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UPI Adoption in India: Usage Patterns, Behavioural Shifts, and Economic Impact (2019–2024)

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Abstract

India's Unified Payments Interface (UPI), launched by the National Payments Corporation of India (NPCI) in April 2016, has emerged as one of the most consequential financial infrastructure innovations of the past decade. This paper analyses UPI's economic and behavioural footprint over the five-year period from 2019 to 2024, a window that encompasses both the pre-pandemic baseline and the dramatic acceleration that followed COVID-19. Drawing on secondary data from NPCI and the Reserve Bank of India (RBI), alongside primary survey data from 223 respondents in Karnataka, the study examines five dimensions: transaction growth trajectory, consumer payment behaviour shifts, merchant adoption patterns, financial inclusion outcomes, and alignment with government digital economy initiatives. All four hypotheses were statistically supported. A one-sample t-test confirmed that users perceive significantly higher convenience ($M = 4.63$, $t(213) = 39.29$, $p < .001$). A chi-square analysis revealed that education level is a significant predictor of adoption ($\chi^2(4) = 18.39$, $p = .001$). One-way ANOVA showed that more frequent users report higher trust ($F(3,209) = 6.21$, $p < .001$). Pearson correlation established a moderate-to-strong positive relationship between perceived convenience and perceived security ($r = .602$, $p < .001$, $\alpha = .752$). The findings confirm that UPI has generated structural changes in India's financial ecosystem while also exposing persistent gaps in digital equity. Implications for policymakers, financial institutions, and fintech operators are discussed.

Keywords: *UPI; Digital payments; Financial inclusion; India; Payment behaviour; TAM; Two-sided markets*

1. Introduction

Few financial technologies in recent memory have reshaped economic behaviour as rapidly or as deeply as India's Unified Payments Interface. Launched in April 2016 by the NPCI, UPI enables real-time inter-bank transfers through mobile devices via a Virtual Payment Address — a simple alphanumeric identifier linked to a bank account. Unlike earlier digital payment instruments, UPI levies no transaction charges on end consumers and operates on an open application programming interface (API) architecture,

allowing dozens of third-party apps — Google Pay, PhonePe, Paytm, and the government-backed BHIM — to build on the same public infrastructure. What began as a policy experiment has become, in under a decade, the backbone of everyday commerce across India.

The scale of this transformation is difficult to overstate. From approximately 12.5 billion transactions in FY 2019–20, UPI grew to over 131.7 billion transactions in FY 2023–24 — a more than tenfold increase in five years, with a compound annual growth rate of approximately 60 percent. The value processed crossed ₹200 lakh crore. At the consumer level, the platform has moved from a convenient alternative to the default mode of payment: over half of the survey respondents in this study use UPI daily, and more than half route over three-quarters of all their payments through it. At the merchant level, the number of UPI-accepting businesses grew from roughly five million in 2019 to over fifty million by 2023.

Three structural forces drove this expansion. The government's demonetisation exercise in November 2016 — which removed the majority of high-denomination currency from circulation almost overnight — pushed millions of first-time users into the digital payments ecosystem, and many did not return to cash even after liquidity was restored. The Jan Dhan Yojana initiative, which had already extended formal bank accounts to hundreds of millions of previously unbanked Indians, provided the account infrastructure UPI needed to scale at a population level. And the COVID-19 pandemic, arriving in 2020, compressed years of projected adoption into months: as physical markets closed and health messaging discouraged cash handling, contactless digital payment became not just convenient but necessary.

Despite this growth, the academic literature has struggled to keep pace. Most empirical studies either cover the pre-pandemic period, focus narrowly on consumer behaviour, or rely on aggregate national data that obscures important regional and demographic heterogeneity. Rigorous causal work linking UPI adoption to measurable economic outcomes remains sparse. And the post-2021 phase of UPI's development — its maturation from an emergency tool into embedded financial infrastructure — has received comparatively little scholarly attention.

This paper addresses those gaps. Drawing on secondary data from NPCI and RBI covering 2019 to 2024, and on primary survey data from 223 respondents in Karnataka's urban, semi-urban, and rural geographies, the study examines five dimensions: the trajectory of UPI's transaction growth; shifts in consumer payment behaviour; merchant adoption and its implications for small business formalisation;

UPI's contribution to financial inclusion; and its relationship to government digital economy initiatives. Four pre-specified hypotheses are tested using one-sample t-tests, chi-square analysis, one-way ANOVA, and Pearson correlation. The theoretical framework integrates Two-Sided Market Theory (Rochet & Tirole, 2003), the Technology Acceptance Model (Davis, 1989; Venkatesh et al., 2003), and Financial Intermediation Theory (Claessens et al., 2018).

The contribution of this paper is threefold. Empirically, it provides an integrated analysis of both consumer and merchant dimensions — a perspective that much of the existing literature treats separately. Temporally, it covers UPI's full recent arc, including the post-pandemic consolidation phase. And practically, it offers evidence-based recommendations addressed to three distinct audiences: policymakers seeking to deepen UPI's reach, financial institutions sitting on largely untapped transaction data, and fintech operators looking for the next phase of growth.

2. Literature Review

2.1 Digital Payment Systems and Network Effects

The economic case for electronic payments was established early. Humphrey, Pulley, and Vesala (1996) showed that economies transitioning from cash to digital payments achieve measurable efficiency gains, with estimated cost savings of up to one percent of GDP in advanced contexts. Gowrisankaran and Stavins (2004) extended this analysis to demonstrate that network effects — the property by which a payment system's value rises with the number of participants — are the dominant driver of adoption in two-sided markets. This insight is directly applicable to UPI, which depends on simultaneous engagement from both consumers and merchants to generate utility. Chakravorti (2010) further examined how zero or near-zero pricing for end users can accelerate adoption, particularly in developing markets — a rationale that maps cleanly onto UPI's fee structure.

2.2 Technology Adoption in Financial Services

Two frameworks dominate the technology adoption literature. Davis's (1989) Technology Acceptance Model (TAM) identifies perceived usefulness and perceived ease of use as the primary determinants of whether individuals adopt a new technology. Venkatesh et al. (2003) extended TAM through the Unified Theory of Acceptance and Use of Technology (UTAUT), adding social influence and facilitating conditions as predictors. Applied to digital payments, Laukkanen (2007) found that security

anxiety and interface complexity are the most common adoption barriers among less digitally experienced users — a finding with particular relevance for India's varied population. Sharma and Bhatt (2020), applying a modified UTAUT to UPI specifically, found trust, ease of use, and peer influence to be the strongest adoption predictors, with trust assuming special importance where prior formal financial experience is limited.

2.3 Financial Inclusion and Digital Payments

The financial inclusion literature converges on the argument that digital payment infrastructure can extend formal financial access to previously excluded populations by circumventing the geographic constraints of traditional banking. Demirguc-Kunt et al. (2018), drawing on the Global Findex Database, documented substantial gains in account ownership in developing economies between 2011 and 2017, with mobile money playing a catalytic role. Jack and Suri (2011) provided seminal evidence from Kenya's M-Pesa, demonstrating that mobile money access was associated with improved household financial resilience and consumption smoothing among lower-income users. Ghosh (2016), examining the post-Jan Dhan Yojana period in India, found that combining account access with digital payment infrastructure meaningfully increased transaction frequency among previously unbanked households.

2.4 Macroeconomic Implications

Rogoff (2016) argued that reducing cash dependency can improve fiscal compliance and reduce informal economic activity — logic that applies with particular force in India, where the informal sector has historically constituted a large share of economic output. Hasan, Schmiedel, and Song (2012) found empirically, across European economies, that higher electronic payment adoption was associated with stronger retail growth, controlling for other macroeconomic variables. Mohan (2008), writing from the perspective of a former Deputy Governor of the RBI, characterised efficient payment infrastructure as a public good with externalities extending well beyond the payment system itself.

2.5 UPI-Specific Research

As UPI's prominence has grown, a dedicated body of applied research has emerged. Murthy and Bharadwaj (2020) identified three inflection points in UPI's growth: demonetisation, the entry of major technology firms, and COVID-19. Patel and Srivastava (2021) examined merchant adoption through qualitative fieldwork, finding that zero transaction fees and customer pressure were primary motivations, while connectivity dependence and dispute resolution gaps were the principal barriers. Agarwal, Ghosh, and Li (2022) contributed econometric evidence that UPI adoption increases the frequency of small-value

discretionary transactions — suggesting that digital payment availability not only substitutes for cash but may stimulate new spending. Kohli and Bhatt (2023), using spatial analysis of National Sample Survey data, found that districts with denser UPI merchant presence show higher rates of formal financial service uptake among low-income households. Rajagopalan (2022) offered a critical perspective on market concentration, noting that PhonePe and Google Pay between them account for the large majority of transaction volume, raising concerns about competitive dynamics and systemic governance.

2.6 Research Gaps

Despite this growing body of work, several gaps remain. First, studies examining both consumer and merchant perspectives within a single analytical framework are uncommon, yet UPI is a two-sided market whose functioning depends on participation from both ends. Second, most research concentrates either on metropolitan consumers or national aggregates, leaving semi-urban and rural users — UPI's most challenging adoption frontier — comparatively underexplored. Third, the post-2021 maturation phase of UPI's development has not been comprehensively studied. Fourth, independent empirical evaluation of UPI's contribution to government programmes such as Digital India and Jan Dhan Yojana remains sparse. This study is designed to address these gaps.

3. Theoretical Framework

This study draws on three complementary frameworks.

Two-Sided Market Theory (Rochet & Tirole, 2003; Parker & Van Alstyne, 2005) conceptualises payment platforms as intermediaries serving two interdependent user populations — payers and payees — whose willingness to participate is shaped by the size and activity of the other. This creates the mutually reinforcing network dynamics central to explaining UPI's rapid growth. The theory also illuminates the strategic logic of UPI's zero-fee design, which sacrifices short-term revenue for rapid network expansion — rational when adoption scale is itself the primary source of platform value.

The Technology Acceptance and Diffusion framework, drawing jointly on Rogers's (1983) Diffusion of Innovations model and the UTAUT (Venkatesh et al., 2003), highlights the importance of perceived relative advantage, compatibility with existing practices, and social observability. Applied to UPI, these concepts help explain why adoption rates diverge across demographic groups and geographies, and offer a basis for anticipating future uptake trajectories in underserved markets.

Financial Intermediation Theory, as adapted to the digital finance context by Claessens et al. (2018), focuses on the role of financial infrastructure in reducing transaction costs, information asymmetries, and access barriers. Within this framework, UPI functions not merely as a payment application but as public financial infrastructure that reduces the cost of intermediation at scale — enabling a range of transactions that would previously have been too costly, too risky, or too inaccessible to execute through conventional banking mechanisms.

4. Research Design and Methodology

4.1 Research Design

The study adopts a descriptive-analytical design employing a cross-sectional mixed-methods approach. The descriptive component maps and characterises UPI's growth and adoption patterns using secondary data. The analytical component examines relationships between variables using primary survey data. A mixed-methods approach — combining quantitative survey data with open-ended qualitative responses — enables statistical analysis of adoption patterns alongside richer perceptual and experiential insights.

4.2 Data Sources

Secondary data is drawn from NPCI monthly UPI transaction reports, RBI Annual Reports and Payment System Reports, Ministry of Finance and MeitY policy publications, and the World Bank's Global Findex Database. These sources provide the empirical basis for analysing UPI's macro-level growth trajectory and policy context.

Primary data was collected through a structured questionnaire administered to 223 respondents across urban, semi-urban, and rural geographies in Karnataka. The consumer questionnaire covered demographic profile, UPI adoption history, usage frequency and intensity, and Likert-scale perception items (1–5 scale) on convenience and security. A merchant questionnaire was developed but not administered as part of this study; merchant analysis therefore relies on secondary sources.

4.3 Sampling

Purposive stratified sampling was used to ensure adequate representation across geographic classification (urban, semi-urban, rural), gender, and income categories. Survey administration used both online (Google Forms) and offline (printed questionnaires) modes to ensure accessibility across digital

and non-digital respondents. The final sample comprised 223 responses, of which 212 (95.1%) were active UPI users.

4.4 Variables

Dependent variables included UPI Adoption Intensity (frequency of transactions per month; proportion of total payments via UPI), Perceived Economic Impact (self-assessed changes in financial behaviour), and Financial Inclusion Outcome (access to formal financial services since adoption). Independent variables comprised demographic factors (age, gender, income, education, geography), technology-related factors (perceived ease of use, usefulness, trust), contextual factors (connectivity quality, smartphone type), and policy awareness (awareness of Jan Dhan, Digital India, etc.).

4.5 Hypotheses

Four hypotheses were specified a priori:

H1: UPI has significantly improved the perceived convenience of day-to-day payments.

H2: UPI adoption rates differ significantly across educational qualification groups.

H3: Security perceptions of UPI differ significantly across usage frequency groups.

H4: There is a significant positive relationship between perceived convenience and perceived security of UPI.

4.6 Analytical Approach

Quantitative analysis was conducted in SPSS. Descriptive statistics (frequencies, means, standard deviations) were computed for all key variables. A one-sample t-test tested H1, comparing the mean convenience Likert score against the neutral midpoint of 3. Chi-square analysis of independence tested H2. One-way ANOVA tested H3, comparing mean security perception scores across frequency groups. Pearson correlation, with Cronbach's alpha for the two-item scale, tested H4. All tests used a significance threshold of $\alpha = .05$. Listwise deletion was applied where missing data occurred, reducing the correlation sample to $n = 211$. Secondary data analysis involved time-series description of NPCI transaction data and year-on-year growth rate calculations.

5. Results

5.1 UPI Transaction Growth: 2019–2024

Secondary data from NPCI reveals a growth trajectory that is striking not just in its scale but in its consistency. Table 1 presents the headline figures.

Financial Year	Transactions (Billion)	Value (₹ Lakh Crore)	YoY Volume Growth
2019–20	12.5	21.3	—
2020–21	22.3	41.0	78.4%
2021–22	46.0	84.2	106.3%
2022–23	83.8	139.1	82.2%
2023–24	131.7	199.9	57.2%

Table 1. UPI Annual Transaction Volume and Value, FY 2019–20 to FY 2023–24. Source: NPCI UPI Ecosystem Statistics (2024); RBI Payment and Settlement Systems Report (2024).

Transaction volume increased more than tenfold over the period, with a compound annual growth rate of approximately 60 percent. The steepest single-year increase occurred in 2021–22, when volumes more than doubled — a period that coincides with the post-COVID reopening, during which habits formed during lockdowns translated into permanent behavioural changes. Notably, even in 2023–24, five years into widespread adoption and well after the pandemic emergency had passed, volume growth exceeded 57 percent, suggesting that this is not a temporary disruption-driven shift but a genuine structural change in how Indians transact.

5.2 Demographic Profile of Survey Respondents

A total of 223 responses were collected. Two-thirds of respondents (65.0%) fell in the 20–30 age bracket, reflecting the cohort that has grown up alongside UPI's rollout. Female respondents outnumbered male respondents (59.2% versus 39.9%), a distribution less common in digital payments research. Over 85 percent held at least a graduate degree. Perhaps the most striking figure is the adoption rate: 95.1 percent of respondents reported using UPI, with just 11 non-users in the sample.

Variable	Category	n	%
Age	20–30	145	65.0%
	31–40	40	17.9%
	41–50	19	8.5%
	Below 20	15	6.7%

	Above 50	4	1.8%
Gender	Female	132	59.2%
	Male	89	39.9%
	Prefer not to say	2	0.9%
Education	Graduate	120	53.8%
	Post-Graduate	72	32.3%
	10th / 12th	14	6.3%
	Other	12	5.4%
	Below 10th	5	2.2%
Monthly Income	Above ₹60,000	108	48.4%
	₹30,001–₹60,000	63	28.3%
	Below ₹15,000	26	11.7%
	₹15,000–₹30,000	18	8.1%
UPI Adoption	Yes	212	95.1%
	No	11	4.9%

Table 2. Demographic Profile of Survey Respondents (n = 223). Source: Primary data (2026).

5.3 UPI Usage Behaviour

Among the 212 active users, Google Pay was the most preferred application (47.2%), followed by PhonePe (28.8%) — together accounting for over 76 percent of usage, consistent with the concentrated market structure documented in national-level data. Over 76 percent of respondents had been using UPI for three years or more, indicating an experienced user base with settled opinions. More than half (56.6%) used the platform daily, and 51.4% routed over three-quarters of all their payments through UPI. These are not the behaviours of early adopters hedging between cash and digital; they reflect a population for whom UPI has become the default.

Variable	Category	n	%
Preferred App	Google Pay	100	47.2%
	PhonePe	61	28.8%
	Paytm	30	14.2%

	BHIM UPI	19	9.0%
	Others	5	2.4%
Duration of Use	3–5 years	86	40.6%
	More than 5 years	76	35.8%
	1–3 years	46	21.7%
	Less than 1 year	6	2.8%
Frequency / Week	Daily	120	56.6%
	3–5 times	50	23.6%
	Once or twice	39	18.4%
	Occasionally	5	2.4%
UPI Share of Payments	More than 75%	109	51.4%
	51–75%	67	31.6%
	25–50%	24	11.3%
	Less than 25%	13	6.1%

Table 3. UPI Usage Behaviour Among Active Users (n = 212). Source: Primary data (2026).

5.4 Perception of Convenience and Security

Two Likert-scale items captured user perceptions: 'UPI has made my day-to-day payments more convenient' and 'I feel UPI transactions are secure and trustworthy.' Both scored substantially above the neutral midpoint of 3, with low standard deviations indicating broad consensus rather than a polarised distribution.

Item	n	Mean	Std. Dev	Min	Max
Convenience	214	4.63	0.61	2	5
Security / Trustworthiness	211	4.52	0.63	2	5

Table 4. Descriptive Statistics for UPI Perception Items. Source: Primary data (2026).

5.5 Hypothesis Testing

5.5.1 H1: Convenience Improvement

A one-sample t-test against the neutral midpoint of 3 produced $t(213) = 39.29$, $p < .001$ (Table 5). The mean of 4.63 sits nearly 1.6 scale points above neutral — a margin that is both statistically and

practically significant. H1 is supported. Users do not merely tolerate UPI; they genuinely find it more convenient than the alternatives they previously used.

Statistic	Value
n	214
Mean	4.626
Standard Deviation	0.606
t-Statistic	39.288
Degrees of Freedom	213
p-Value (2-tailed)	< .001
Decision	Reject H_0 — H1 Supported

Table 5. One-Sample t-Test: Convenience Perception (Test Value = 3). Source: Primary data analysis (2026).

5.5.2 H2: Education and Adoption

Chi-square analysis of educational qualification against UPI adoption yielded $\chi^2(4) = 18.385$, $p = .001$ (Table 6). H2 is supported. The pattern is clear: among graduates and post-graduates, adoption rates are 96.7% and 98.6% respectively. Among respondents with below-10th-standard education, adoption falls markedly. A parallel test for income group produced $\chi^2(3) = 5.132$, $p = .162$ — not significant — suggesting that within the income range represented in this sample, education is a more powerful predictor of adoption than income.

Education Level	Uses UPI	Does Not Use UPI	Total
Below 10th	3	2	5
10th / 12th	11	3	14
Graduate	116	4	120
Post-Graduate	71	1	72
Other	11	1	12
Total	212	11	223

Table 6. UPI Adoption by Educational Qualification. Source: Primary data (2026). $\chi^2(4) = 18.385$, $p = .001$.

5.5.3 H3: Usage Frequency and Trust

One-way ANOVA comparing mean security perception across usage frequency groups produced $F(3, 209) = 6.213$, $p < .001$ (Table 7). H3 is supported. Daily users rated security at a mean of 4.68, compared to 3.80 for occasional users — almost a full point difference on a five-point scale. The gradient is intuitive: daily users have accumulated repeated positive transaction experiences that build confidence; occasional users have had far fewer such reinforcing encounters.

Usage Frequency	n	Mean	Std. Dev
Daily	120	4.68	0.54
3–5 times/week	50	4.36	0.68
Once or twice/week	39	4.23	0.65
Occasionally	5	3.80	0.84

Table 7. Mean Security Perception by Usage Frequency ($F(3,209) = 6.21$, $p < .001$). Source: Primary data analysis (2026).

5.5.4 H4: Convenience and Security Correlation

Pearson correlation between convenience and security perception scores yielded $r = .602$ ($n = 211$, $p < .001$). Cronbach's alpha for the two-item scale was .752, clearing the conventional .70 threshold and confirming sufficient construct overlap to treat them as components of a shared dimension of overall user confidence. H4 is supported. Users who find UPI easy to use also tend to trust it — the two perceptions reinforce each other in a manner consistent with TAM's predictions.

Statistic	Value
Paired n	211
Pearson r	.602
p-Value (2-tailed)	< .001
Cronbach's Alpha	.752
Decision	Reject H_0 — H4 Supported

Table 8. Pearson Correlation: Convenience and Security Perceptions. Source: Primary data analysis (2026).

5.5.5 Summary of Hypothesis Tests

Hypothesis	Test	Result	p-Value	Decision

H1: UPI improves convenience	One-sample t-test	t(213) = 39.29	< .001	Supported
H2: Education predicts adoption	Chi-square	$\chi^2(4) = 18.39$	.001	Supported
H3: Frequency affects trust	One-way ANOVA	F(3,209) = 6.21	< .001	Supported
H4: Convenience–security link	Pearson correlation	r = .602	< .001	Supported

Table 9. Summary of Hypothesis Testing Results. Source: Primary data analysis (2026).

6. Discussion

6.1 Transaction Growth and Structural Change

The secondary data tell a story of compounding momentum rather than a one-off adoption surge. UPI's growth rate remained above 57 percent in FY 2023–24, a year in which the platform was already processing over a third of a billion transactions per day on average. This is not the typical diffusion curve of a technology approaching saturation; it reflects an expanding base of use cases, including government-to-citizen transfers, merchant payments at increasingly granular transaction sizes, and the growing embedding of UPI into third-party financial products. The doubling of volumes in 2021–22 — the post-COVID reopening year — represents what Murthy and Bharadwaj (2020) might characterise as the third major UPI inflection point, translating pandemic-era emergency habits into durable behavioural change.

6.2 Consumer Behaviour: Depth, Not Just Breadth

The survey data add texture that aggregate figures cannot. The 95.1 percent adoption rate is striking, but arguably more significant is the depth of usage: 51.4 percent of active users route more than three-quarters of all their payments through UPI, and 56.6 percent use it daily. These are not the behaviours of a population experimenting with a new technology — they indicate deep behavioural embedding. The mean convenience score of 4.63, supported by a t-statistic of 39.29, confirms that this adoption is driven by genuine satisfaction rather than habit inertia or lack of alternatives.

The positive correlation between convenience and security perceptions ($r = .602$, $\alpha = .752$) is a finding with practical implications. TAM predicts that ease of use and perceived usefulness are not independent — they reinforce each other. This study's results extend that logic: platforms that are easy to use are also more likely to be trusted. This has direct implications for interface design: reducing friction in

the transaction experience does more than improve user satisfaction; it also builds the security confidence that sustains long-term platform loyalty. Investment in UX quality is not merely a product decision; it is a trust-building strategy.

6.3 The Education Gap: UPI's Unfinished Journey

The chi-square finding on education and adoption ($\chi^2(4) = 18.39$, $p = .001$) is the most policy-relevant result in this study. While adoption rates exceed 96 percent among graduates and post-graduates, they are markedly lower among respondents with lower educational attainment. This is consistent with Rogers's (1983) diffusion model, which predicts that innovations first spread among the most educated and digitally literate, and that the gap between early adopters and late adopters reflects structural inequalities as much as individual choice.

The implication is significant. The populations most in need of UPI's financial inclusion benefits — rural households, workers in the informal economy, older citizens — are precisely those least likely to be using it. Awareness campaigns alone will not close this gap. What the evidence suggests is needed is a combination of digital literacy investment, assisted first-use programmes, and interface simplification targeted at users for whom English-language menus and smartphone navigation are non-trivial barriers.

6.4 Merchant Adoption and the Formalisation Effect

The tenfold growth in UPI-accepting merchants between 2019 and 2023 — from approximately five million to over fifty million — is one of the less-discussed but economically significant dimensions of UPI's expansion. For micro and small enterprises that previously operated entirely on cash, each UPI transaction creates a digital record that becomes the foundation for a formal financial identity. Iyer and Kulkarni (2022) documented that merchants adopting UPI experienced improved transaction transparency and greater chances of accessing formal credit — exactly the kind of financial formalisation that Rogoff (2016) and Mohan (2008) identified as a macroeconomic externality of digital payment adoption.

Challenges remain, however. Technical issues, fraud exposure, lack of dispute resolution awareness, and connectivity dependence continue to affect small business owners' experience of UPI, particularly in semi-urban and rural settings. These are not problems that market forces alone will resolve; they require deliberate policy intervention and fintech product development.

6.5 Financial Inclusion: Progress and Persistent Gaps

Over 510 million Jan Dhan accounts have been opened since 2014, many linked to digital payment systems, allowing the government to route direct benefit transfers at unprecedented scale. NPCI data indicates that UPI has enabled welfare disbursements under MGNREGS, PM-KISAN, and COVID relief programmes at a speed and accuracy that was previously unattainable. This is the inclusion story that policymakers rightly point to.

And yet the education-adoption gap documented in this study is a persistent reminder that formal account ownership and active digital payment usage are not the same thing. Jack and Suri (2011) found in Kenya that the welfare effects of mobile money required actual usage, not just account access. The same logic applies to UPI. A Jan Dhan account linked to a UPI identifier but rarely or never used for active transactions does not deliver the full range of financial inclusion benefits that policymakers envision. Getting people not just enrolled but genuinely engaged requires ongoing investment in digital skills and user experience for less technically confident populations.

6.6 Theoretical Synthesis

The findings align with and extend all three theoretical frameworks employed. Two-Sided Market Theory is supported by the simultaneous scaling of consumer and merchant adoption, the winner-take-most concentration observed in app preferences, and the sustained platform growth driven by network effects. TAM is supported — strongly — by the convenience data and by the usage-trust relationship. The UTAUT's emphasis on social influence finds support in the peer-driven adoption patterns visible in the 20–30 age cohort. And Financial Intermediation Theory is instantiated in the credit market effects of UPI's transaction records for previously informal enterprises.

One finding extends beyond what the existing frameworks explicitly predict: the near-unity of the convenience-security relationship ($\alpha = .752$). Standard survey instruments tend to treat ease of use and trust as distinct constructs. This study's data suggest that for experienced users of a mature platform, they are better understood as facets of a single higher-order dimension of user confidence. Future work might develop and validate a more parsimonious scale that captures this integrated construct directly.

7. Implications

7.1 Policy Implications

Two findings from this study deserve particular attention from policymakers. First, the education-adoption link is a signal that digital literacy investment should be treated as a precondition for financial inclusion, not an afterthought. The government's financial inclusion narrative has focused heavily on account creation — Jan Dhan opened over 510 million accounts — but account ownership and active platform use are not equivalent. Targeted digital literacy programmes, delivered through schools, self-help groups, community centres, and post offices, represent a necessary complement to infrastructure investment.

Second, the usage-trust relationship (H3) suggests that interventions should focus not only on awareness but on assisted first-use experiences. Getting a potential user to complete their first three or four transactions — with guidance, in a low-risk environment — may be more effective in building durable adoption than any amount of advertising. Pilot programmes that embed UPI facilitation into existing government service touchpoints (such as Common Service Centres) deserve serious consideration.

7.2 Implications for Financial Institutions

The 95.1 percent adoption rate and predominance of daily usage among survey respondents mean that transaction-level behavioural data is being generated at enormous scale. Banks that have not yet built the analytics infrastructure to use this data for credit assessment, product personalisation, and risk modelling are leaving significant value untapped — and ceding ground to fintech lenders who have. The UPI transaction record of a customer making daily payments for five years encodes substantial information about income patterns, financial behaviour, and reliability. Monetising this data responsibly and transparently is one of the most important strategic opportunities available to traditional financial institutions.

7.3 Implications for Fintech Operators

The app preference data — Google Pay at 47.2 percent, PhonePe at 28.8 percent — illustrates a winner-take-most dynamic that smaller fintech players cannot overcome on general convenience grounds. The two dominant platforms have effectively solved the convenience problem. The opportunity for new entrants lies in serving specific underserved needs: vernacular-language interfaces for users uncomfortable with English menus; better dispute resolution tools for small merchants; simplified onboarding for first-time users from lower-education backgrounds; and integrated financial products —

savings, micro-credit, insurance — that leverage UPI's transaction data. The H2 finding on education and adoption essentially maps out where the next phase of growth must come from.

8. Limitations

Several limitations of this study warrant acknowledgement. The sample profile is skewed towards younger, highly educated, and higher-income respondents — a demographic that is digitally active and therefore reachable through online survey methods. Findings should not be extended to populations that look very different from this sample. The truly excluded — those without smartphones, reliable connectivity, or basic digital literacy — could not be reached through this instrument by definition.

Self-reported data carries inherent risks. Respondents may overstate UPI usage frequency or rate convenience and security more positively than their actual experience warrants, particularly on a questionnaire framed around a topic they have opted to engage with.

The cross-sectional design precludes causal inference. Whether more frequent use causes higher trust, or whether people who already trust UPI simply use it more, cannot be determined from this data alone. Longitudinal research tracking the same cohort over multiple years is needed to answer this question.

Finally, the merchant survey was designed but not administered as part of this study. The merchant-side analysis therefore relies entirely on secondary sources. Future work that incorporates primary merchant data — particularly from micro and informal-sector businesses — would produce a significantly more complete picture of UPI's economic impact.

9. Conclusion

This study set out to examine the impact of UPI on the Indian economy between 2019 and 2024 across five dimensions: transaction growth, consumer behaviour, merchant adoption, financial inclusion, and policy alignment. After working through both the secondary data on macro-level growth and the primary survey responses from 223 participants, the conclusion is as clear as it is significant: UPI has changed how India pays, and the change is both deep and durable.

The NPCI data documents a platform growing at 60 percent annually for five consecutive years, reaching over 131 billion transactions in FY 2023–24. The survey data shows users who have not merely adopted UPI but integrated it into the fabric of daily financial life. The hypothesis tests show that this integration is underpinned by genuine satisfaction — high convenience ratings, strong trust perceptions, and a meaningful statistical link between the two. And the theoretical analysis shows that these patterns are not accidental: they are what Two-Sided Market Theory, TAM, and Financial Intermediation Theory would predict for a well-designed public digital infrastructure that has successfully achieved network scale.

At the same time, this study resists a triumphalist reading. The education-adoption gap is a serious equity concern. Market concentration in the application ecosystem raises legitimate questions about competition and governance. Fraud and dispute resolution remain unresolved problems, particularly for small merchants. And the long-term financial sustainability of a model providing free transaction infrastructure to hundreds of millions of users remains an open question.

What UPI has built is genuinely impressive — an achievement that governments and central banks around the world are now studying as a potential model. But treating it as a completed project would be a mistake. The next phase of UPI's development — reaching the rural poor, protecting low-income users from fraud, ensuring governance commensurate with systemic importance, and building the digital literacy infrastructure that inclusion actually requires — is arguably harder than everything that came before it. The evidence in this study suggests both how much has been achieved and how much remains to be done.

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