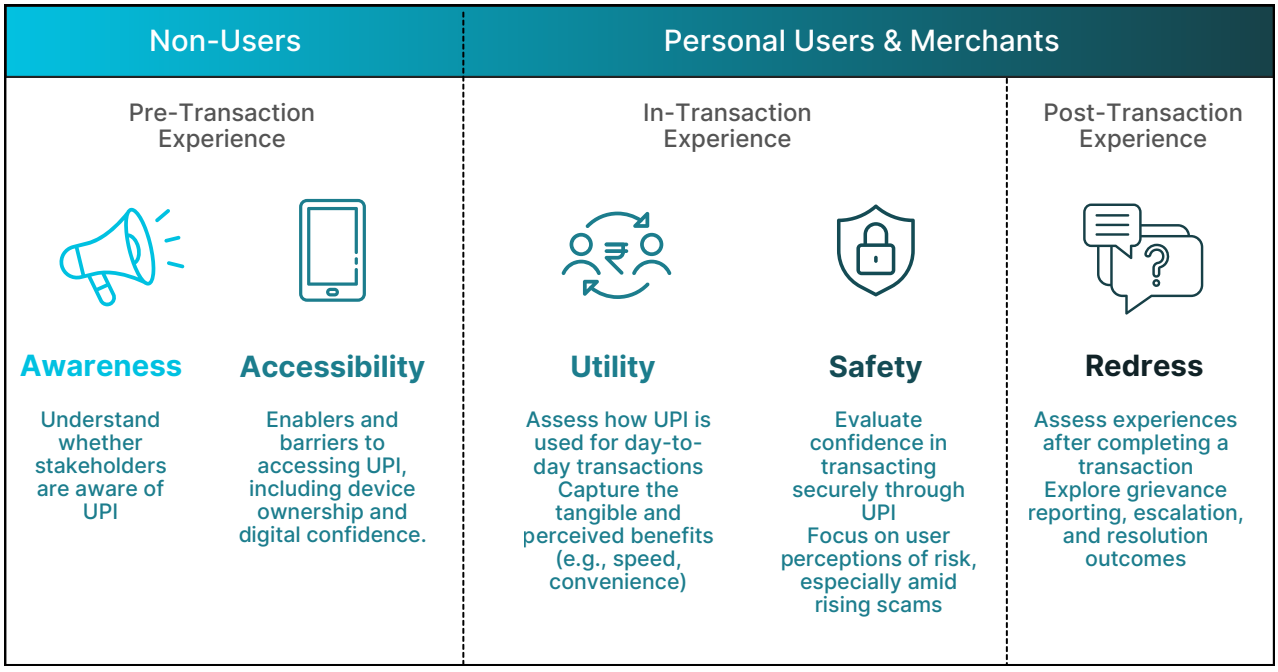
3.3 Assessment framework

To structure our analysis of user experience, we developed an assessment framework that divides the respondents' UPI journey into three stages: pre-transaction, in-transaction, and post-transaction. Here, transaction is used in an extended sense to include not just the moment of payment, but the broader experience: from becoming aware of UPI and gaining access, to the act of transacting, to what happens when issues arise afterward. Each stage is linked to specific dimensions:

- **Pre-transaction** Before a person makes their first UPI transaction, they must cross the "entry threshold." This pre-transaction stage relates to **awareness** and **accessibility**: knowing UPI exists, understanding how it works, and having the basic tools to use it. Non-users often get stuck at this stage, making it a key barrier to inclusion.
- **In-transaction** captures the transaction experience itself: how personal users and merchants UPI in practice. Here, we examine **utility** – both perceived and tangible benefits of using UPI – and **safety.**
- **Post-transaction** indicates what happens when personal users and merchants seek help or resolution, often following a failed, incomplete, or problematic transaction. It focuses on **redressal.**

Responses were collected across these three stages and five dimensions to develop a holistic understanding of how personal users and merchants experience UPI in practice and where non-users face barriers *(See Figure 3)*. The next section explains how the five dimensions were defined.

Figure 3: Three-Stage Assessment Framework



Internally developed assessment framework

3.3.1 Pre-transaction parameter : Awareness

This dimension captures basic familiarity with UPI. It reflects whether individuals have encountered information about UPI through campaigns, peers, or institutions, and whether they recognise it as a payment option available to them [25-27] . In our framework, we assess whether the non-users in our sample are unaware of UPI altogether or if they face other barriers. This helps distinguish between informational gaps and deeper access or confidence constraints.

3.3.2 Pre-transaction parameter : Accessibility

We define accessibility as the conditions that affect whether someone can practically engage with UPI. This includes both

- **External enablers** such as ownership of a bank account [28] , personal mobile phone [29] , and a debit card to activate UPI and
- **Capability-related** factors such as digital comfort and confidence in navigating apps or using mobile devices [30- 32] .

3.3.3 In-transaction parameter: Utility

Utility refers to the actual and perceived value that users and merchants derive from using UPI. It explores whether UPI is both available and meaningful to users in their daily lives. We assess this via four sub-dimensions:

- **Perceived utility:** Subjective value assigned to UPI based on context
- **Observed utility:** Breadth, frequency, and value of usage
- **Comparative utility:** UPI's advantages over other modes (e.g., cash, cards)
- **Utility gaps:** User feedback on what could improve their experience

Together, they help assess whether UPI is simply being used or whether it is delivering deeper value.

3.3.4 In-transaction parameter: Safety

This dimension captures how personal users and merchants perceive the security of transacting through UPI, particularly the risk of experiencing monetary loss. While the platform is designed with strong technical safeguards, its mobile-first, frictionless experience can be exploited by bad actors, leaving users vulnerable to risks such as deceptive prompts, interface manipulation, or unintentional transfers [33-37] .
We examine how these risks are perceived and how they affect users' trust in UPI and their willingness to continue using it.

3.3.5 Post-transaction parameter: Redressal

Redressal refers to how personal users and merchants seek help when things go wrong, such as failed payments, incorrect transfers, or suspected scam. We examine whether users are aware of redress pathways, whether they use them, and whether they find them effective. These insights help assess not just service quality but also the accountability of the broader UPI ecosystem.

CHAPTER 4: FINDINGS AND INSIGHTS

The following section draws on survey and interview data to understand how UPI is experienced by personal users, non-users, and merchants in different contexts. **Rather than a simple story of adoption versus exclusion, the findings reveal a more layered picture, shaped by access to devices, digital comfort, social norms, and trust. All findings are based on in-sample data and are neither statistically random nor nationally representative. The results capture perceptions rather than verified transaction data.**

While the survey offers broad insights into UPI's awareness, accessibility, utility, safety, and redressal, the FGDs add depth by highlighting the lived experiences of personal users and merchants along these same dimensions. Together, they provide a holistic view of UPI from the ground. We begin with the most foundational aspect of digital inclusion: who still struggles to access UPI and why? *Chart 1* offers a starting point, mapping key demographic differences between users and non-users.

Chart 1

How do UPI users compare to non-users?

	Non-users *Sample size: 780*	Users *Sample size: 3283*
Gender	**48%** Men **52%** Women	**64%** Men **36%** Women
Education	**27%** Illiterate or no formal schooling **68%** Formal schooling (any level up to class 12) **4%** College and above	**1%** Illiterate or no formal schooling **64%** Formal schooling (any level up to class 12) **34%** College and above
Age Range	**23%** 18-30 **40%** 31-45 **37%** Over 45	**51%** 18-30 **44%** 31-45 **5%** Over 45
Household Spending	**64%** ₹10,000 and below **21%** ₹10,000 – 20,000 **3%** More than ₹20,000 *12% preferred not to disclose*	**54%** ₹10,000 and below **31%** ₹10,000 – 20,000 **8%** More than ₹20,000 *12% preferred not to disclose*
Phone Type	**46%** Personal feature phone with keypad **30%** Personal smartphone with screen **14%** Shared feature phone with keypad **9%** Shared smartphone with screen	**0%** Personal feature phone with keypad **99%** Personal smartphone with screen **0%** Shared feature phone with keypad **1%** Shared smartphone with screen

4.1 Awareness: Do people know about UPI and how to access it?

(n = 780 non-users)

1. Lack of awareness remains an obstacle to using UPI

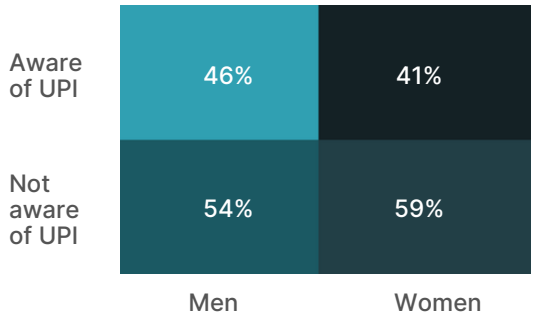
Across four districts, 57% (443 individuals) in our sample were not aware of UPI.

This pattern is also visible at an aggregate level, where more than half of non-users in both high- and low-usage areas remain unaware of UPI *(See Chart 3)*.

Chart 2 (a)

Slightly higher unawareness of UPI among women

% of men vs women who said they had never heard of UPI

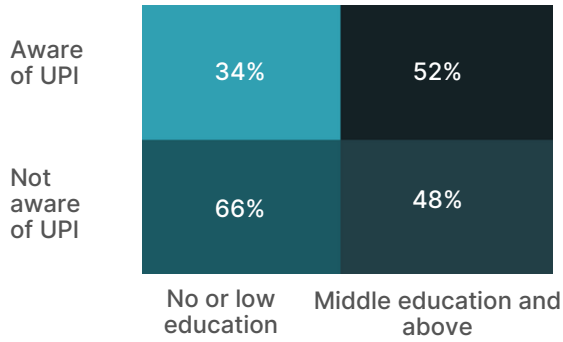


Note: Based on a sample of 780 non-users (407 women, 373 men)

Chart 2 (b)

Higher unawareness of UPI among those with no or low education

% of respondents who had never heard of UPI and their education levels



Note: "No or low education" includes individuals who were illiterate, literate but without formal schooling, and those who had completed 5th grade or below. "Middle education and above" covers individuals who had completed 8th grade or higher.

Preliminary patterns showed higher unawareness among women and among those with no or low education (completed 5th grade or below) *(See Chart 2 (a and b))*

Unawareness among non-users varies widely and does not track neatly with overall UPI usage in a district. In high-usage Nashik, the majority of non-users were unaware, whereas in another high-usage district, Patna, only a third were unaware, suggesting that other barriers dominate there.

Similar variation is seen in low-usage districts: in Nalanda, 48.3% of non-users were unaware, compared with 61% in Ratnagiri.

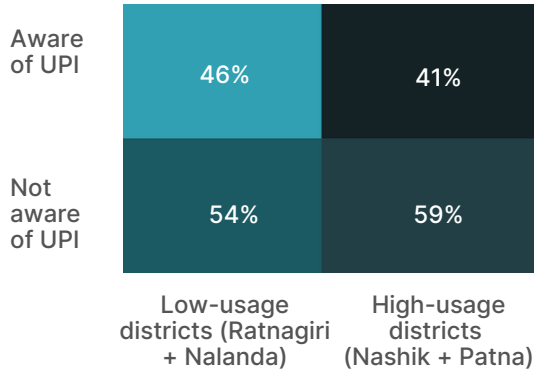
This means that even in districts with high adoption, pockets of informational exclusion can persist. Outreach strategies therefore need to be tailored to local patterns of exclusion, rather than guided by adoption levels alone.

It is important to state that these findings reflect the characteristics of non-users at the district level and not the overall prevalence of non-use or low awareness in those districts.

Chart 3

High unawareness among non-users even in high-usage districts

% of non-users who had never heard of UPI in high- and low-usage districts



Note: Based on a sample of 780 non-users

4.2 Accessibility: Do people have the tools, digital skills, and enabling conditions to use UPI? (n = 337 UPI-aware non-users)

1. Most aware non-users were digitally constrained

Individuals who were aware of UPI (equally split between men and women) did not use it either because of lack of means or by choice. To better understand their reasons, we categorised these respondents into two groups: digitally constrained and digitally ready.

- **Digitally constrained:** Nearly 60% (202 individuals) of aware non-users faced structural or capability-related barriers, such as not owning a phone, having to share a mobile phone, or lacking the confidence to use digital tools (i.e., low digital comfort). We tried to identify the demographic factors (e.g., gender, education, or remote location) that may have contributed to them being digitally constrained.
- **Digitally ready:** About 40% (135 individuals) of aware non-users were digitally ready. They met the basic preconditions for UPI use (i.e., owning a personal phone and having a reasonable level of digital comfort) but still chose not to use it. With this set of non-users, we tried to understand what held them back from adopting UPI.

It's important to note that we use these terms not as labels but as a lens to understand the different types of barriers that shape non-use.

2. Not having a personal smartphone and low digital comfort were the the main constraints

All aware non-users in our sample had bank accounts, but their access to mobile phones varied widely. While 80% had access to a personal phone (44% owned a smartphone and 36% owned a feature phone), 20% shared a phone with family members. These patterns remain deeply gendered: 31% of female non-users reported sharing phones with others in their household compared to only 10% of male non-users. Moreover, phone sharing was more common in rural areas (23%) than in urban areas (17%) [38].

> **These findings suggest that limited access to personal mobile phones remains a key barrier to UPI use, particularly among women and those in rural areas."**

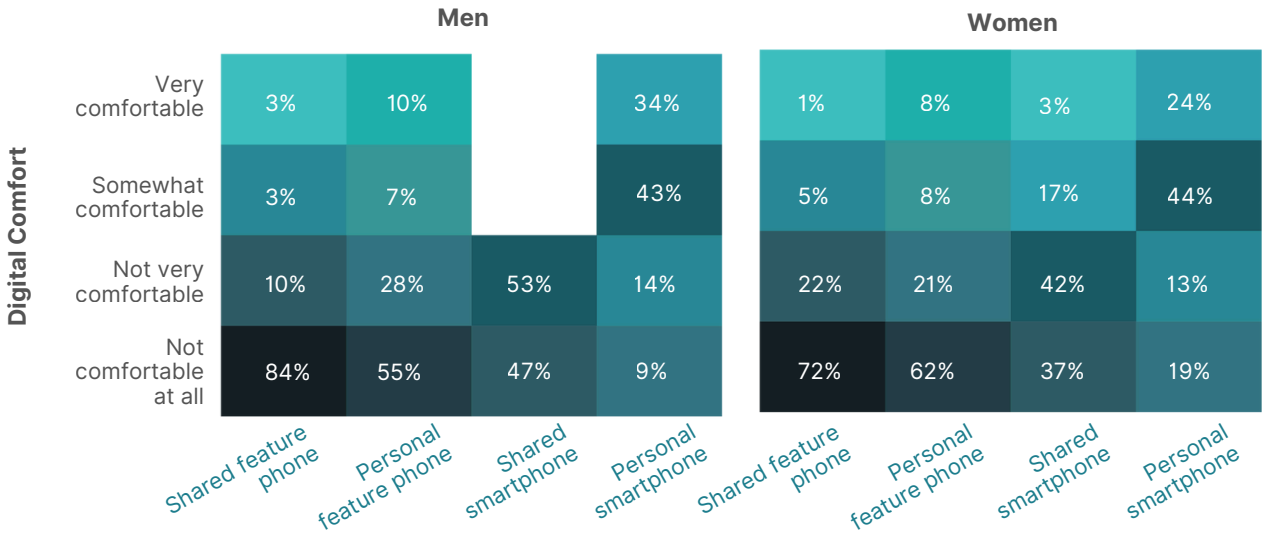
Those who owned mobile phones did not always feel comfortable using them. Sixty-eight percent said they were either not comfortable or somewhat comfortable using their phones for tasks like messaging, browsing apps, or shopping online. Digital comfort varied significantly by gender: Among female non-users, 63% said they were not comfortable using their phones as against 50% of male non-users.

Further, phone type (smartphone vs. features phone) emerged as a key factor influencing digital comfort. Between feature phone and smartphone owners, those with smartphones (both men and women) showed higher levels of comfort (*see Chart 4*). In practice, owning a feature phone meets the basic technical requirements for UPI use, especially with the availability of UPI 123Pay and UPI Lite; however, our data suggests that feature phones are linked to low digital comfort and in turn poor UPI adoption. Further, this possibly points to low awareness of offline or keypad-based solutions among feature phone users. In our broader survey, we found that there were gaps in awareness about these features, even among active UPI users [39].

Chart 4

Strong correlation between smartphone ownership and digital comfort

% of non-users grouped by gender, phone type and ownership, and self-reported digital comfort



Note: Based on a sub-sample of 337 UPI-aware non-users: 170 men, 167 women.

3. Digitally constrained non-users also faced other barriers

Nearly 49% reported not knowing how to use UPI as an additional barrier. Around 17% preferred cash or other modes of payment, and 14% lacked trust in digital payments (*See Chart 5*). These responses highlight knowledge gaps, user preferences, and trust deficits as key barriers to UPI use among this group. These patterns were consistent across men and women as well as across rural and urban locations.

4. The digitally ready mostly don't know how to use UPI

Among this group, the most cited reason (by 41%) for not using UPI was "don't know how to use it". Given that these individuals self-identified as digitally confident, this likely reflects first-time user hesitation rather than a lack of ability. For many, the absence of guided onboarding may be enough to deter initial use. Other commonly cited reasons were lack of trust in digital payments (16%) and technical issues such as poor internet connectivity or banking server problems (13%), and a strong preference for cash (13%) (*See Chart 5*).

These findings show that having access to a phone and digital skills aren't enough. Many users hesitate because they're unsure, worried about making mistakes, or don't feel UPI is relevant to their needs.

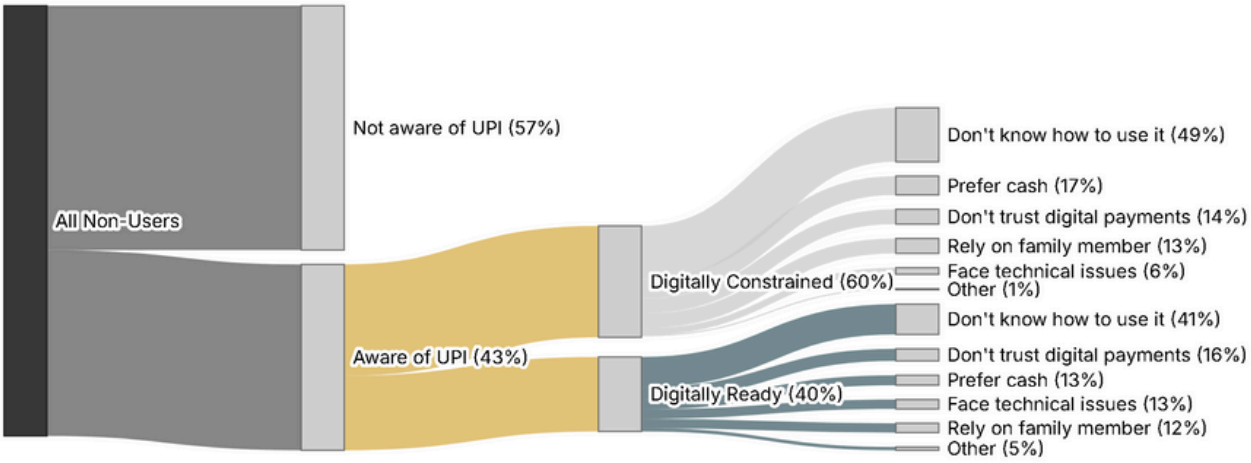
> *"I don't use the UPI app, but I know it's used to send money and recharge phones. I've learned it a few times but then forget. I don't feel the need to use it, because we don't keep much money in the account. And with housework, it's hard to make time to learn. What if the money goes to the wrong place?"*
> *- Female non-user, Nalanda (Translated from Hindi)*

This shows the need for more hands-on support, especially for first-time users. Building confidence, offering low-risk ways to try it out, and showing real value can go a long way.

Chart 5

Reasons for non-use of UPI

% of digitally constrained and digitally ready non-users and their reasons for non-use (multiple responses allowed)



Note: Based on a sample of 780 non-users

5. Safety was a concern among both digitally constrained and digitally ready groups

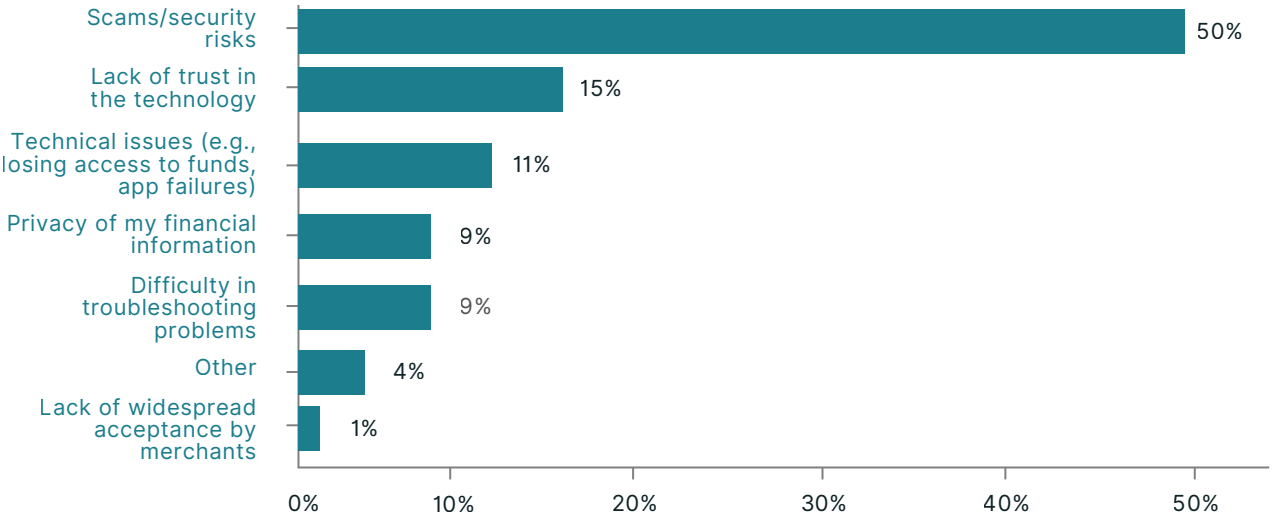
Beyond their main reasons for not using UPI, non-users also shared a wider set of concerns about adopting it (*See Chart 6*).

These ranged from safety-related worries – the most frequently mentioned – to issues such as technical reliability and the risk of transaction errors. Because respondents could select multiple concerns, these do not always match their primary reason for non-use but offer a broader view of what holds them back.

Chart 6

Main concern among aware non-users: Perceived security risks

% of aware non-users who responded to the question "What concerns do you have about using UPI?" (multiple responses allowed)



Note: Based on a sub-sample of 337 UPI-aware non-users.
The question captured general concerns, not direct reasons for non-use.

4.3 Utility: How useful is UPI in everyday financial activity?

4.3.1 Utility of UPI among personal users (n = 3283 personal users)

1. UPI is preferred over cash but hasn't replaced it

Within our sample of personal users, 99% reported using UPI regularly. About 42% said they used it daily, and another 40% reported using it a few times a week. Further, 82% explicitly said they preferred UPI over alternatives like cash, cards, or mobile banking apps. This preference held consistently across demographic and geographic groups: men and women, rural and urban.

Despite strong preference and adoption data, 91% of UPI users still reported using cash regularly *(See Chart 7)*. This shows that people choose payment modes based on context, transaction type, and perceived risk.

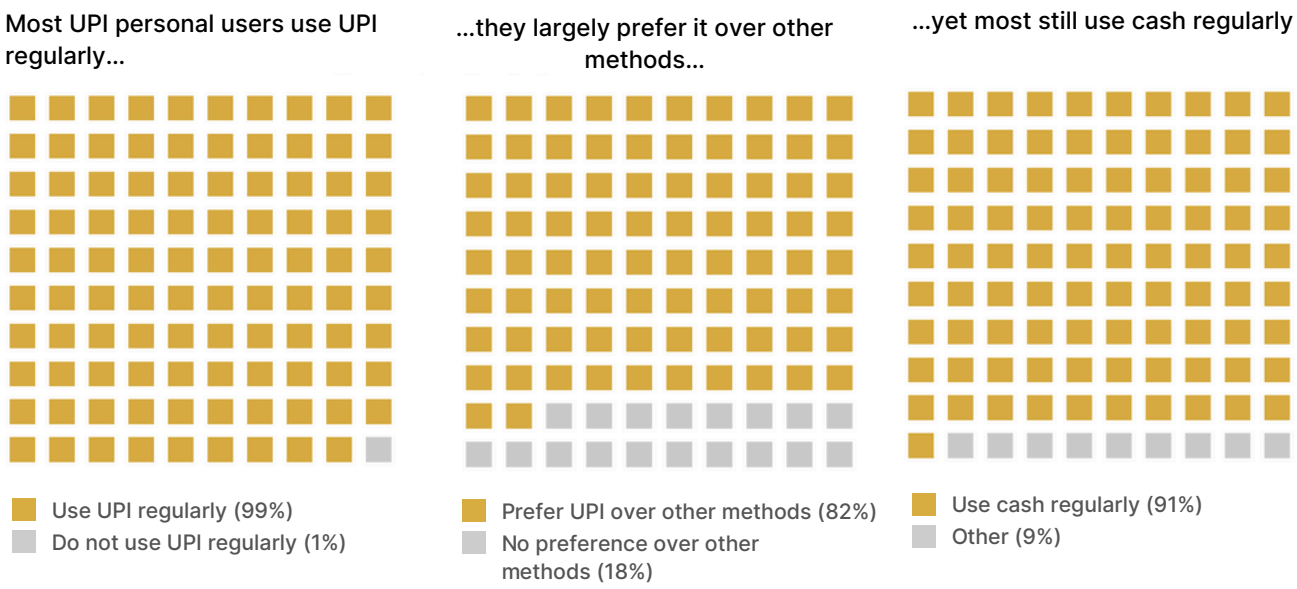
Given the limited use of cards, especially among low-income users, a preference for UPI over card-based transactions is unsurprising.

That UPI is preferred even over cash – traditionally dominant for small-value payments – signals a meaningful behavioural shift. However, digital adoption cannot be interpreted as a path to "going cashless". A more realistic goal is cash–digital coexistence, supported by robust cash-in/cash-out (CICO) infrastructure and inclusive design.

Chart 7

UPI is strongly preferred but not a replacement for cash

% of UPI users who responded to questions about their usage of UPI and whether they prefer it over other modes of payment



Note: Each square = 1% of personal users. Based on a sample of 3283 personal users.

2. Users prefer UPI for its speed, simplicity, and control

The top four reasons for preferring UPI were ease of use and simplified transactions, instant transfers across banks and apps, real-time payment tracking and digital records, and minimal need for cash or cards.

Qualitative findings confirmed that UPI's mobile-native design – using phone numbers or QR codes instead of account details – was perceived as far more intuitive than internet banking, especially for small, frequent, or on-the-go payments *(See Chart 8 and Figure 4)*.

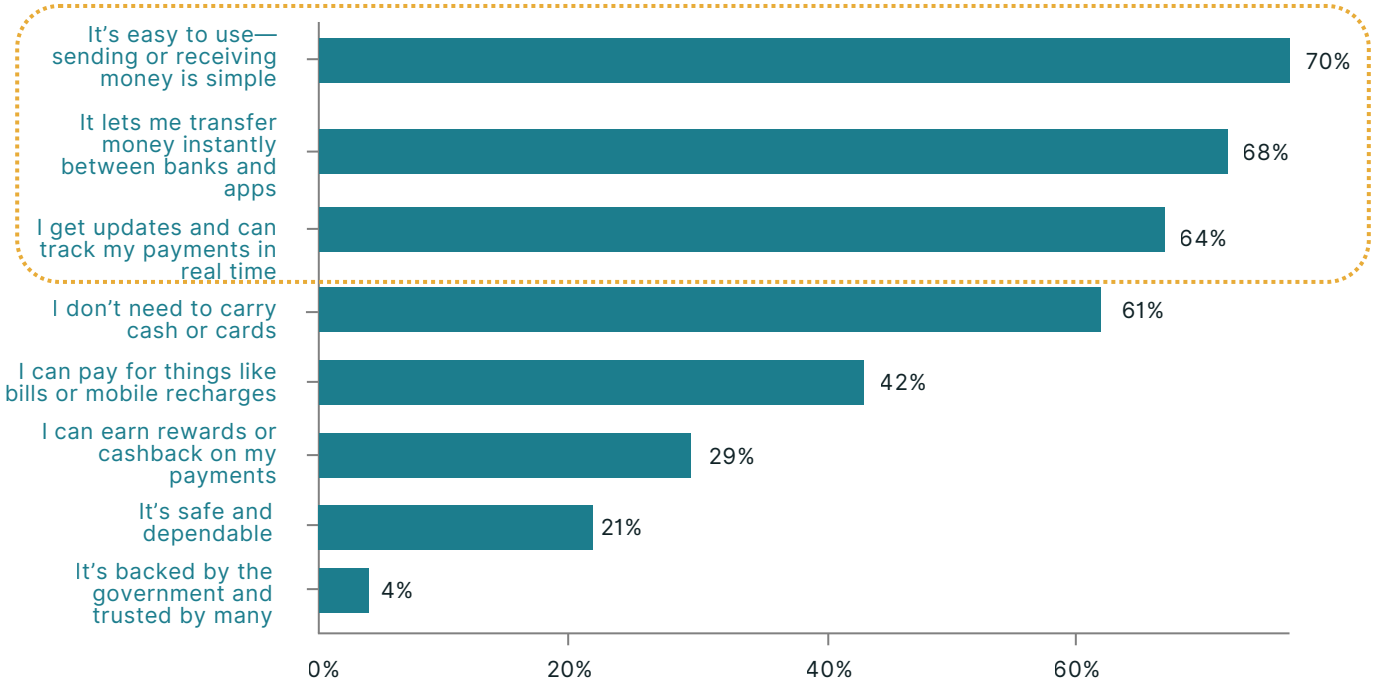
> *"Time gets saved, and you can make payments from the comfort of your home... Money comes directly on the phone and gets deposited in your bank account."*
> *— Male personal user, Nashik (Translated from Marathi)*

> *"When I heard about UPI, I felt good that now we wouldn't have to go to the bank and could do transactions from home... I've been using it for 10 years. It's very convenient." — Female user, Patna (Translated from Hindi)*

Chart 8

Key UPI benefits for personal users: Simplicity, speed and transaction visibility

% of personal users responding to the question "Why do you prefer UPI?" (multiple responses allowed)



Note: Based on a sub-sample of 2678 personal users who prefer UPI over other modes of payment

Figure 4: Key UPI benefits from qualitative discussions with personal users: Easy transfers and no cash needed

3. UPI supports a wide range of everyday transactions

Over four in five personal users reported using UPI for at least three types of transactions: bill payments (80%), money transfers to family or friends (79%), and purchases at shops or restaurants (79%).

This widespread usage suggests that UPI is not only widely adopted but also meaningfully integrated into users' daily payment habits.

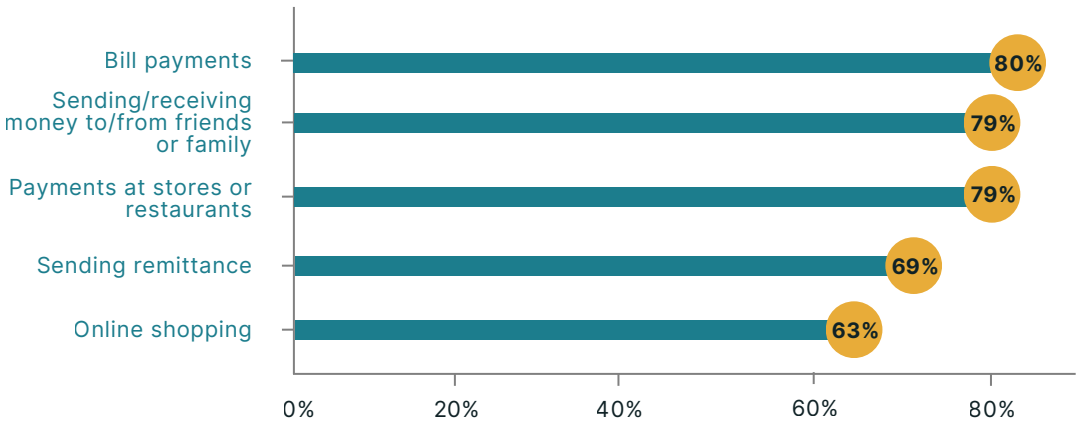
Additionally, many (69%) reported using UPI to send remittances to family members; in fact, remittance transactions were more common than online shopping-related transactions (63%). In our field conversations, some users, especially from lower-income or migrant households, described the ability to send money home instantly and directly as one of the most valuable things about UPI. (*See Chart 9*)

A key informant mentioned how UPI has turned remittances into "a quick three-step process", vastly different from earlier practices that required physical forms, long queues, or bank visits. In addition to simplifying the process, UPI has reduced costs and improved convenience, particularly for households that once depended on agents or informal channels [40].

Chart 9

UPI used for a range of transaction types

% of personal users who selected each UPI use case (multiple responses allowed):



Note: Based on a sample of 3,283 personal users.

4. A small segment of users prefer cash even though they use UPI

In our sample of personal users, 8% (278) expressed a preference for cash or other methods. Within this set of users, 41% (113) felt generally uncomfortable with digital payments, 35% (96) had low trust in online transactions, which was linked to fears of scams or mistakes, and 30% (82) found formal banking activity unnecessary because they had low or irregular account balances (i.e., money came and went quickly). Only 8% (23) cited usability or interface issues.

These findings underline a critical point: reluctance to use UPI isn't about how it works, but whether it feels trustworthy or worthwhile. For users with tight, cash-based budgets or limited financial buffers, digital systems may still feel uncertain even if they use them occasionally.

A large majority (65%) of personal users are comfortable using UPI for payments above ₹2,000 regardless of the amount. However, comfort is still linked to transaction value for some:

10% said they were uncomfortable using UPI for large payments, and another 10% preferred cash for high-value transactions (*See Chart 10*).

This hesitation, often tied to concerns about irreversibility and lack of recourse, shows that even satisfied users may hold back from trusting UPI for higher-stakes payments.

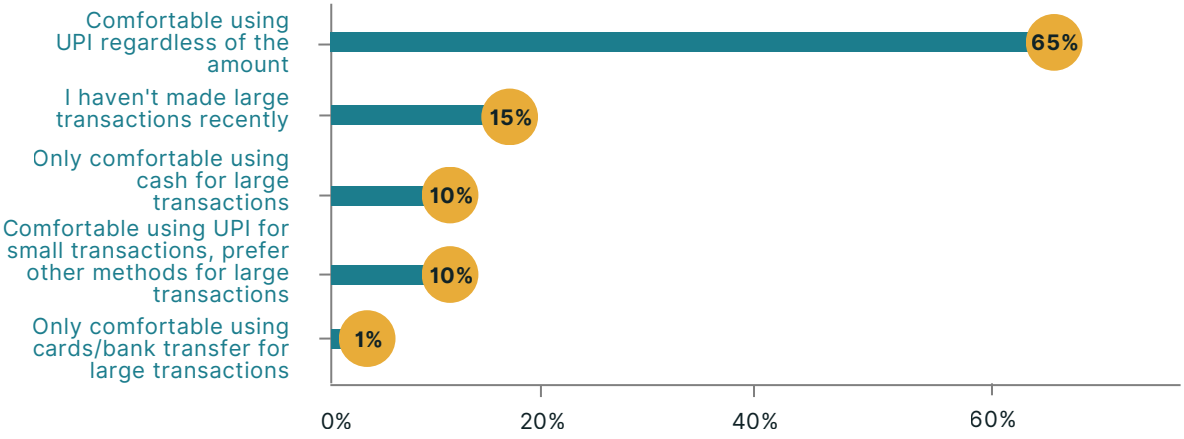
5. Reduce server downtime and safety against scams are highly desired improvements

As UPI adoption expands, personal users are increasingly prioritising reliability and safety to support its everyday use. Sixty-six percent of users identified stronger protection against scams and 64% of users identified reducing server downtime as key improvements to enhance their experience (*See Chart 11*). (Here, downtime does not attribute the source of such disruptions, which may arise at different points in the transaction chain, including acquiring or issuing banks, the UPI switch, or application providers. It does not specify whether issues originate at banks, the UPI switch, or app providers)

Chart 10

Personal users' comfort with UPI based on transaction value

% of personal users that selected each response related to their comfort level using UPI for transactions over ₹2000

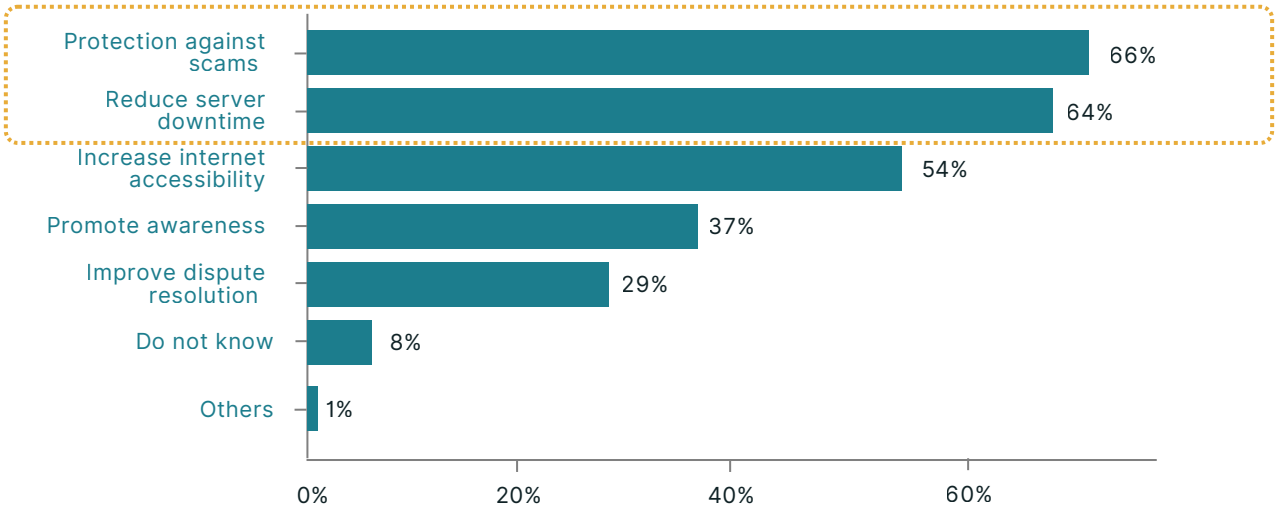


Note: Based on a sample of 3283 personal users

Chart 11

Most sought improvements from personal users: Reduced server downtime and stronger scam protection

% of personal users responding to the question "What changes would you suggest to improve UPI?" (multiple responses allowed)



Note: Based on a sample of 3283 personal users
"Downtime" refers to periods of service unavailability as experienced by users.

4.3.2 Utility of UPI among merchants (n = 742 merchants who accept UPI payments)

6. UPI delivers business benefits to merchants

Instant, direct bank settlement:
A vast majority of merchants who accept UPI payments reported that UPI had a positive impact on their business (*See Chart 12*). For 75% of merchants, the main benefit was immediate settlement. Quicker access to funds improved cash flows and reduced frequent bank visits.

> *"...earlier, we used to go to the bank more often. It would take two to three hours, and by then, other work would get delayed. My friend showed me that with UPI, we can transfer money from anywhere. It saves time, and we can keep working." - Merchant, Ratnagiri (Translated from Marathi*

Convenience and reduced cash handling: Merchants also highlighted ease of transacting and reduced reliance on cash as major advantages of UPI. About 60% said UPI made daily transactions more convenient for themselves and their customers by eliminating the hassle of handling low-denomination currency.

> *"People prefer UPI because they don't have to carry small change, which makes it easier for customers. After implementing UPI, the number of customers in my shop increased. Other shopkeepers also advised me to accept UPI payments, which further boosted customer footfall." - Merchant, Nalanda (Translated from Hindi)*

Customer satisfaction and higher footfall: More than half of merchants reported improved customer satisfaction and increase in customer footfall after adopting UPI. Notably, 63% said that customer preference for UPI was a key motivation for using the platform.

Thus, rising consumer demand is encouraging merchants to adopt digital payments and is, in some cases, nudging them towards more formalised business practices.

Digital records and operational visibility:
This shift towards formalisation also brings operational benefits. Nearly 47% merchants said that UPI's digital transaction records helped them monitor their business better, making it easier to track sales and income as well as manage accounts. For some, this contributed to better financial organisation. Transaction tracking was cited as a benefit more frequently in Ratnagiri and Nashik, suggesting that UPI plays a role in helping merchants maintain clearer records, especially in urban and semi-urban markets.

Potential access to formal credit:
About 15% of merchants reported that their UPI-linked banking activity improved their visibility to lenders. In several cases, banks proactively reached out with credit offers, something these merchants had not experienced prior to adopting UPI.

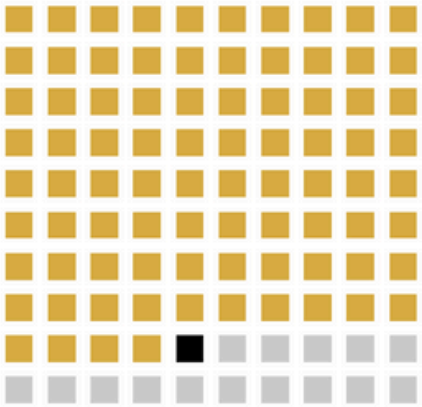
These survey findings on benefits to merchants were also corroborated by inputs gathered during qualitative analysis (*See Chart 13 and Figure 5*).

"It is also a big benefit while taking a loan. Because we have cash, we do not see any change in our record in the bank, what is the difference in our record? It doesn't seem like if I do a business worth Rs 30 lakhs, the bankers started asking me if I have cash. I have an account with ___ Bank, and I started getting calls from there asking if I need a loan. At first, we weren't getting any calls. When our position started to show that we do a business worth Rs 10-15 lakhs a year, the bankers also started asking us. This is an advantage for us" - Merchant, Ratnagiri (Translated from Marathi)

Chart 12

Impact of UPI adoption on merchants' businesses: Largely positive

% of UPI-accepting merchants who reported a positive, neutral, or negative impact on their business after adopting UPI



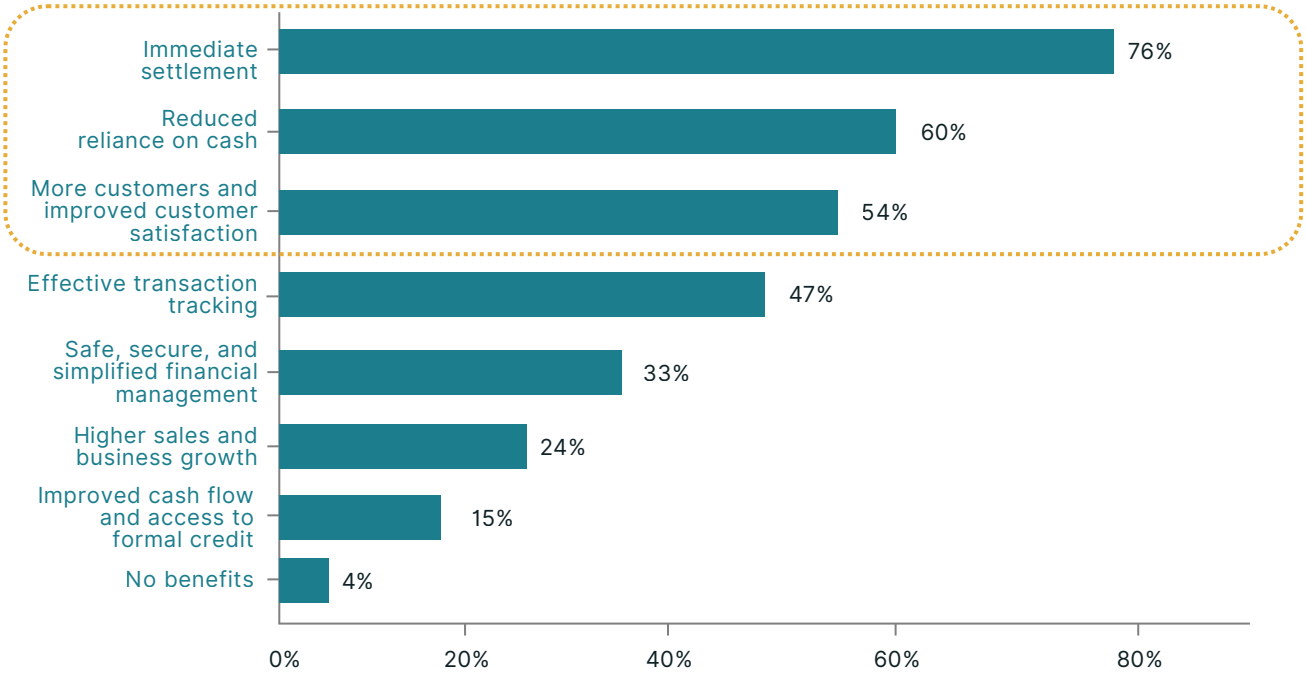
Largely Positive (84%)
Largely Negative (1%)
No significant impact (15%)

Note: Based on a sample of 742 UPI-accepting merchants. Each square = 1% of UPI-accepting merchants.

Chart 13

Key UPI benefits for merchants: Quick settlement and more customers

% of UPI-accepting merchants responding to the question "What benefits have you experienced after you started using UPI?"



Note: Based on a sample of 742 UPI-accepting merchants

Figure 5: Key UPI benefit from qualitative discussions with merchants: Instant money transfer

7. Willingness to pay for UPI use suggests growing stickiness

For many merchants, UPI is no longer just a zero-cost utility – it is embedded in their daily business routines. While affordability has helped drive adoption, some merchants said that they would continue using UPI even if small charges were introduced as long as convenience and reliability remained unchanged.

These views are not yet widespread, but they do suggest early signs of stickiness in UPI usage, rooted in habit, ease, and customer demand, beyond more than just cost.

"If the UPI transaction fee is low, I'll continue using it. If the charges are high, then I'll have to think based on the need...using UPI has now become a habit or necessity for people, and it's made payments easy."
– Merchant, Nashik (Translated from Marathi)

"UPI has become a necessity, and stopping it would be difficult. If fees are reasonable, I will continue using it, but if they are too high, I might stop depending on the situation. However, I doubt anyone would completely stop using UPI."
– Merchant, Nalanda (Translated from Hindi)

8. UPI adoption is broad, but formal registration is uneven

Seventy-five percent of merchants were formally registered with a payment service provider (PSP), while the remaining 25% used personal UPI IDs to accept retail payments. Formal registration was more common among urban merchants (81%) than rural ones (70%). Nashik reported the highest registration levels, with 94% of rural and 98% of urban merchants formally onboarded.

In contrast, rural areas in Nalanda and Patna had the largest share of unregistered merchants, at 28% and 44% respectively. From our pilot studies, we learned that many merchants remain unregistered as they prefer accepting retail payments as informal peer-to-peer (P2P) transactions instead of formal peer-to-merchant (P2M) transactions to bypass the delay in the P2M settlement cycle (*See Box 1*).

Education also played a role. While 80% of merchants with a graduate degree or higher were formally registered, this figure dropped to 56% among those with no literacy.

Among unregistered merchants, a majority (62%) said they did not see the value in registering, and 34% said they didn't know how *(See Chart 14)*.

Box 1: Checks in place to differentiate P2P and P2M

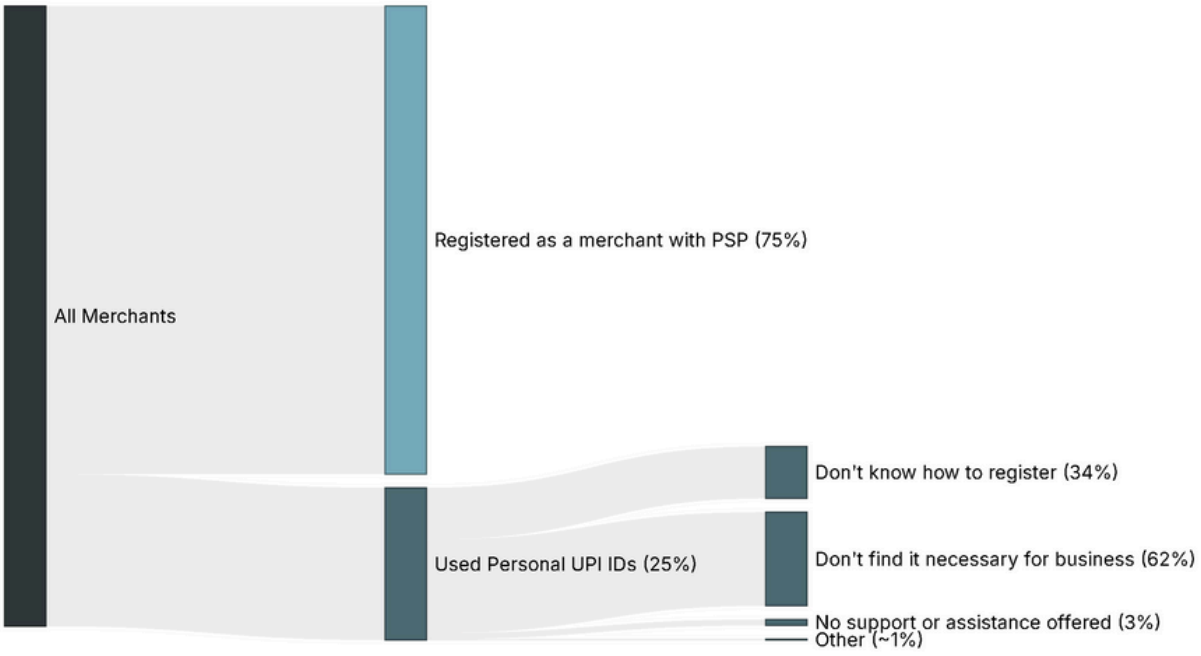
While many merchants cite "instant settlement" as a key benefit, P2M transactions on UPI actually follow a T+1 settlement cycle. This means that although the payment appears immediate to the payer and is visible on the merchant's app, the actual credit to the bank account happens with a delay, usually on the next day after the transaction. A "settle now" option exists for merchants, but the awareness of this feature remains limited.

According to a key informant, UPI's backend uses an internal identifier called "I'm a merchant" to classify merchant accounts, to which the T+1 settlement cycle applies. While the identifier is assigned to accounts registered as merchants, it can also be assigned through backend checks on P2P transactions – if the same payment pattern repeats for seven consecutive days, the system flags the account as showing merchant-like activity.

Chart 14

Formal merchant registration on UPI and reasons for avoiding it

% of merchants officially onboarded as UPI merchants vs those using personal accounts and reasons for non-registration



Note: Based on a sample of 742 UPI-accepting merchants

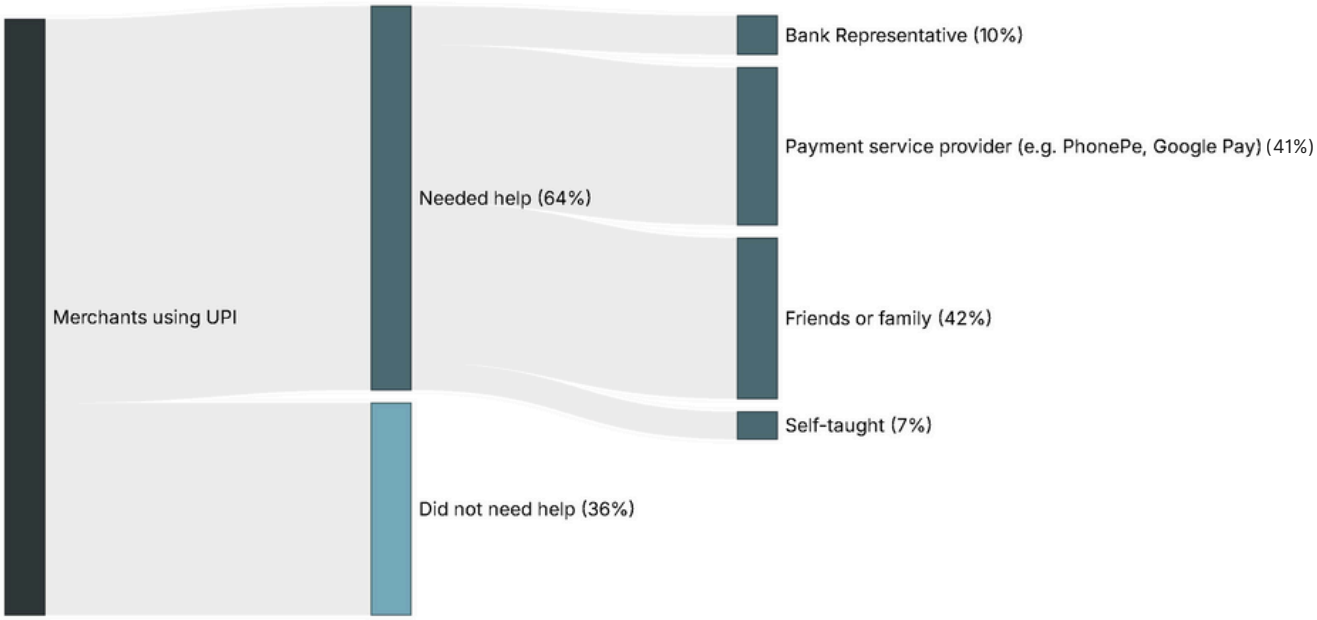
Among those who were formally registered, onboarding was rarely self-directed. In fact, 64% of all merchants said they needed help setting up UPI, mainly from PSP agents, family members, or friends. Just 10% were onboarded by a bank representative (*See Chart 15*).

This pattern varied by geography: in urban Nashik, PSPs dominated onboarding (71%), while in rural Ratnagiri and Nalanda, peer networks played a larger role. In Patna, self-taught users were more common than in other districts, suggesting different support models depending on ecosystem maturity.

Chart 15

Key drivers of onboarding for merchants who needed help: PSPs and peers

% of merchants who needed assistance for UPI-onboarding and who assisted them



Note: Based on a sample of 742 UPI-accepting merchants

More broadly, much of UPI's merchant expansion is driven by informal or third-party channels rather than structured institutional pathways. This highlights the continued need for more accessible and reliable onboarding mechanisms, particularly for smaller or less digitally confident businesses.

In rural areas, poor connectivity added to the reluctance to register. For example, merchants reported eKYC verification failures due to weak networks:

> *"...The [eKYC] call...was blurry. There was a problem with the network. We tried for many days but couldn't get it done, so we gave up." – Unregistered merchant, Ratnagiri (Translated from Marathi)*

In such cases, merchants often defaulted to using personal UPI accounts for business transactions. While this allows continued use, it limits access to the potential benefits of formal registration and can complicate reporting and compliance, especially when business payments are incorrectly classified as P2P transfers.

9. UPI enables better recording of business transactions

Since adopting UPI, 37% of merchants reported an increase in digital transactions. This was the most widely reported behavioural shift across all four districts, with similar trends across both urban and rural locations (*See Chart 16*). Additionally, 27% of merchants reported using separate accounts for personal and business expenses – a key step towards more formal financial management. Another 13% reported improvements in financial tracking and recordkeeping, enabled by the visibility UPI provided into daily transactions.

Changes in financial behaviour were further reflected in our qualitative interviews, where merchants described how UPI has enabled more strategic decision-making. Many reported using transaction data to understand customer behaviour, identify repeat or high-value customers, and track business patterns over time. With greater access to such data, some merchants had begun to tailor their offerings, manage inventory more efficiently, and even introduce loyalty-based incentives – early signs of more structured and responsive business practices.

"Our record-keeping has improved. What we used to note down on paper is now automatically tracked through UPI. This helps us see how often a customer comes to us over time. For example, we realised that one customer gave us business worth nearly four thousand rupees, so we could treat them differently." – Merchant, Ratnagiri (Translated from Marathi)

Many merchants also reported a reduction in the number of times they had to extend small sums of informal credit as a result of UPI. Merchants often allowed purchases on credit when customers lacked change or delayed minor payments. With UPI, such transactions were typically settled on the spot, reducing the need for deferred payments.

"Using UPI has also reduced ' 'udhaar' (small informal credit). Earlier, people delayed payments due to lack of change. Now they just pay through UPI on the spot." — Merchant, Patna (Translated from Hindi)

These changes suggest that UPI is introducing many micro-merchants to the benefits of digital transactions.

As a result, some are beginning to track transactions more systematically, receive payments on time, and manage their business finances in a more organised way. Still, a notable minority (15%) of merchants, particularly in Nashik, reported no change in their financial habits as a result of UPI, highlighting the limits of digital influence among some businesses.

Beyond formal business benefits, several merchants described informal and improvised uses of UPI tailored to their local context. One such use was acting as an informal "cash-out" point: customers transferred money to a merchant's UPI ID, and the merchant gave them cash in return. While this is not an expected use of the platform, it appears to meet persistent liquidity needs, especially in areas with poor ATM access or limited CICO infrastructure.

"If someone doesn't have cash and suddenly needs it, they transfer money to a nearby shopkeeper who gives them the cash...No one goes to the ATM." — Merchant, Nashik (Translated from Marathi)

These informal arrangements offer mutual convenience: customers avoid ATM visits, and merchants build goodwill or increase footfall. However, these innovative uses also highlight a broader issue:

UPI's widespread adoption has not been matched by equivalent investments in formal CICO infrastructure. In the absence of accessible alternatives, merchants are stepping in to fill a gap that the formal system hasn't yet addressed[41].

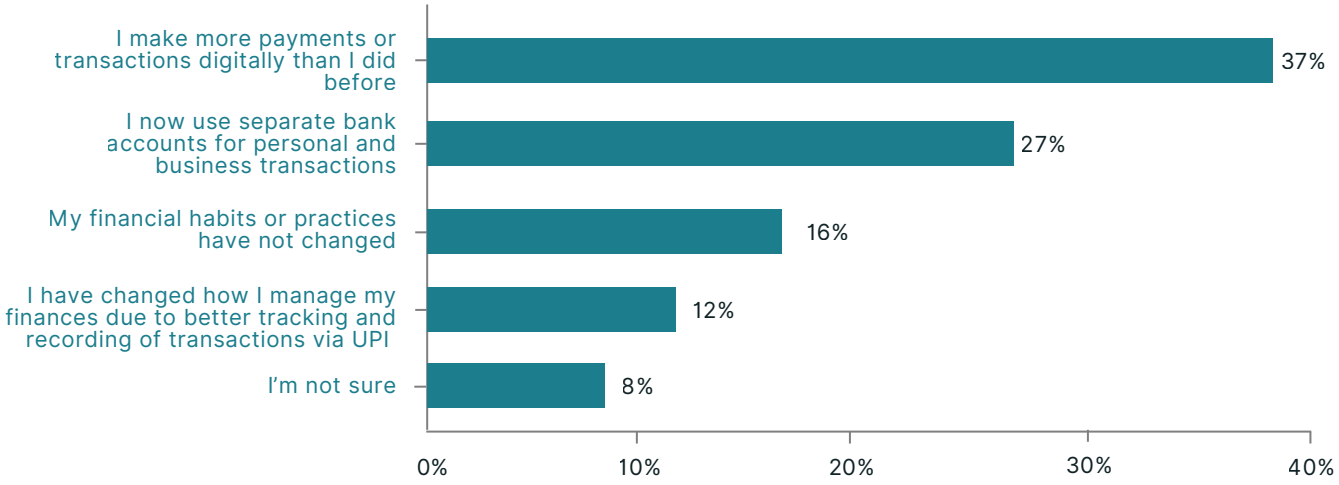
10. UPI has gained ground in back-end business payments, but cash still plays a role

About 73% of merchants reported using UPI for back-end business payments, including vendor settlements and wage disbursements, indicating a digital shift in areas traditionally dominated by cash. Merchants cited benefits such as digital receipts, payment verification, and audit trails, which helped resolve disputes and build trust in business relationships.

Chart 16

Noticeable changes in merchants' financial habits after UPI adoption

% of UPI-accepting merchants who reported changes in their financial/payment behaviour since adopting UPI



Note: Based on a sample of 742 UPI-accepting merchants

"While paying people's salaries, we mostly use UPI... We give them five hundred rupees daily in the evening... We have a receipt that I have paid them. ..[For back-end business payments] it is easy for us to make payments because there is a limit of five or six thousand. Suppose now I am buying chickens from someone. We have a history of how much business a normal chicken has given in a year. I can tell you that if we give you this much business, in the future he will give us a lower rate." — Merchant, Ratnagiri (Translated from Marathi)

The use of UPI for daily wage payments also points to broader ripple effects: more timely digital disbursements may be easing short-term cash constraints for informal workers, though this needs further exploration beyond merchant perspectives.

However, 27% of merchants in our sample did not use UPI for back-end business payments (*See Chart 17*). The most common reason was vendor or employee preference for cash, often driven by habit. Others pointed to technical and procedural issues, including transaction limits and concerns around failed or delayed payments. In qualitative discussions, some merchants shared that they avoided using UPI for large-value back-end business payments due to fears about security and the time taken to resolve issues when payments fail.

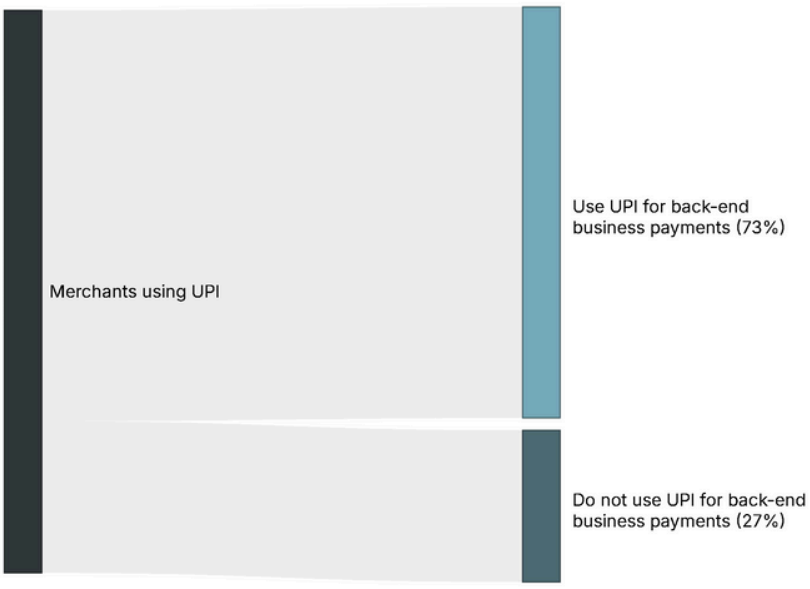
> *"Even if a big payment gets stuck, they take 48 hours, but we have to go to the help section and clear it... generate OTP and all, it's a long process. If we give a cheque then there's no such tension, the bank is responsible. So many people don't use UPI for big transactions... Even we don't." — Merchant, Nashik (Translated from Marathi)*

These findings point to a key perception gap: although UPI is technically capable of handling large-value transactions, many merchants don't consider it reliable or secure enough for such use cases. For UPI to become the preferred mode across the full value chain, changes in transaction limits and redressal timelines will be necessary.

Chart 17

Use of UPI for back-end business payments and reasons for non-use

% of merchants who use UPI for back-end business payments (vendor settlements, wage disbursements) and reasons for non-use (multiple responses allowed)



Note: Based on a sample of 742 UPI-accepting merchants

11. Most merchants endorse UPI use, but downtime and safety risks undermine trust

Merchant satisfaction with UPI remains high: 83% said they would recommend the platform to others. Endorsement was strongest in Nashik and Ratnagiri, where over 94% of merchants (both rural and urban) said they would recommend UPI. However, in Patna, particularly in rural areas, 30% of merchants said they would not.

Willingness to recommend UPI was closely linked to merchants' experiences of business impact. Among those who reported a positive effect, 88% said they would recommend the platform. Even among merchants who saw no significant change, more than half (58%) still endorsed UPI, suggesting a generally favourable perception (*See Chart 18*).

Only 12% of merchants said they would not recommend UPI, highlighting pain points such as server downtime, poor internet connectivity, and inadequate protection from scams. These issues have tangible consequences, especially for small merchants.

"Sometimes we face a lot of trouble because of internet issues. The payment gets stuck, and then the customer says it went for a refund. We are helpless. Though they get a refund, they don't cooperate with us, and we lose the money." — Merchant, Nashik (Translated from Marathi)

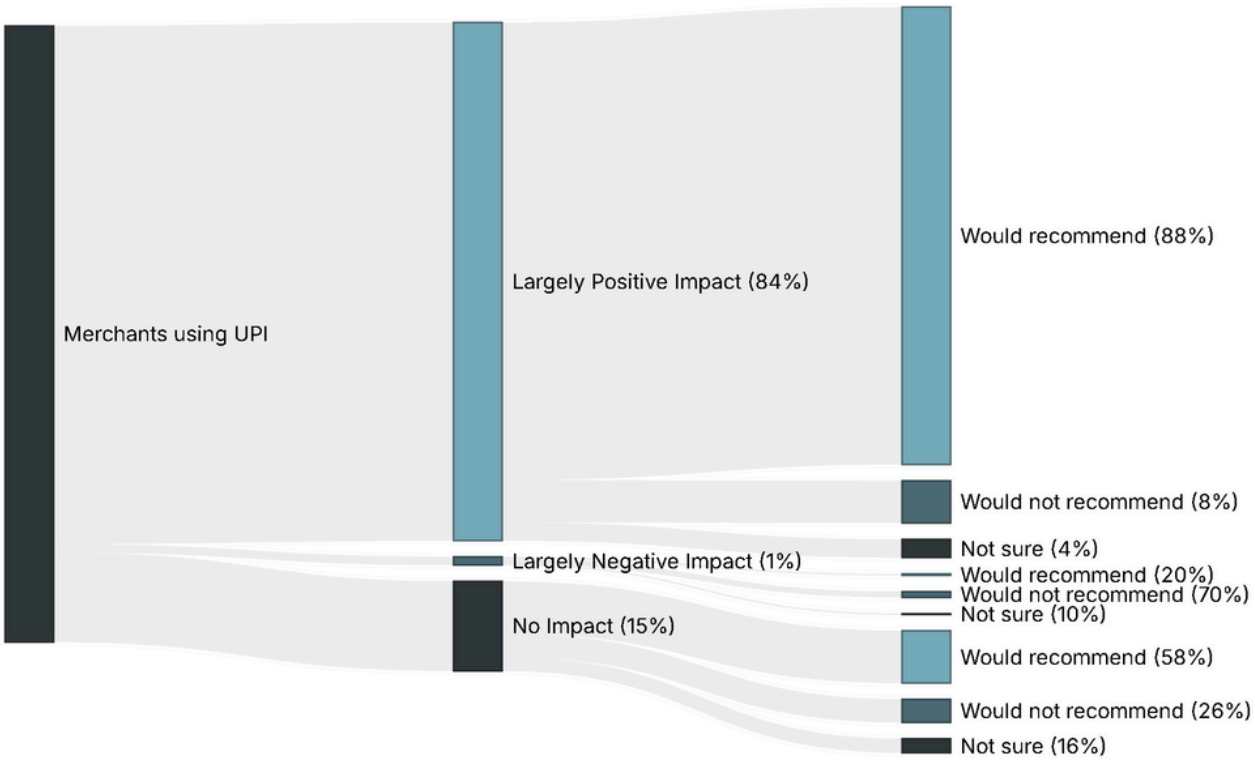
A failed or delayed transaction could lead to lost sales, unhappy customers, or reputational damage, all of which are harder to absorb for merchants with limited financial buffers.

Safety concerns were more pronounced among merchants with lower levels of digital literacy, who reported limited awareness of redress processes and inadequate support when issues arose.

Chart 18

Perceived business impact of UPI and merchants' willingness to recommend UPI

% of merchants who reported positive, negative or no impact of UPI on their business and whether they would recommend UPI to another merchant



Note: Based on a sample of 742 UPI-accepting merchants.

12. Addressing server issues was the most sought improvement

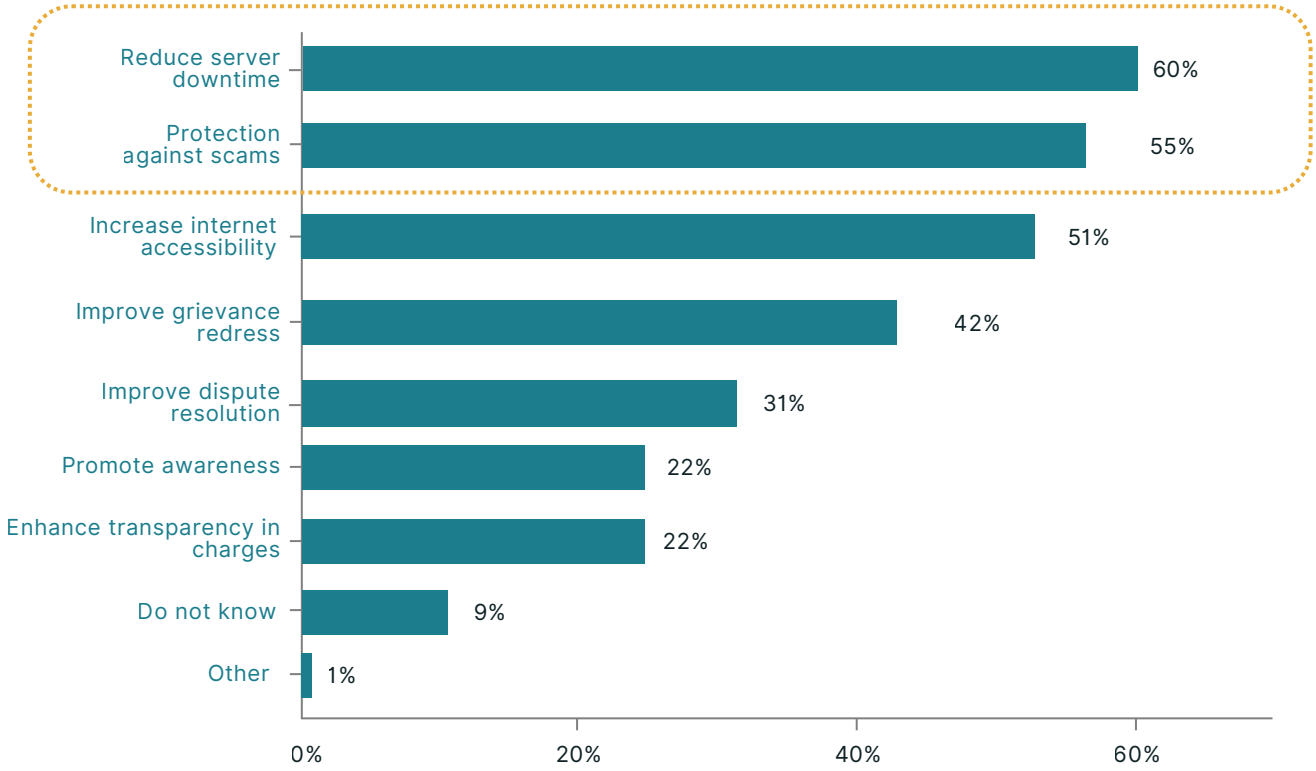
Across merchants, server downtime emerged as a significant gap in UPI's utility, directly impacting its reliability for day-to-day transactions.

This issue was reported by 60% of merchants and was consistently echoed in qualitative discussions (*See Chart 19 & Figure 6*).

Chart 19

Most sought UPI improvements from merchants: Reliability and safety

% of merchants responding to the question "What changes would you suggest to improve UPI?" (multiple responses allowed)



Note: Sample of 742 UPI-accepting merchants

Figure 6: Recommended UPI improvements from qualitative discussions with merchants

Safety & security improvements Feature to reactivate UPI

Improve network & server issues

Better awareness of filing complaints **Features for less educated users**

4.4 Safety: Do users feel confident and secure while transacting?

4.4.1 Safety for Personal Users (n = 3283 personal users)

1.UPI users remain exposed to risks of monetary loss

A user in our sample was deceived into transferring money to an unknown UPI ID under the false promise of a large donation:

> *"I saw a video of a famous person helping the poor, and my child left a comment. Later, someone called claiming to be him, saying he'd send ₹5 lakh for our house and asked for my UPI details. I got a message saying the money was sent in dollars and was told I needed to pay tax to receive it. He spoke convincingly, so I believed him and ended up sending ₹11,000."*
> *— Female user, Nalanda*

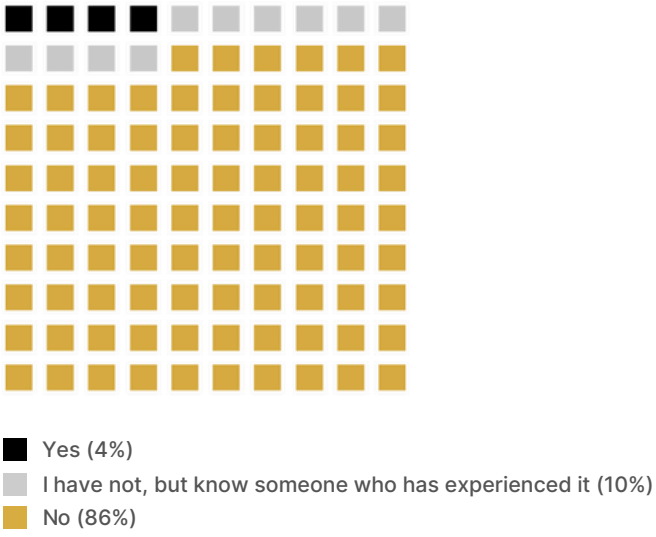
This incident did not stem from a flaw in UPI's infrastructure, but is an example of how behavioural risks, such as acting on misleading prompts, giving into pressure, or responding to deceptive communication, can be exploited by bad actors. It also reflects how the platform's strengths, such as real-time transfers and phone-number-based payments, can be manipulated in socially engineered scams (*See Box 2*).

About 4% of users in our sample reported personally losing money in digital transactions *(See Chart 20)*. Importantly, these incidents did not track directly with UPI penetration: Nalanda, a low-usage district, reported the highest loss rate at 6.7%; Patna (5.1%) and Nashik (4.7%), both high-usage areas, showed moderate incidence; and Ratnagiri had the lowest rate at 1.6%.

Chart 20

Reports of monetary loss among personal users

% of personal users who have experienced monetary loss



Note: Each square = 1% personal users. Based on a sample of 3283 personal users. Monetary losses reported by personal users stemmed from unauthorised transactions, deceptive requests, social engineering attacks and user mistakes or confusion about how UPI works. In many cases, the transaction was technically authorised but made under misleading or unclear circumstances.

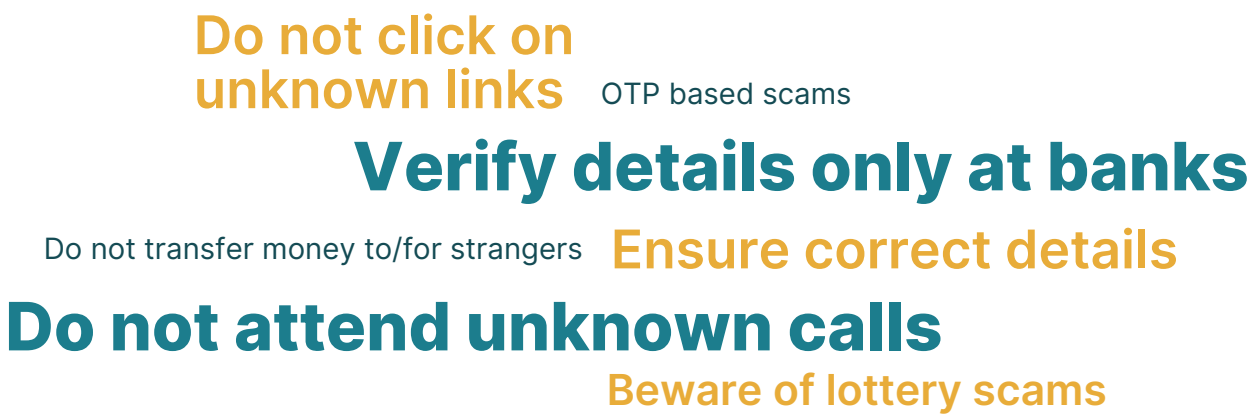
The majority of users in our sample did not report financial loss, but many described receiving suspicious calls or messages that tested their judgement (49.5%). In FGDs, users described adopting self-protective behaviours like double-checking recipient details, avoiding unknown links, verifying numbers, and sending small test payments before larger transfers (*See Figure 7*).

> *"One should first check whether the person to whom they want to send or from whom they want to receive payment... whether their mobile number is correct or not. They should first send a small amount... only after that, they should make the payment."*
> *— Male user, Nashik (Translated from Marathi)*

2. Loss often follows repeated targeting

Among those who experienced monetary losses, 79% had previously received scam-like messages or calls, and over half said they had encountered them multiple times (*See Chart 21*).

Figure 7: Practices to prevent monetary loss shared by personal users in qualitative discussions



While these practices suggest that digital risk awareness is relatively strong among active users, they also indicate that users feel the burden of protection rests largely on them.

This suggests that such incidents are rarely isolated or accidental; they tend to emerge from persistent targeting, where exposure builds over time and eventually leads to a breach,

Box 2: How Bad Actors Exploit User Vulnerability in a Frictionless System

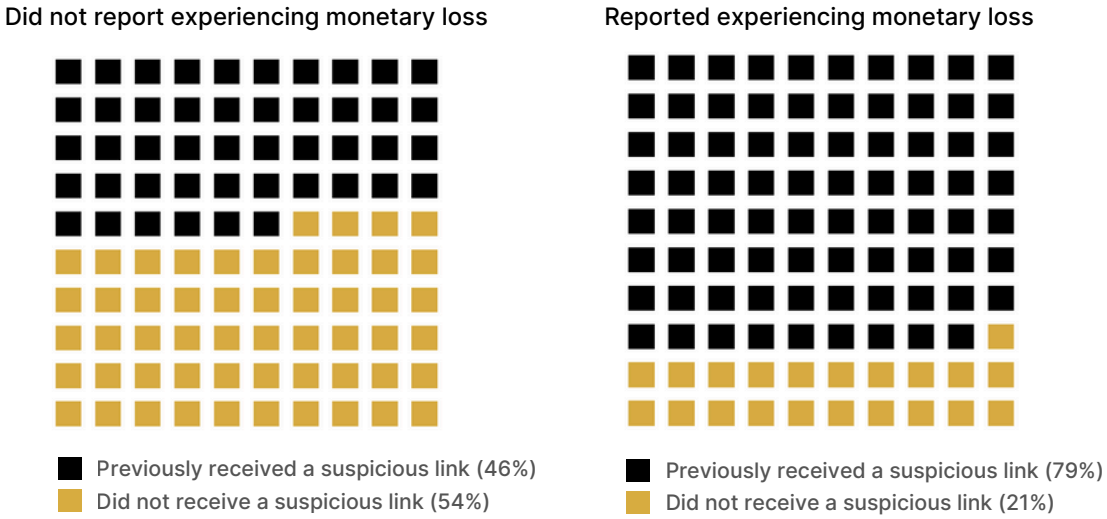
Scams tend to follow the flow of money, and as payments in India increasingly shift to digital channels, particularly through UPI, the platform has become a growing target for scams. In FY 2023–24, reported cases of UPI-related scam surged by 85%, rising from 725,000 incidents in FY 2022–23 to 1,342,000, with reported losses nearly doubling from ₹5.73 billion to ₹10.87 billion[42].

These scams are not typically the result of technical vulnerabilities in the UPI infrastructure itself. Rather, they exploit a key product-level feature: UPI's frictionless, real-time design. Most attacks rely on social engineering tactics such as impersonation, manipulation, and user confusion. Common schemes include deceptive payment requests, approvals that are technically authorised but unintended, impersonation of trusted contacts, and simple user errors during transactions. These are human-centered vulnerabilities, not necessarily system failures. Addressing them requires more than just user vigilance; it calls for better in-app design choices, including added friction for high-risk actions, proactive warnings, and safeguards that anticipate common patterns of misuse.

Chart 21

Reports of suspicious communication vis-a-vis reports of monetary loss among personal users

% of personal users responding to the question "How often have you received suspicious links, calls, or messages on UPI apps?"



Note: Each square = 1% of UPI- accepting merchants. Based on a sample of 3283 personal users.

4. Reporting is inconsistent, and users are often uncertain about next steps

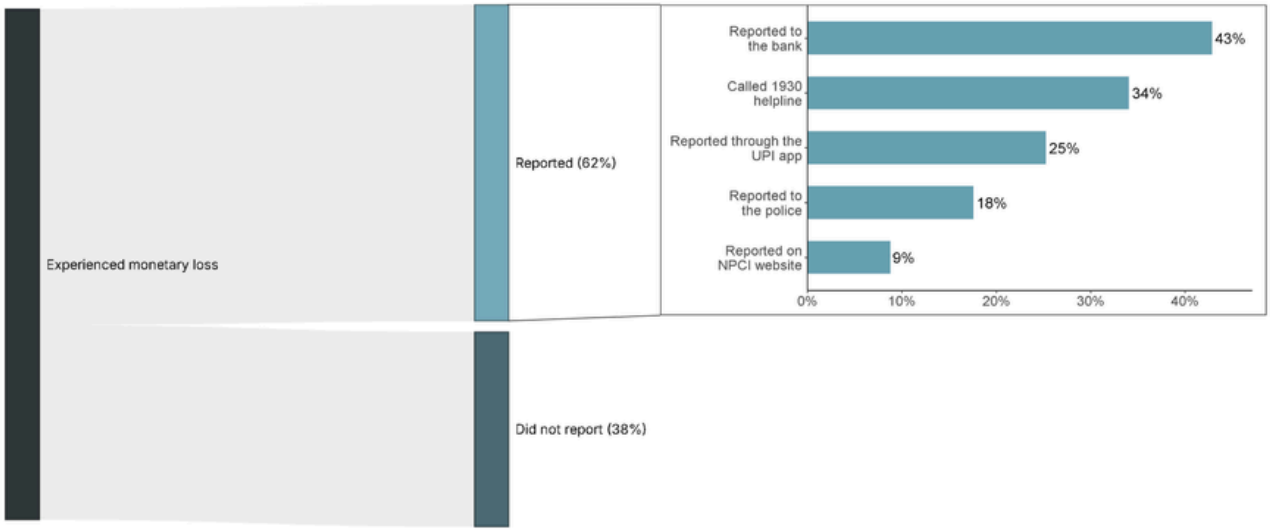
Among users who experienced monetary loss, 62% reported the incident to an authority, 38% did not report it at all - of which most were unsure what to do. This points to persistent awareness and access gaps.

Those who did report the incident turned to different channels (*See Chart 22*). About 13% used multiple channels, uncertain which was most effective. While the redress mechanism is formally structured, users often experience it as unclear and scattered, unsure of where to turn or what response to expect.

Chart 22

Reporting of monetary loss by personal users and the redress channels used

% of personal users who reported loss and the channels they used (multiple responses allowed)



Note: Based on a sub-sample of 147 personal users who have experienced a monetary loss.

5. Recovery is rare even when cases are reported

Most affected users – three out of four – were unable to recover their funds. Among those who reported the incident, recovery rates were only marginally better at 23%.

These figures highlight a critical weakness in the resolution mechanism and suggest that current systems offer limited recourse once harm has occurred.

6. Trust is disrupted for some, but not all

Reactions to such incidents were split. While 47% of affected users said the experience had no impact on their UPI usage, 44% said it reduced their willingness to use the platform (*See Chart 23*). The rest were unsure or chose not to respond.

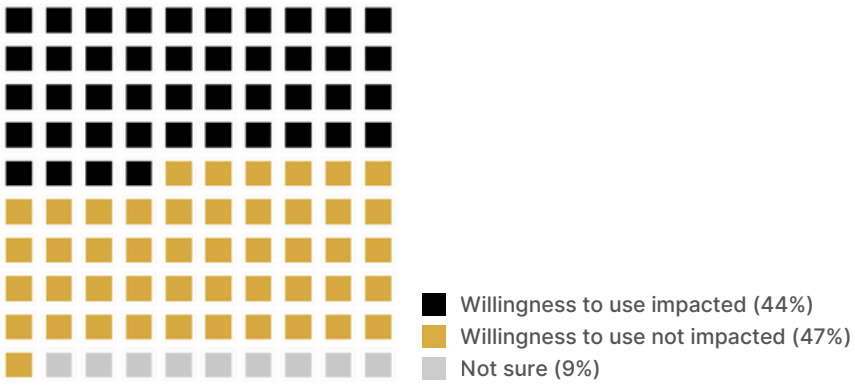
This indicates that while many users continue to value UPI's convenience and functionality, such experiences, especially without effective redressal, can erode trust and introduce hesitation.

"[One] should use UPI for all types of transactions. However, [they] should only send money when [they are] sure about the amount and recipient." – Male user, Patna (Translated from Hindi)

Chart 23

Impact of monetary losses on personal users' willingness to use UPI

% of personal users whose willingness to use UPI has been impacted by experiencing monetary loss



Note: Each square = 1% of personal users. Based on a sub-sample of 147 personal users who have experienced a monetary loss with no pending resolution.

4.4.2 Safety for merchants

(n = 742 merchants who accepted UPI payments)

7. Merchants face risk of monetary loss at point of sale

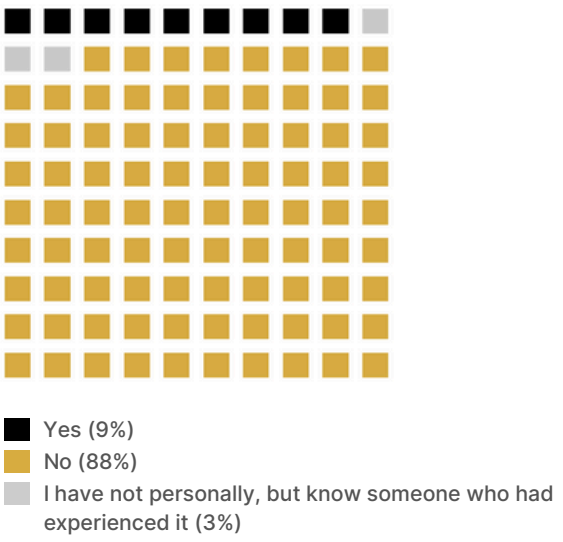
While most merchants (88%) did not report any monetary loss via UPI, about 9% said they had experienced it typically due to disputed payments, deception at the point of sale (PoS), or failed transactions that remained unresolved (*See Chart 24*). Loss incidents often occurred at the PoS when merchants were under time pressure and often relied on the customers' screens to verify whether payments had been made.

Several merchants described incidents where payments appeared successful on the customer's device but were never credited to their accounts. In some cases, merchants shared that customers showed screenshots of UPI confirmations, such as the blue tick, without actually completing the transaction. During busy hours, this was particularly difficult to detect, leaving merchants exposed to fraud (*See Box 3*).

Chart 24

Reports of monetary loss among merchants

% of merchants who have experienced monetary loss



Note: Each square = 1% of UPI-accepting merchants. Based on a sample of 742 UPI-accepting merchants.

"A customer came to my shop, had breakfast, and then scanned the QR code to send money. It showed as 'Successfully Paid' on his device, but the money never reached my account."
— Merchant, Patna (Translated from Hindi)

These incidents were more frequently reported in Patna and Nashik (especially urban areas), both high-usage districts, but were also present in lower-transacting areas like Nalanda [43]. Overall, they point to a deeper trust gap in the payment experience, where even experienced or digitally literate merchants remain vulnerable.

Market-led innovations like the UPI voice box, which provides real-time audio confirmations for incoming payments, aim to address this challenge. However, their impact depends on reliability, clear merchant communication, and responsive after-sales support, all of which remain uneven.

Box 3: The UPI voice box

The UPI voice box is a market-led innovation designed to address a real concern for merchants: the inability to verify payment alerts during busy hours. By providing audio alerts when payments are received on merchant QR codes, it offers real-time reassurance and allows merchants to tend to their customers without interruptions. The device has been widely appreciated and has helped improve merchant confidence in digital payments. However, our fieldwork surfaced some issues that risk undermining its potential:

- Misaligned expectations: Many merchants report that third-party agents sell the device as "lifetime free" but later impose hidden or recurring charges without clear communication. One group of merchants in Ratnagiri explained as follows:

> ***"That's the problem. ..They deduct money through PhonePe... agents tell you it's free for life, then they deduct later. If we face issues, no one answers our calls. We now use our own scanner so we know when the money comes in." — Merchant, Ratnagiri (Translated from Marathi)***

- Technical glitches and poor support: When the voice alert malfunctions or is delayed, agents are often unreachable. This erodes confidence in what is meant to be a trust-enhancing feature.
- Confusion around confirmation vs. settlement: Some merchants assume the voice alert means the money has reached their accounts, when in fact, the funds may arrive the next day. This gap in understanding can lead to frustration, especially if deductions or delays occur. Unlike P2P transactions, P2M transactions on UPI have a t+1 settlement cycle

These implementation challenges do not diminish the underlying value of the voice box, but they underscore the need for greater transparency, clearer merchant communication, and improved after-sales support to sustain trust in the system.

Even among merchants who experienced monetary loss, 82% reported regularly receiving payment safety advisories whether through banks, apps, government campaigns, or peer networks.

This suggests that awareness efforts are reaching their intended audience. However, information alone isn't enough to prevent such incidents.

Merchants often remain vulnerable at the point of transaction, especially during high-traffic hours or when customers exploit ambiguous situations. What's needed is not just awareness, but more dependable verification tools, greater transaction transparency, and responsive redressal support.

8. Reporting and recovery are low

Note: The results in this subsection are based on a small sample and should be interpreted as exploratory insights that highlight emerging themes.

Among merchants who lost money, 64% did not report the incident to any authority (*See Chart 25*).

The most common reason was procedural uncertainty: 74% of non-reporters said they didn't know what steps to take. This indicates that the gap is not in scam awareness, but in response readiness. Current redressal systems are not clearly communicated, intuitive, or tailored to the contexts in which small merchants operate.

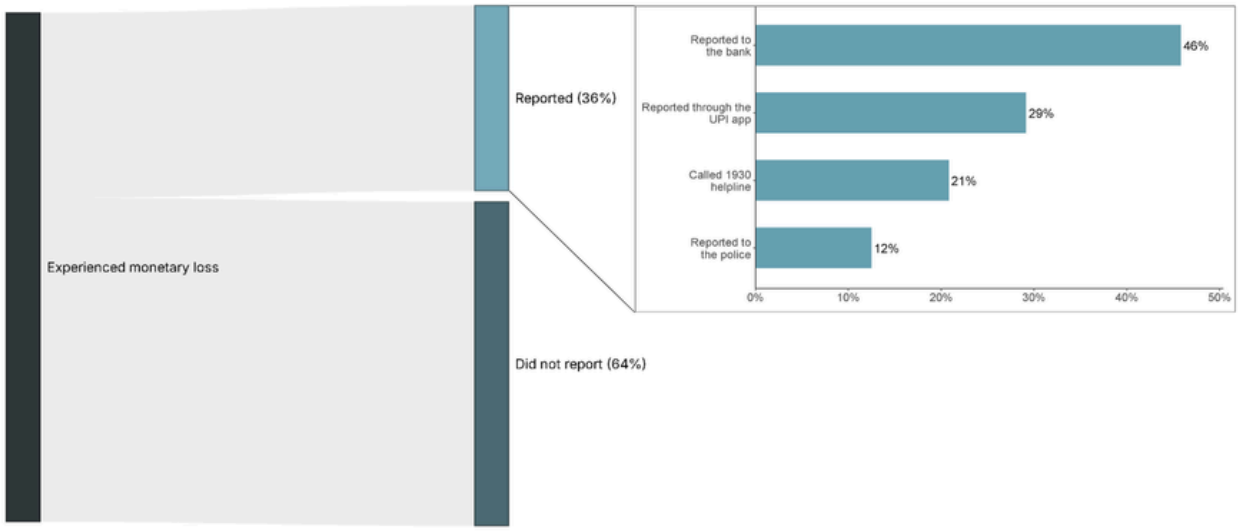
Recovery rates were also low. Seventy-seven percent of affected merchants said they were unable to recover their money, while only 18% reported successful recovery. An additional 5% said their cases were still under investigation.

These findings underscore a crucial point: even when merchants are aware of risks, limited support systems and unclear resolution pathways continue to weaken overall confidence in digital payments.

Chart 25

Reporting of monetary losses by merchants and the redress channels used

% of merchants who reported loss and the channels they used (multiple responses allowed)



Note: Based on a sub-sample of 66 UPI-accepting merchants who have experienced a monetary loss.

9. Monetary losses shake confidence but don't completely deter use

More than half of affected merchants said their experience reduced their willingness to use or accept UPI, but 38% reported no change (*See Chart 26*). Despite setbacks, UPI's core value – ease, speed, and customer demand – still outweighs its perceived risks for many.

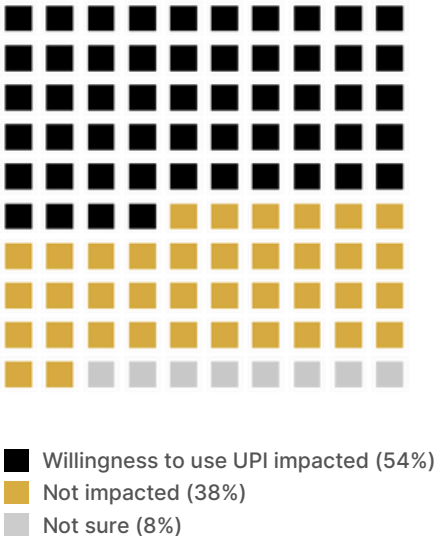
However, this trade-off may not hold indefinitely. Without stronger scam prevention, clearer redress mechanisms, and more reliable tools like the voice box, repeated negative experiences could gradually erode trust, prompting some merchants to limit usage or fall back on informal workarounds.

As UPI becomes more embedded in daily commerce, its long-term resilience will depend not just on technical fixes, but on inclusive and responsive ecosystem governance.

Chart 26

Impact of monetary losses on merchants' willingness to use UPI

of merchants whose willingness to use UPI has been impacted by experiencing monetary loss



Note: Each square = 1% of UPI-accepting merchants. Based on a sub-sample of 63 UPI-accepting merchants who experienced a monetary loss with no pending resolution.

4.5 Redress: What happens when something goes wrong and how easy is it to seek help?

4.5.1 Grievance redress for personal users (n = 3282 personal users)

1. Most don't know where to turn when something goes wrong

More than two-thirds of personal users were not fully aware of how to report problems or seek redressal on UPI, which reveals critical gaps in user education and support systems (*See Chart 27*).

Awareness gaps were especially pronounced among women and rural users. Forty-four percent of women said they wouldn't know how to respond to a UPI issue compared to 38% of men. Similarly, 45% of rural users reported a lack of clear guidance versus 36% of urban users (*See Chart 28 (a and b)*). Qualitative information shared during the FGDs reinforced these findings.

> *"I don't have much knowledge about this. If money is sent to someone I know by mistake, I call them and ask them to return it. But I don't know where to file an official complaint." — Female user, Nashik (Translated from Marathi)*

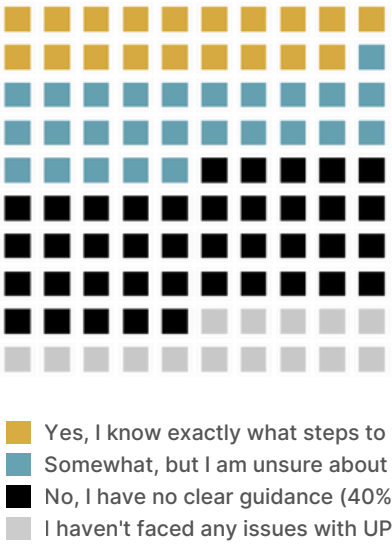
While most users had not encountered serious problems, we learned that a large share remain unprepared for things going wrong, particularly those already navigating digital access barriers.

Strengthening awareness and accessibility around grievance redressal is essential to maintaining user trust as UPI continues to scale.

Chart 27

High uncertainty among personal users regarding redressal

% of personal users responding to the question,
"Do you feel you have clear information on what to do if something goes wrong with a UPI transaction?"

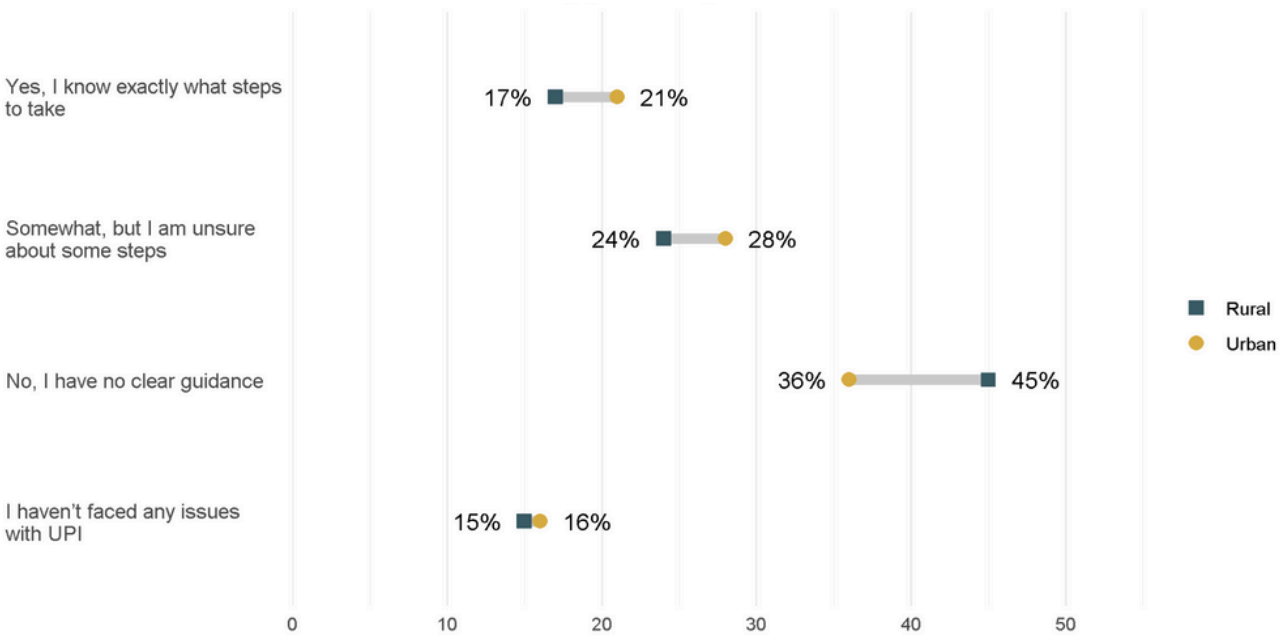


Note: Each square = 1% personal users. Based on a sample of 3283 personal users.

Chart 28 (a)

Lower awareness of grievance redressal in rural users vs. urban users

% of personal users responding to the question,
"Do you feel you have clear information on what to do if something goes wrong with a UPI transaction?"

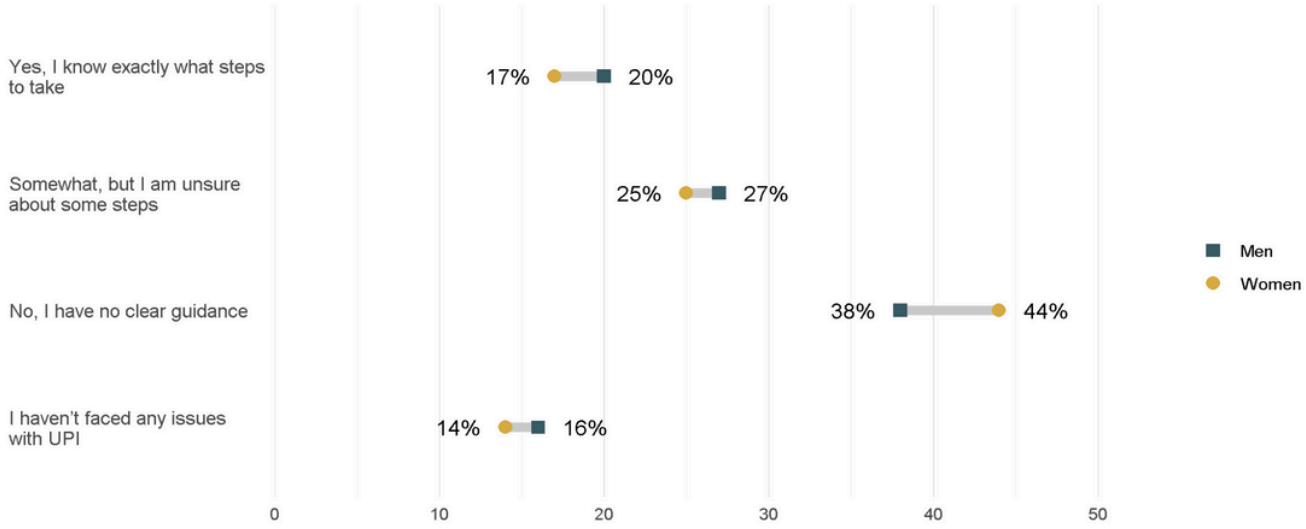


Note: Based on a sample of 3283 personal users

Chart 28 (b)

Lower awareness of grievance redressal in women vs. men

% of personal users responding to the question,
"Do you feel you have clear information on what to do if something goes wrong with a UPI transaction?"



Note: Based on a sample of 3283 personal users

2. Failed transactions are the most common but few are reported

Only 8% of personal users (253) reported raising a complaint through the UPI app. The low rate of complaints may reflect a combination of low incident frequency and low awareness of redress options,

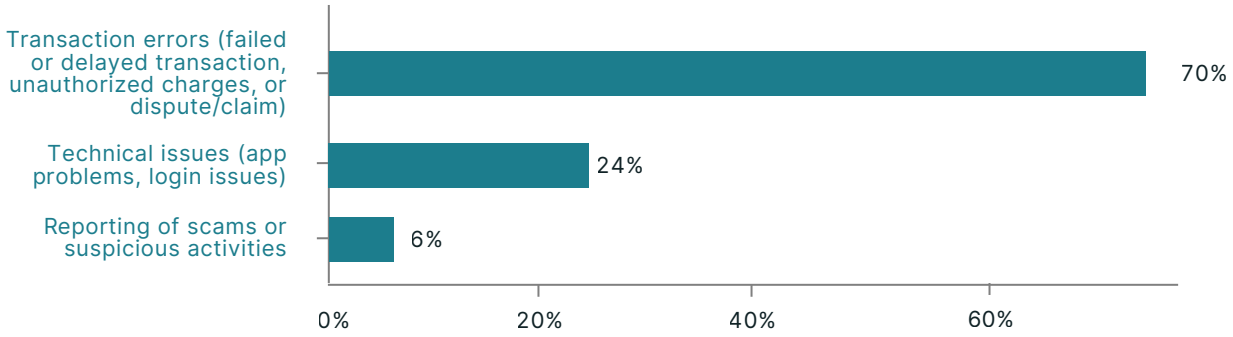
Among those who raised grievances, 73% said their issue was resolved satisfactorily, suggesting that when the GRM is accessed, it can be effective (*See Chart 30*).

However, these positive experiences did not translate into consistent perceptions across the wider user base.

Chart 29

Most common grievance among personal users: Technical errors

% of personal users who reported each type of grievance



Note: Based on a sub-sample of 253 personal users who used UPI to report grievances

with the latter being more likely, as uncovered above. Among those who did register complaints, the majority (70%) reported transaction-related issues such as failed, delayed, or disputed payments or unauthorised deductions (*See Chart 29*).

Views on the GRM were mixed: only 30% of personal users in our sample believed it was effective, while an equal proportion viewed it as ineffective. The largest segment, 40%, remained unsure, largely due to a lack of direct experience with the system (*See Box 4*).

3. Redressal can be effective, but perceptions of support vary

Among those who raised grievances, 73% said their issue was resolved satisfactorily

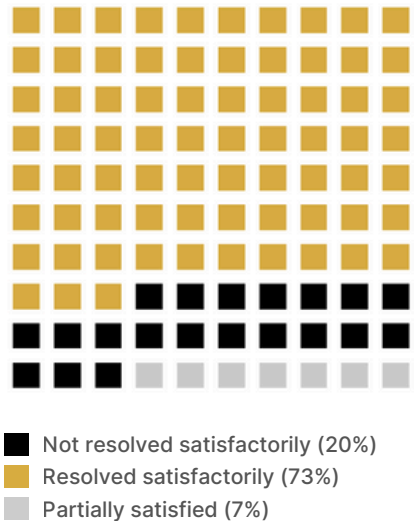
Box 4: Need for greater consistency across redress outcomes

Resolution rates on the UPI platform varied by issue type. Technical issues, such as app glitches and login failures, saw the highest resolution rate at 90%, suggesting that service providers are better equipped to handle system-side problems. Transaction-related grievances, while more common, were resolved at a slightly lower rate of 73%. In stark contrast, monetary loss related complaints had the poorest outcomes: only 2 out of 13 such cases filed by personal users were fully resolved. In these situations, the burden of resolution is passed onto the users themselves, highlighting an area where current protections fall short.

Chart 30

Largely positive experience of UPI grievance resolution among personal users

% of personal users reporting whether their issue was resolved satisfactorily



Note: Each square = 1% of personal users.
Based on a sub-sample of 253 personal users who used UPI to report grievances.

4.5.2 Grievance Redress for Merchants (n = 742 merchants)

4. Many merchants remain unaware of redress options

About 42% of merchants said they had no clear information about the grievance redress process, and another 23% had only a vague understanding *(See Chart 31)*.

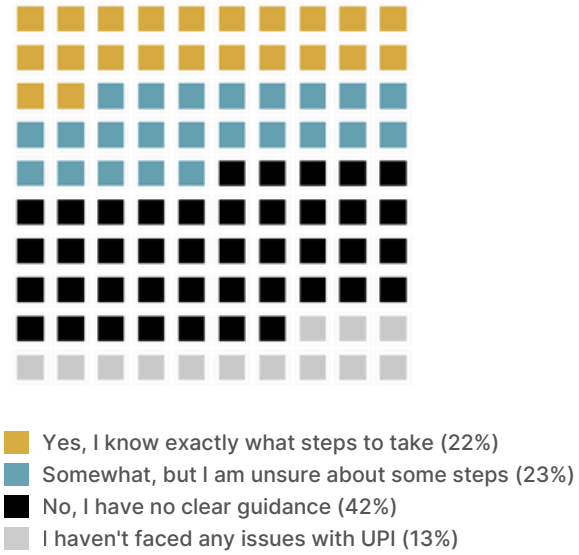
Awareness was particularly low in rural areas, where nearly half the merchants lacked clarity as against 36% in urban areas.

"I realised it when I checked my UPI ID and saw that the money had not been credited. However, I didn't file any complaint as I had no knowledge of where to report it. Nowadays, such scams are happening frequently." –Merchant, Patna (Translated from Hindi)

Chart 31

High uncertainty among merchants regarding redressal

% of merchants responding to the question,
"Do you feel you have clear information on what to do if something goes wrong with a UPI transaction?



Note: Each square = 1% of UPI-accepting merchants. Based on a sample of 742 UPI-accepting merchants.

5. Use of redress mechanism is limited mainly to tech-related hiccups

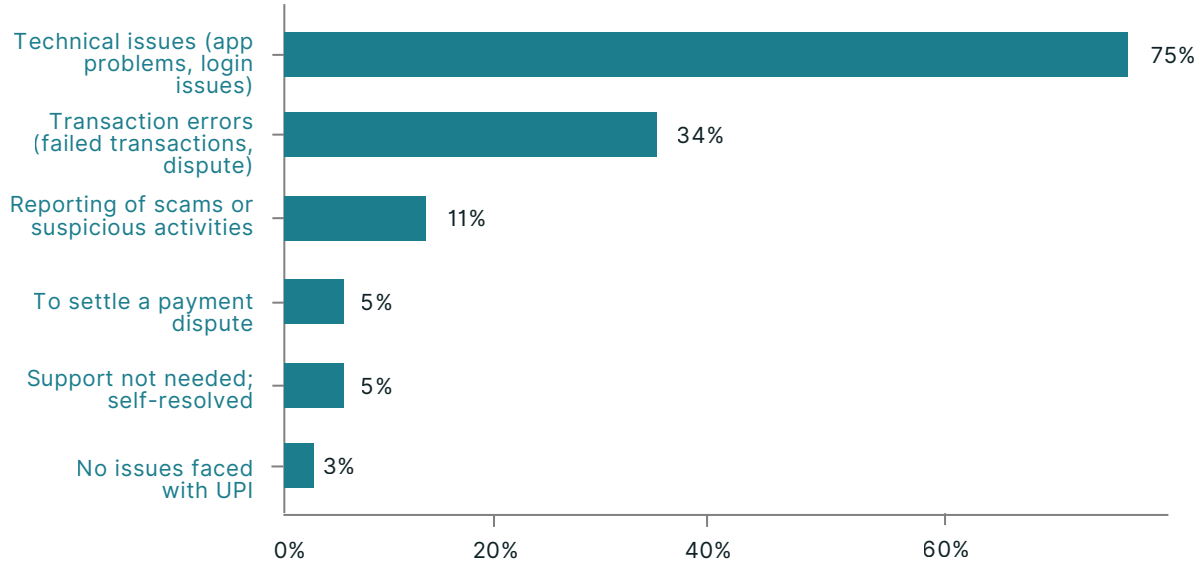
Only 12% of merchants reported using the GRM available in their UPI apps, pointing to a clear gap between need and access.

Those who did submit complaints mainly reported technical issues, such as app-related or login-related problems (*See Chart 32*).

Chart 32

Most common grievance among merchants: Technical issues

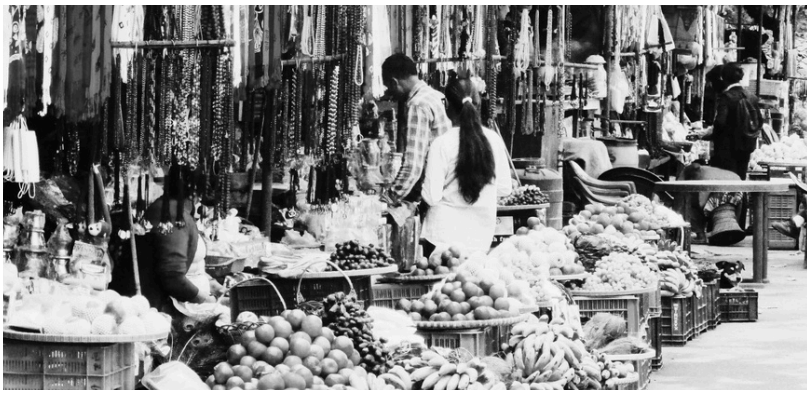
% of merchants who reported each type of grievance



Note: Based on a sub-sample of 93 merchants who have used the grievance redressal

6. Reporting grievances mostly gets results

Among merchants who raised grievances, 87% reported that their issues were resolved satisfactorily, while 13% said their problems remained unresolved. This suggests the system largely works for those who use it, though even a small number of unresolved cases can still affect user trust. The bigger challenge, however, is increasing awareness and encouraging usage of the GRM so more merchants can benefit from the redress mechanisms in place.



CHAPTER 5: DISCUSSION AND POLICY RECOMMENDATIONS

The findings in the previous section suggest that UPI's next phase will depend not only on expanding its reach but also on strengthening the system behind it. Our analysis of how personal users and merchants access, use, and experience UPI across five key dimensions reveals that the platform has been integrated into everyday financial life, bringing notable improvements in convenience, liquidity, and digital comfort. At the same time, there are deeper frictions that cannot be resolved at the user level alone, such as persistent onboarding gaps, rising exposure to social engineering attacks, uneven grievance redress outcomes, and usability barriers for certain segments.

As the platform scales, its continued success will rest on preserving what makes it work, like frictionless use and an open ecosystem, while also enhancing safety, ensuring financial sustainability, and clarifying accountability as more players join the ecosystem. This section reflects on those emerging tensions, drawing from both field insights and ecosystem-level developments, to outline what it will take to ensure UPI's continued inclusionary impact.

5.1 Enhancing safety without compromising ease of use

As mentioned in Chapter 2, UPI's adoption has been driven by deliberate design and policy choices – interoperability, real-time settlement, mobile-first access, and zero MDR – that have made it easy to use and lowered barriers for first-time users. These features remain critical to its inclusionary impact. But as the platform scales, they have also created new vectors of risk.

Social engineering attacks, where users are manipulated into authorising payments that are unintended[44], are an increasingly common concern[45]. These include impersonation, fake refund requests, phishing links, and fraudulent QR codes[46]. Since the user technically approves the transaction, such incidents fall outside RBI's[47] definition of "unauthorised transactions", and compensation in these cases is not guaranteed under the existing limited liability framework (*See Box 6*).

Like other real-time payment systems, such as Brazil's Pix[48], UPI follows an instant and irrevocable transaction model. Unlike NEFT or credit card systems, it lacks a built-in buffer to detect or reverse erroneous or malicious transfers; thus, solutions need to be typically targeted at front-end prevention of monetary loss rather than post-facto reversal. A transaction once initiated is final, which places the full burden of vigilance on users, even in emotionally manipulative or high-pressure situations.

This is not a marginal issue. Our survey found that 4% of personal users and 9% of merchants had lost money to such incidents, nearly all of them without recourse. Across users, scam protection was the most commonly cited area for improvement. And yet, introducing friction, such as hold windows for large-value peer transfers or confirmation prompts for new payees, risks undermining UPI's core strengths: simplicity and speed.

The challenge, then, is not to trade off usability for safety but to build systemic safeguards that enable both. This will require stronger backend detection, clearer grievance redress mechanisms, user-centric design changes, and coordinated action across banks, TPAPs, NPCI, and regulators.

It also raises a deeper question: In a system built on zero-cost transactions, who bears the responsibility and the cost of protecting users?

5.2 For UPI to be sustainable, the economic model needs a rethink

As UPI continues to scale, crossing 18 billion transactions per month in 2025[49], service reliability emerges as a major user concern. In our study, 64% of personal UPI users and nearly 60% of merchants identified system downtime as a key improvement area. Episodes of users being unable to send or receive money due to technical overload have become more frequent. Between late March and mid-April 2025 alone, UPI experienced three significant outages, which affected major platforms like Google Pay, PhonePe, and Paytm[50][51].

While NPCI has responded with technical fixes, such as protocols to limit unnecessary server queries[52], these solutions address symptoms rather than root causes.

The underlying issue is one of infrastructure stress: as new users, platforms, and use cases are added to the ecosystem, the demands on backend systems are intensifying. Sustained investment, real-time system monitoring, and institutional alignment across the ecosystem are needed to meet these demands and achieve the ambitious goal of one billion transactions a day[53]. Banks, TPAPs, regulators, and platform providers must collectively identify bottlenecks, coordinate responses, and invest in system resilience. However, for this model to work, all actors must have both the incentive and the capacity to invest in long-term system health – something the current revenue structure does not reliably support.

The zero-MDR policy, introduced in 2020 encouraged many businesses with an annual turnover above ₹500 million to accept UPI payments as banks and the RBI began to absorb the costs of processing these transactions, instead of passing them on to merchants or users [54]. Additionally, the government subsidised the cost of processing low-value (below ₹2,000) P2M transactions,[55] while P2P transactions have always been free of charge. These measures have succeeded in expanding UPI adoption, but as the system matures, its economic underpinnings are showing signs of strain.

While the UPI transaction volume has increased nearly eightfold since 2020[56], the annual subsidy has not kept pace. From ₹36.3 billion in FY 2023–24 [57], it was sharply reduced to ₹15 billion in FY 2024–25[58]. The estimated annual cost of maintaining and scaling the UPI ecosystem is around ₹100 billion [59] . Even with government subsidies, this leaves a funding gap of approximately ₹85 billion,[60] which pushes ecosystem participants, such as TPAPs, payment gateways, and other intermediaries, to seek alternative revenue sources.

Many have turned to monetising peripheral services: charging convenience fees on bill payments, embedding ads and brand tie-ups, nudging users toward financial products, or extracting value from user data [61] . While not inherently problematic, these practices raise important concerns around data privacy, user consent, and long-term alignment between platform incentives and user welfare, particularly in the absence of a sector-specific data protection regime.

Global examples offer useful contrasts. Brazil's Pix, for instance, applies a modest MDR of 0.22% on merchants, well below card fees, and uses this to fund ongoing investment in infrastructure and fraud controls. India, as discussed, has instead pursued a publicly funded model aimed at preserving zero-cost access at the point of use. Although there has been speculation about introducing a nominal MDR, potentially 0.2–0.3% for large merchants, recent government statements have refuted this possibility [62] . The official stance remains committed to maintaining a zero-charge framework for both users and merchants.

Some merchants we spoke to also indicated that they would be willing to bear a small transaction cost, especially if it meant more reliable service, fewer disputes, or stronger recourse mechanisms, suggesting that affordability, rather than absolute zero-cost, may be the more sustainable benchmark in the long term.

If the government intends to continue supporting a zero-charge framework, it will need to ensure that public funding is both adequate and predictable, aligned with the scale and complexity of UPI's evolving role in the economy. Without such support or a credible alternative, there is a growing risk that key ecosystem actors may scale back investment, deprioritise infrastructure quality, or adopt monetisation strategies that do not always serve the best interests of the users.

Box 5: Too easy to find? How UPI's convenience and search feature may be exploited

One of UPI's most user-friendly features is the ability to send money using just a mobile number. However, this convenience has also introduced a privacy vulnerability that scammers are increasingly exploiting. By entering random or targeted phone numbers into a UPI-enabled app, scammers can identify whether the number is linked to a UPI account, and in many cases, see the associated name or UPI handle.

This layer of visibility, originally designed to make payments seamless, is now being misused for social engineering scams. Armed with partial identity information, scammers can impersonate trusted contacts, send fake payment requests, or craft convincing messages to deceive users. The risk is especially high for individuals whose phone numbers are publicly accessible (like small business owners) and is compounded by the lack of granular privacy or discoverability controls in most UPI apps.

As UPI becomes more embedded in daily life, addressing this design-level privacy gap is critical. Protecting users from targeted scams must go hand-in-hand with preserving the platform's ease of use and accessibility.

A key informant noted that, in response to this risk, NPCI has recently tightened fintechs' access to certain UPI APIs such as the "Mapper API" used to fetch a VPA from the central database, after concerns that they were being misused for identity lookups rather than legitimate payment purposes.

5.3 Clarifying public accountability of ecosystem actors is vital to building trust

The involvement of diverse institutions – banks, non-banks, and TPAPs – in the UPI ecosystem has supported rapid innovation, user choice, and reach across platforms. However, as the number of actors facilitating a single transaction has grown, so too has the complexity of responsibility, particularly when things go wrong.

In our study among personal users who reported monetary loss, 22% did not report the issue to any authority, often because they did not know where to turn.

From a user's perspective, this complexity can make grievance redress unclear. A failed transaction or an instance of scam may involve multiple players: the app interface, the user's bank, the recipient' bank, and the UPI switch managed by NPCI - the central system that routes payment requests between banks in real-time.

But users rarely have visibility into which party is at fault or whom to contact. This signals a need to strengthen the public-facing dimensions of accountability. While NPCI plays a central coordinating role in governance, much of the underlying structure remains invisible to users. As new actors, such as credit platforms, Buy Now Pay Later (BNPL) providers, and embedded finance apps, enter the system, it becomes more important to ensure that users experience consistent and coherent grievance redressal, regardless of where they initiate their transactions.

To be sure, some steps have already been taken[63]. UPI platforms now carry in-app grievance mechanisms, and NPCI has issued guidelines to improve response times. In 2020, NPCI also introduced the Unified Dispute and Issue Resolution (UDIR) platform – a backend system to streamline dispute resolution across all ecosystem participants by enabling faster case tracking, status updates, and common escalation protocols.

Looking ahead, strengthening accountability will require a coordinated set of improvements across platforms and institutions. These could include

1. **Consistent, clearly labelled grievance entry points across all UPI apps**, so that users can easily find where and how to raise a complaint regardless of which platform they use
2. **Public-facing service standards for complaint resolution,** including indicative timelines for acknowledgement, resolution, and escalation, published by apps and enforced across ecosystem participants
3. **Better integration and visibility of the existing UDIR system**, including real-time, in-app status tracking for complaints, instead of users having to navigate external portals or reference numbers
4. **A formalised coordination framework across banks, TPAPs, and NPCI,** ensuring that responsibilities for resolution are clearly delineated and consistently applied when multiple entities are involved

These measures can help preserve trust in a system where multiple players deliver a seamless experience, but where responsibility must also be shared, visible, and reliable when that experience breaks down.

5.4 Key takeaways for policymakers and regulators

1. How can UPI ensure the sustainability of its infrastructure?

Reliability is the bedrock of trust in digital payments, evident in both personal users and merchants citing payment failures and server downtimes as top concerns. These failures are not minor glitches; they disrupt commerce, erode confidence, and limit digital adoption.

Although NPCI and banks have made backend improvements, capacity expansion lags behind transaction growth. Given the zero-MDR regime, banks and PSPs currently lack commercial incentives to invest in server upgrades.

Going forward, policymakers should address the question of who pays for resilient digital infrastructure. Viable options include targeted government subsidies, a tiered subsidy-incentive model based on user segments, or revisiting MDR for specific high-frequency or commercial use cases. Without economic incentives, ecosystem investment will remain patchy, creating systemic bottlenecks that threaten inclusion at scale.

2. How can UPI's safety concerns be addressed?

UPI's low-friction design, while instrumental to its rapid adoption, also makes users vulnerable to a growing wave of social engineering attempts and errors, which include manipulation, impersonation, or exploiting user confusion. Safety was one of the most strongly desired system improvements in our study, with many users even unsure of what to do when something went wrong.
Addressing this requires both **preventive and responsive infrastructure.**

- On the preventive side, NPCI is reportedly in early discussions with banks to disable pull transactions (collect requests) on UPI[64], which are a frequent channel for fraud. While this move could significantly reduce risk, it may take time to implement and could impact legitimate use cases. In the meantime, a critical safeguard is for apps to deploy better-designed, standardised in-app risk warnings. Currently, prompts for collect requests or unknown payees exist in some apps, but they are often inconsistent, easy to overlook, or poorly understood, particularly by first-time or low-literacy users. These warnings must be made more prominent and supported by clear, actionable messaging. This approach tackles fraud at the point of interaction, where users are most vulnerable, empowering them to make safer choices without requiring a complete redesign of the transaction model.
- On the responsive side, backend mechanisms for scam detection, liability resolution, and escalation must be significantly strengthened.

Better data sharing across TPAPs, PSPs, and NPCI; coordinated oversight; and the establishment of a common risk mitigation framework, along with a fund to compensate verified victims, could serve as important institutional safeguards.

3. How can the UPI ecosystem ensure timely and effective resolution when users face issues?

Currently, UPI's redress system is reactive, fragmented, and opaque. More than 4 in 5 personal users and merchants we surveyed were unclear about how to report issues or where to turn. Among those who attempted reporting, some tried multiple channels: banks, apps, and NPCI.

To restore trust, grievance redress must become seamless, visible, and accountable. A unified escalation framework, embedded within all UPI apps, would reduce the burden on users to navigate different redress processes across platforms. By linking complaints to the relevant PSP or bank through a standardised backend, this system could significantly streamline resolution. UPI's long-term success lies not only in boosting adoption but also in retaining users by responding effectively when things go wrong.

4. How can UPI's utility be improved?

Findings from this study indicate that personal users and merchants are engaging with UPI in ways that go beyond P2P and P2M payments, such as for tracking transactions and maintaining records, accessing credit through visible financial activity, and facilitating business operations payments. These emerging use cases are a natural evolution of digital engagement. To deepen such engagement and unlock the next layer of value from the existing user base, policymakers should explicitly recognise and promote these emerging use cases through targeted communication campaigns.

At the same time, enabling innovation at the edge is critical. Third-party apps, fintechs, and businesses must be empowered to build interoperable, value-added services atop UPI's open infrastructure. Regulatory sandboxes, already deployed by the RBI to support fintech experimentation, can be leveraged more actively to test and scale such solutions within a safeguarded environment.

It is also important to balance utility gains with trust and perceived safety. In Karnataka, for instance, state tax authorities recently used UPI transaction data to flag unregistered merchants who appeared to exceed GST thresholds, issuing preliminary notices[65]. While intended to streamline compliance and advance formalisation goals, the move has also made some merchants more cautious about accepting digital payments. To balance innovation with public trust, the ecosystem must also move towards data fiduciary models, ensuring that user data is handled transparently, with strong consent and accountability frameworks[66]. India's Account Aggregator (AA) framework offers a compelling blueprint for how such principles can be operationalised. As UPI-linked transaction data increasingly becomes a gateway to financial services like credit, embedding these safeguards will be essential to maintaining user trust in the ecosystem.

5. How can UPI expand access and bring non-users into the fold?

The study findings suggest that potential UPI users fall into two distinct groups: those who are unaware of UPI and those who are aware but remain uncertain about using it. Increasing awareness through targeted campaigns and inclusive outreach efforts can help close the gap for the first group. These efforts should also highlight tools that reduce access barriers, such as UPI123, which enables feature phone users to make digital payments without internet access. Popularising such inclusion-oriented solutions can play a critical role in extending the reach of UPI to personal users with limited connectivity or smartphone penetration, especially in rural or underserved areas[67].

With the second group, well-designed, user-friendly resources, such as step-by-step guides, video content in local languages, and hands-on demonstrations can play a vital role in converting awareness into active use. Expanding initiatives like NPCI's UPI Circle, which promotes safe digital learning through peer-to-peer and experiential methods, can further support adoption (*See Annex 3 for information on the new frontiers of UPI*). However, such efforts must be scaled thoughtfully and tailored to different regions and user groups, including those facing specific challenges, such as senior citizens or individuals with low digital confidence.

To enable more precise targeting of these efforts, NPCI and regulators should consider making granular, anonymised data on UPI usage publicly available. Disaggregated insights by geography, gender, age, device type, and frequency of use would help identify where and among whom gaps persist, allowing for smarter, more inclusive outreach strategies.

5.5. Future research directions

The global DPI landscape is evolving rapidly, but structured, on-the-ground evaluations remain limited. India's UPI stands out for its unprecedented scale and reach, yet many questions remain about how platforms like UPI shape financial behaviour, institutional performance, and broader market outcomes. This study offers a few potential explanations by centering the lived experiences of personal users and merchants using UPI across two of India's most populous states. Using a structured assessment framework spanning five core dimensions – awareness, accessibility, utility, safety, and grievance redress – it provides insights into both user-level gaps and systemic frictions. Nonetheless, this is only a partial view, and a more robust understanding of the UPI user experience calls further research along the following three directions.

5.5.1 Disaggregated usage behaviour and experience

Although this study is based on primary fieldwork, larger-scale surveys and observational data are needed to fully understand how UPI is used in different user groups and settings. Future studies could replicate this framework at a national scale to explore how demographic variables (e.g. gender, education, age), geography (urban/rural, state-level variation), and device ecosystems (smartphone vs feature phone) affect usage patterns, user outcomes, and trust. Doing so would enable a deeper analysis of usage gaps and support more targeted, evidence-based interventions.

5.5.2 Institutional dynamics and governance design

This study offers only a preliminary view into the perspectives of institutional actors. Future research should systematically explore the incentive structures and operational challenges faced by key players, including banks, TPAPs, and regulators such as NPCI. Issues such as liability in fraud cases, cost-sharing in infrastructure maintenance, and conflicting commercial incentives merit closer analysis. A stronger understanding of these institutional dynamics is essential to inform future governance models that are both innovation-friendly and financially sustainable.

5.5.3 Applying the framework across DPI systems

As India rolls out interconnected DPI layers, such as DigiLocker, Account Aggregator, Open Network for Digital Commerce (ONDC), and Aadhaar-enabled services, there is a pressing need to assess not only their technical performance but also their social and economic impact. The analytical lens used in this UPI study – grounded in user experience, inclusion outcomes, and ecosystem incentives – offers a potential blueprint for evaluating other DPI systems. A comparative, modular approach to DPI research could help identify common enablers and bottlenecks and inform cross-cutting strategies for DPI governance, design, and accountability.

ANNEX 1 :
UPI: ARCHITECTURE AND ACTORS

A. India's Digital Payment Ecosystem

India's digital payment ecosystem consists of systems designed for different purposes – from high-value transfers between banks to everyday purchases by individuals. These fall into five broad categories.

Financial market infrastructures – such as Real Time Gross Settlement (RTGS), used for large-value interbank transfers.
Retail credit transfers – user-initiated "push" payments via systems like NEFT and IMPS (and, more recently, UPI).
Debit transfers – "pull" payments authorised by the account holder, such as e-NACH for bill payments or loan instalments.
Card payments – debit and credit cards via Visa, Mastercard, and RuPay, widely used for point-of-sale transactions.
Prepaid instruments – mobile wallets like Paytm or Amazon Pay, which store value in advance and are typically used for small online or in-app purchases.

UPI is officially classified as a retail credit transfer system because most of its transactions are user-initiated "push" payments. But what sets it apart is how it blends features from other systems: real-time, low-cost transfers like IMPS, the ease of use of wallets, and "pull" transaction features like collect requests and e-mandates[6869].

Legacy Constraints and UPI's Design Response

Earlier digital payment systems were often built around the needs of formal banking customers and organised retail. Many required multiple identifiers, specialised hardware, or operated in closed environments, creating barriers for small merchants and lower-income users.

UPI was developed as a foundational public platform to address these gaps *(See Figure A)*.

While these design choices addressed many of the functional gaps in earlier systems, UPI's ability to scale and maintain trust has also depended on the governance structures and institutional roles underpinning the platform.

Figure A: Institutional responses to UPI's governance goals

Legacy Constraint	UPI Design Response
Fragmented ecosystems Prepaid instruments such as mobile wallets operated in closed loop ecosystems[70]. Merchants often need to manage multiple integrations and platforms, leading to friction for both businesses and consumers[71].	Unified interoperable platform UPI enables users to send and receive money across any bank using any UPI-enabled app, offering seamless interoperability through a unified, app-agnostic infrastructure.
High transaction costs for small-value payments. Primarily designed for high-value or scheduled payments and initially fee-based, RTGS and NEFT are less suitable for frequent, small-ticket transactions. Cards require a point-of-sale machine which involves high set-up costs, in addition to a merchant discount rate of 1.5% to 3.5% of the transaction amount, making them less viable for small value payments	No MDR policy for users and small merchants (at launch)
Complexity of user onboarding IMPS has complex user flows, including the need for a Mobile Money Identifier (MMID), long account numbers, and transaction fees[72].	Simplified flows: mobile-first, VPA creation, real-time authentication
Limited innovation in user-facing applications	TPAP model encourages private sector innovation on public rails

B. Key actors in UPI's institutional architecture: Governing for scale, trust, and innovation

The layered institutional model that governs the UPI ecosystem, characterised by strong regulatory oversight and clearly defined roles for banks, fintechs, and app providers, has contributed significantly to its rapid growth and widespread adoption. Central to this DPI architecture is the deliberate separation of responsibilities: the core infrastructure is managed by NPCI, while the innovation layer is open to a wider set of actors (*See Figure B*). This model was designed to support rapid expansion while safeguarding systemic integrity, though questions remain about its adaptability and risk management over time. These institutional choices continue to shape how UPI operates, who it reaches, and how it builds and maintains user trust.

NPCI: Scheme owner and operator

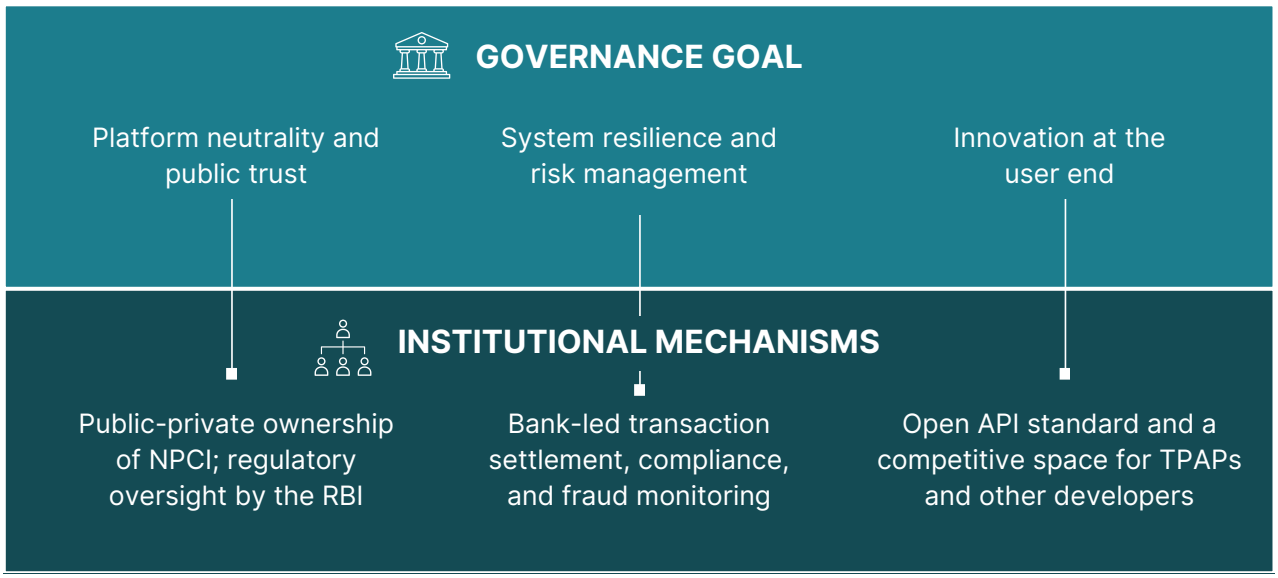
NPCI lies at the heart of UPI's technical and operational setup, functioning as both the owner and network operator. Established as a not-for-profit entity owned jointly by a consortium of Indian banks, NPCI operates under the regulatory oversight of RBI. Its responsibilities include managing the UPI switch, maintaining interoperability standards, certifying participants, and introducing new features.

NPCI's hybrid role has enabled UPI to scale without compromising operational stability. It has supported technical standardisation while leaving space for market-led innovations. At the same time, as UPI's centrality to India's financial system has grown, this dual role has raised concerns about potential conflicts of interest, concentration of influence, and the need for more independent or formalised governance mechanisms [73].

RBI: Regulator and systemic overseer

RBI plays a strategic role in UPI's governance, setting broad policy directions and guiding its development through regulatory oversight. Under the Payments and Settlement Systems Act (2007), it provides the framework within which NPCI operates. RBI's approach has largely been facilitative, encouraging innovation while intervening selectively to align system parameters with public interest goals such as financial stability, equitable access, and consumer protection. Key interventions have included maintaining a zero MDR, promoting zero-cost transactions for small merchants, mandating GRMs, and issuing cybersecurity guidance.

Figure B: Institutional responses to UPI's governance goals



Banks and PSPs: Anchoring trust and settlement

Banks play a foundational role in anchoring UPI within the regulated financial system. They are responsible for onboarding users through eKYC, managing transaction settlement and float balances, monitoring suspicious activity, and addressing customer disputes.

PSPs, often bank-led, act as intermediaries between user-facing apps and the UPI switch. They help ensure that liquidity, compliance, and risk controls remain embedded within the system even as front-end experiences are delivered by non-bank actors.

TPAPs: Innovation at the Edge

TPAPs, such as PhonePe, Google Pay, and Paytm, have contributed significantly to UPI's mass adoption by simplifying the onboarding process and developing intuitive, multilingual, and feature-rich user interfaces. Among merchants, TPAPs drove adoption by deploying on-ground teams and simplifying the registration process. TPAPs connect to the UPI backend via licensed banks and PSPs, using open APIs provided by NPCI.



ANNEX 2 : METHODOLOGY NOTE

Sample selection and sizes

In the absence of baseline data on UPI user-to-non-user ratios at the district level, we used purposive sampling to obtain highly specific information from three respondent groups:

- **Personal users**: Those who had used UPI at least once in the past three months (n = 3,283; nearly 800 per district; 64% men and 35% women)
- **Non-users:** Those who had not used UPI in the past three months (n = 780; nearly 200 per district; 48% men and 52% women)
- **Merchants:** Small-scale retailers (mainly grocery and kirana shop owners, food or drink stall operators, and eatery or restaurant owners). This group included only those merchants who accepted UPI payments (n = 742; nearly 200 per district; 85% men and 15% women)

More UPI users were intentionally included in the sample, reflecting the study's primary focus on user experience across gender, geography, and levels of digital access. Smaller sample sizes of non-users and merchants were sufficient to explore why some individuals remained outside the UPI ecosystem and how micro and self-run enterprises (merchants) engaged with the platform.

Recruitment strategy

In each selected district, we surveyed both UPI users and non-users from urban and rural areas. Areas were classified as urban or rural by matching polling booth-level data with Census 2011 classifications. Polling booths located within statutory towns or municipal limits were designated as urban, while those outside notified urban boundaries were considered rural. In urban areas, polling booths were mapped to their corresponding municipal wards, which served as the primary sampling unit. In rural areas, polling booths were mapped to villages. Within each selected ward or village, we employed systematic random sampling, with surveyors visiting every 10th household starting from the polling booth.

In case of non-response, enumerators proceeded to the adjacent household.

In addition to households, 200 merchants were surveyed per district, equally divided between rural and urban areas. Eligible respondents consisted of small-scale, independent retailers and shop owners who were responsible for decisions related to digital payment adoption. Retailers were sampled across a range of categories identified by NPCI as "high-transacting" merchant types, which included grocery/kirana shops; vegetable and fruit carts; food stalls; eateries; tea stalls; tobacco and paan shops; chemists and pharmacies; apparel and clothing shops; and telecommunication service providers (e.g., mobile recharge, printing).

In rural areas, enumerators surveyed merchants in the core market zones of selected villages, especially near railway stations, *sabzi mandis*, or in retail clusters of 2-4 shops where larger commercial hubs were absent. In urban areas, merchant surveys were conducted in key market areas within selected wards, with approximately 10 shopkeepers interviewed per ward.

ANNEX 3:
CONTINUOUS INNOVATION AND REACH EXPANSION

Since its launch, UPI has not remained static. Continuous product innovation has expanded its reach and deepened its role in daily transactions.

Innovations like UPI Autopay and RuPay Credit Card integration have strengthened its role in users' daily financial routines, while features such as UPI 123Pay (supports feature phone users through interactive voice response and voice-based flows) and UPI Lite (on-device wallet for offline transactions) have lowered access barriers for those with limited connectivity or basic mobile phones (*See Figure C*). NPCI actively monitors and refines the UPI ecosystem, regularly introducing new capabilities to improve usability and expand reach.

Figure C : New frontiers of UPI span a variety of user types and needs

- Credit & Lending
- Recurring Payments
- Off line & Low-Bandwidth
- Internationally-enabled
- Proximity Payments
- Delegated Payments
- Cash access

2020

AutoPay
Enables customers to automate payments by setting up e-mandates for recurring transactions such as mobile bills, electricity bills, loan EMIs and mutual fund investments.

UPI Global Acceptance
This allows users to make QR code-based payments at select international merchant locations directly from their Indian bank accounts via UPI-powered applications.

2021

UPI LITE
On-device wallet designed to simplify low-value transactions without requiring an internet connection.

UPI 123Pay
This is an instant payment system designed for users with feature phones and users with limited or no internet connectivity.

2022

RuPay Credit Card on UPI
Combining the convenience of UPI's seamless payments with the benefits of credit cards, users can make UPI transactions with credit instead of their bank balance.

UPI LITE-X
Allows users to make offline payments of up-to ₹500 by utilising the existing UPI LITE wallet.

2023

Forward Inward/Outward Remittances
This allows individuals in India to receive funds from abroad directly into their UPI-linked bank accounts.

UPI ATM
This enables customers to withdraw from and deposit cash with compatible ATMs using UPI.

Credit Lines
Banks offer pre-sanctioned credit lines on UPI which enables borrowers to transact directly through UPI without requiring an intermediary account.

UPI Tap and Pay
Instead of using the camera, Tap & Pay captures the Payee UPI ID/VPA through near field communication.

2024

UPI Circle
This allows a primary user to securely delegate payment authority to a trusted secondary user.

UPI for NRIs
This allows users with international mobile numbers to make UPI transactions.

UPI OneWorld
This enables international travellers to transact seamlessly with merchants & vendors across India that accept UPI Payments.

END NOTES

1 According to key experts, the total addressable user base of UPI is approximately 750 million. As per NPCI, UPI's current user base in India stands at around 330 million. It is, therefore, estimated that the residual pool of non-users constitutes over 50% of the total addressable user base.

2. Merchant insights are drawn from the experiences of retail micro-merchants in our sample, nearly half of whom ran local grocery/kirana stores. Around 78% reported monthly business incomes below ₹50,000. Medium-sized merchants, who may weigh transaction traceability differently due to tax or compliance considerations, were not a significant part of the sample.

3. A recent report by SIDBI, "Understanding Indian MSME Sector: Progress and Challenges" found that nearly 12% of micro-enterprises still rely on informal sources of credit. Nearly 35% of micro-enterprises remain unregistered due to lack of awareness and fear of scrutiny. As a result, they find it difficult to access formal credit. Small Industries Development Bank of India. (2025). Understanding Indian MSME Sector - Progress and Challenges. https://www.sidbi.in/uploads/Understanding_Indian_MSME_sector_Progress_and_Challenges_13_05_25_Final.pdf

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16. NEFT and IMPS are both 24x7 bank-led payment systems that typically require internet or mobile banking access and the recipient's bank account details. NEFT processes payments in batches and is available both online and at branches, while IMPS enables real-time transfers. However, both often involve transaction fees and are less intuitive than UPI for everyday users.
17.When a user registers for UPI, the app binds the UPI account to the mobile device through a secure cryptographic process. This binding ensures that UPI transactions can only be initiated from the registered device.
18. All data transmitted through UPI is encrypted end-to-end, ensuring that sensitive information such as account details, UPI IDs, and UPI PINs remain protected from interception.
19. Users are required to enter their unique Mobile Personal Identification Number (MPIN) to validate the transaction. Additionally, UPI leverages biometric authentication, utilising features like fingerprint or iris recognition.
20. The survey has been undertaken after receiving approval from an Institutional Review Board (IRB) - Monk Prayagshala. All data was collected with informed consent, and participation was voluntary and anonymised. The data has been securely stored in encrypted systems, and any personal identifiers have been removed to protect participants' privacy.
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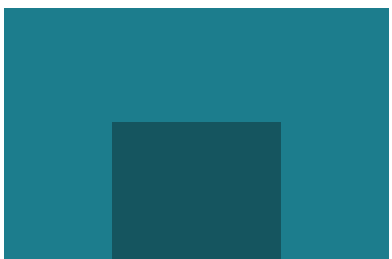

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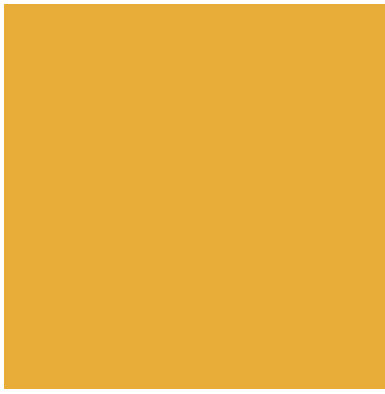

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