

Perceived Trust, Ease of Use and Adoption of UPI-Based Payments among Street Vendors and Micro-Merchants in Urban Punjab: A TAM-Based Survey

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Abstract—India's Unified Payments Interface processed over 131 billion transactions in FY 2023-24, making it the world's most widely used real-time payment system by volume. Yet the academic literature on UPI adoption has concentrated almost exclusively on salaried, educated, and smartphone-primary users — while the micro-merchant and street vendor segment, which constitutes a massive and economically vital share of India's informal commerce, remains essentially unstudied. This paper examines UPI adoption behaviour among street vendors and micro-merchants in Ludhiana, applying the Technology Acceptance Model (TAM) to a population whose adoption experience is shaped by very different constraints than those of middle-class digital payment users. Primary data were collected from 200 street vendors and micro-merchants operating in Ludhiana's key commercial streets — Chaura Bazar, Ghanta Ghar, and the Civil Lines market area — through a structured, interview-administered questionnaire measuring perceived usefulness, perceived ease of use, trust, fraud anxiety, and social influence as predictors of UPI adoption intention and actual usage. Multiple regression analysis was employed. Perceived usefulness emerged as the strongest predictor of UPI adoption intention ($\beta = 0.39$), followed by trust ($\beta = 0.33$) and social influence from neighbouring vendors ($\beta = 0.27$). Perceived ease of use was significant ($\beta = 0.21$) but weaker than expected, reflecting the growing familiarity with QR-code payment interfaces even among low-literacy users. Fraud anxiety was a significant negative predictor ($\beta = -0.29$). The study contributes original TAM evidence from India's informal street economy and offers policy-relevant guidance for expanding digital payment adoption among micro-merchants.

Index Terms—UPI, digital payments, Technology Acceptance Model, street vendors, micro-merchants, Ludhiana, Punjab, perceived trust, fintech adoption, informal economy

I. INTRODUCTION

Walk down any busy commercial street in Ludhiana today — Chaura Bazar, the Ghanta Ghar market, the textile wholesale lanes near Gill Chowk — and the evidence of UPI's penetration is visible in every second stall: a laminated QR code propped against a spice jar, taped to a vegetable cart, hanging from a nail beside a cloth bale. The pheriwalas and dukanwalahs who three years ago dealt exclusively in cash have, with varying degrees of enthusiasm and comprehension, joined the digital payments ecosystem. What has pushed them there is a mix of customer demand, pandemic-era cash aversion, government pressure, and the genuine convenience of receiving payment without exact change. What keeps them there — or drives some of them away — is a more complex story, and it is one the academic literature has not yet told.

The Technology Acceptance Model, introduced by Davis (1989), predicts that technology adoption is primarily determined by two user perceptions: whether the technology is perceived as useful (does it help me accomplish something I want to accomplish?) and whether it is perceived as easy to use (can I use it without excessive effort?). Subsequent extensions of the model — particularly TAM2 (Venkatesh and Morris, 2000) and the Unified Theory of Acceptance and Use of Technology (UTAUT, Venkatesh et al., 2003) — added social influence, facilitating conditions, and trust as additional predictors. Applied to the UPI adoption context among street vendors, these constructs take specific and locally textured forms: perceived usefulness is not abstract but concrete — does accepting UPI mean fewer arguments about change, faster settlement, fewer walk-aways from customers without cash? Perceived ease of use, for a vendor whose smartphone literacy is limited to WhatsApp and phone calls, is about whether the QR code scan-and-receive workflow is manageable without reading a screen carefully. Trust, in this population, is primarily about whether the money actually arrives in the bank account — a question shaped by early experiences with wrong-number transfers, delayed settlements, and fraudulent QR substitution incidents.

Ludhiana is a natural laboratory for this inquiry. The city combines a dense informal commercial sector — vegetable and fruit vendors, street food stalls, auto parts dealers, second-hand clothing sellers, and small service providers — with a relatively high smartphone penetration rate driven by the purchasing power of its industrial workforce. The adoption experience in this setting is likely to be more typical of Tier II Indian cities than the Delhi and Mumbai samples that dominate the published literature, making the findings relevant to a much wider policy audience.

II. REVIEW OF LITERATURE

2.1 Technology Acceptance Model: Framework and Extensions

Davis (1989) developed the Technology Acceptance Model as a parsimonious framework for predicting user acceptance of information systems, demonstrating empirically that perceived usefulness and perceived ease of use together explained a significant proportion of variance in technology adoption intentions across multiple system types. The model's parsimony — two core

constructs, directly measurable through validated scales — has made it the most widely applied framework in information systems and digital adoption research, with applications spanning internet banking (Pikkarainen et al., 2004), mobile commerce (Wei et al., 2009), e-government services (Carter and Belanger, 2005), and, more recently, mobile payment systems (Liébana-Cabanillas et al., 2018). Trust has emerged as a consistently important third predictor in payment technology contexts, reflecting the financial risk dimension that is absent in non-transactional technology adoption scenarios.

2.2 UPI and Digital Payment Adoption: Indian Evidence

Research on UPI adoption in India has grown rapidly since 2019 but remains dominated by studies of student and professional populations. Singh and Srivastava (2018), in an early study of mobile wallet adoption in India, found perceived usefulness and security to be the dominant predictors, with ease of use playing a secondary role — a pattern consistent with the present study's hypotheses. Patil et al. (2020) examined UPI adoption among semi-urban users in Maharashtra and found that social influence — specifically the observation that peers and neighbours had adopted UPI — was a stronger predictor of adoption intention than perceived ease of use, suggesting that for populations with limited prior technology experience, observational learning is more important than individual assessment of usability. Chauhan (2015) studied mobile banking adoption among rural populations and identified trust and security concerns as the most significant barriers — a finding that anticipates the fraud anxiety dimension central to the present study's design. The street vendor population has not been studied in any published Indian UPI or digital payment adoption research.

III. RESEARCH METHODOLOGY

A cross-sectional, descriptive-causal survey design was adopted. The study population comprised street vendors and micro-merchants operating in Ludhiana's outdoor and semi-permanent commercial spaces — vegetable and fruit vendors, street food sellers, textile stall operators, auto accessory micro-dealers, and small service providers (cobblers, tailors, key-cutters). Three market areas were selected for data collection: Chaura Bazar (high-density mixed retail), Ghanta Ghar market area (street food and daily essentials concentration), and the Civil Lines commercial stretch (mixed vendor types with higher footfall from professional customers). Since many respondents had limited formal literacy, the 34-item structured questionnaire was administered through personal interviews conducted in Punjabi by trained research assistants. Of 240 approached vendors, 200 provided usable responses (response rate: 83.3%).

The questionnaire comprised six sections. Section A collected demographics and business profile: age, education, years of vending experience, smartphone ownership, prior digital payment experience. Section B measured Perceived Usefulness (5 items, adapted from Davis, 1989): the degree to which respondents believed UPI helped them serve customers better, reduce cash handling, and improve settlement speed. Section C measured Perceived Ease of Use (5 items):

how intuitive and manageable the QR code payment workflow was perceived to be. Section D measured Trust in UPI (5 items): confidence that money would be received correctly and promptly. Section E measured Fraud Anxiety (4 items): worry about incorrect transfers, QR tampering, and inability to contest wrong transactions. Section F measured Social Influence (4 items): the role of peer vendors' adoption and customer pressure in shaping adoption intention. The dependent variable was UPI Adoption Intention (3 items) for non-users and Actual Usage Frequency for current users. Cronbach's Alpha for the full instrument was 0.82.

IV. RESULTS AND ANALYSIS

4.1 Respondent Profile and UPI Status

Characteristic	Category	Frequency	Percentage
Gender	Male	141	70.5%
	Female	59	29.5%
Age	Below 30 years	48	24.0%
	30–45 years	104	52.0%
	Above 45 years	48	24.0%
Education	Below class 8	54	27.0%
	Class 8–12	103	51.5%
	Graduate/above	43	21.5%
Smartphone ownership	Yes	178	89.0%
	No (feature phone only)	22	11.0%
UPI status	Current UPI user	134	67.0%
	Non-user (would consider)	46	23.0%
	Non-user (not interested)	20	10.0%
Years in vending	Less than 3 years	41	20.5%
	3–8 years	108	54.0%
	More than 8 years	51	25.5%

The 67% current UPI adoption rate among this sample of Ludhiana street vendors is notable — it reflects the intensity of the post-demonetisation and post-COVID push toward digital payments in even the most informal commercial segments. However, adoption is not equivalent to active, confident use: among the 134 current users, 44.8% described themselves as 'occasional or reluctant users' who accept UPI when a customer insists but actively prefer cash, while only 31.3% described themselves as 'actively promoting UPI payment to customers'. The 10% who remain uninterested are predominantly above 45 years of age and have no smartphone, suggesting that age and device access are the primary demographic barriers among the residually resistant.

4.2 Construct Mean Scores

Construct	Mean (/5)	Std. Dev.	Interpretation
Perceived Usefulness	3.74	0.81	High — vendors see transactional value clearly
Trust in UPI	3.42	0.94	Moderate — occasional bad experiences shape anxiety
Social Influence	3.61	0.79	High — peer adoption and customer pressure strong
Perceived Ease of Use	3.38	0.88	Moderate — QR familiar, disputes less so
Fraud Anxiety	3.19	1.02	Moderate-high — wrong transfer fear persists
UPI Adoption Intention	3.57	0.86	Positive — non-users lean toward future adoption

The high Perceived Usefulness score ($M = 3.74$) is the most revealing finding in the descriptive data. Street vendors understand, quite viscerally, what UPI does for them: it removes the constant negotiation over change (Rs. 10, Rs. 5 coins are in perpetual short supply in informal markets), it allows them to transact with customers who carry no cash — a population that has grown substantially since 2020 — and it creates an automatic digital record of their daily transactions that some vendors (particularly those who are tax-registered) find useful for reconciliation. The value proposition is clear to them; what is not always clear is how to handle problems when they arise.

4.3 Regression Results: Predictors of UPI Adoption Intention

Predictor	β (Std.)	t-value	p-value	Significance
Perceived Usefulness	0.391	7.34	< 0.001	Strongest
Trust in UPI	0.332	6.21	< 0.001	***

Social Influence	0.271	5.08	< 0.001	***
Fraud Anxiety (negative)	-0.291	5.43	< 0.001	***
Perceived Ease of Use	0.214	3.98	< 0.001	***
Education Level	0.143	2.67	0.008	**
Smartphone Literacy	0.162	3.01	0.003	**

Notes: $p < 0.001$, $p < 0.01$. $R^2 = 0.597$, *Adjusted R*² = 0.581, $F(7,192) = 40.63$, $p < 0.001$. Dependent variable: UPI adoption intention score (for non-users) and usage intensity score (for current users), combined on a common 15-point scale.

The near-equal strength of perceived usefulness ($\beta = 0.39$) and fraud anxiety as a negative predictor ($\beta = -0.29$) creates what might be described as a motivational standoff in this population: vendors see the value clearly but are held back, often viscerally, by fear of losing money to incorrect transfers or QR code fraud. The fear is not irrational — during qualitative follow-up, seven respondents described personal experiences of receiving incorrect amounts, and three mentioned seeing neighbouring vendors' QR codes replaced with fraudulent ones. These experiences, even when witnessed rather than personally suffered, create a community-level risk perception that rational awareness campaigns alone cannot overcome.

V. DISCUSSION AND CONCLUSIONS

The TAM framework performs well in this informal vendor context, with perceived usefulness, trust, social influence, and fraud anxiety together explaining approximately 60% of the variance in adoption intention. The model's performance validates its applicability beyond its original organisational information systems context and demonstrates that it can capture meaningful variation even in a population with limited formal technology education. The social influence finding ($\beta = 0.27$) is particularly noteworthy: vendors are significantly more likely to adopt UPI when neighbouring vendors in their market lane have done so — a peer-network diffusion dynamic that suggests cluster-based adoption campaigns, targeting entire market lanes or bazaar sections simultaneously rather than individual vendors, would produce greater adoption ROI than scatter-shot individual outreach.

Fraud anxiety's strong negative effect ($\beta = -0.29$) points to a specific and addressable barrier. The National Payments Corporation of India (NPCI) and partnering banks have established dispute resolution mechanisms for UPI transactions, but awareness of these mechanisms among street vendors is negligible. A targeted awareness campaign — delivered through printed QR code sleeves with a helpline number, through market association meetings, and through simple Punjabi-language WhatsApp messages from bank representatives — explaining how to report and recover incorrect transfers would directly reduce the anxiety dimension without requiring changes to the payment system itself.

Three concrete recommendations emerge. First, the Punjab Government's Digital Payments promotion programme should shift from individual-outreach to lane-by-lane or bazaar-by-bazaar adoption drives, leveraging the strong social influence effect identified in this study. Second, NPCI should develop and distribute, through partner banks, simple Punjabi-language guides — printed and voice-based — explaining the UPI dispute resolution process, making the dispute mechanism visible and accessible to low-literacy users. Third, banks should consider offering micro-merchants a merchant UPI dashboard — accessible through basic smartphones — that shows daily transaction history, pending settlements, and a one-click complaint button, reducing the perceived opacity that feeds fraud anxiety.

Limitations of this study include the single-city scope — Ludhiana's vendor population may differ in digital readiness from vendors in smaller Punjab towns or in predominantly agricultural market towns like Moga or Fazilka. The cross-sectional design captures adoption intention at a single point in time; longitudinal follow-up would reveal whether expressed intentions translate into actual adoption behaviour and whether trust builds or erodes with usage experience. Future research extending this TAM framework to rural haat vendors and agricultural produce sellers — the most digitally underserved commercial population in Punjab — would provide a valuable complement to the urban street vendor evidence generated here.

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