IOSR Journal of Business and Management (IOSR-JBM)
e-ISSN:2278-487X, p-ISSN: 2319-7668. Volume 27, Issue 11. Ser. 1 (November. 2025), PP 75-81
www.iosrjournals.org

Digital-Payment Adoption Among Small Merchants in India: Study of Digital Payment Behaviour and Transaction Friction

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Abstract
India's digital-payment infrastructure has expanded dramatically, yet infrastructure growth alone does not explain whether small merchants use digital payments for most sales. This paper synthesizes evidence on the adoption of digital payments among small merchants, with emphasis on Unified Payments Interface (UPI), merchant experience, customer demand, perceived risk, business routines, and policy support. Sources include the Center for Financial Inclusion's interviews with 50 micro-merchants, a published study of 1,003 fixed-store merchants in Jaipur, a small-merchant UPI preprint, official NPCI/Indian government statistics, PM SVANidhi policy material, and a statistical-method reference [1–8].
The review distinguishes access, first-time adoption, repeat use, and meaningful use. Published Jaipur data report that 58% of surveyed merchants had not adopted digital payments, while among merchants using a digital method, cash and cheque still represented 81.37% of transaction value with customers and 90.81% with suppliers [2,3]. At the national infrastructure level, official figures report 24,161.69 crore UPI transactions in FY 2025–26, with a transaction value of about ■314 lakh crore [4,5]. These figures describe different levels of the system and should not be treated as directly comparable.
The paper adds descriptive calculations, graphs, a proposed adoption framework, and a future mixed-method research protocol. The central interpretation is that adoption is an ecosystem outcome shaped by merchant confidence, customer demand, supplier practices, system reliability, and institutional support. Recommendations focus on measuring active and sustained use, strengthening dispute resolution, offering practical local-language training, and avoiding claims of causal impact without suitable evaluation. The study is a desk-based synthesis, not a systematic review or original empirical survey.
Research questions
1. What factors encourage or discourage small merchants from accepting and routinely using digital payments?
2. How do customer demand, trust, suppliers, and perceived formalization risks interact?
3. What measures could make digital-payment use more reliable and valuable to merchants?

I. Introduction

Small merchants—kirana shops, food stalls, fruit and vegetable vendors, salons, repair shops, and other neighbourhood enterprises— make payment decisions under tight margins and time constraints. Digital payments may reduce the need for exact change, support remote transactions, and create searchable records. They can also introduce concerns about failed transfers, unclear settlement, fraud, refunds, connectivity, privacy, and how digital records may be interpreted.

UPI is a major component of India's retail payment infrastructure. Official statistics show the scale of transaction growth: government figures report 1.78 crore transactions in FY 2016–17 and 24,161.69 crore in FY 2025–26 [4,5]. However, a national transaction total cannot tell us whether a particular merchant receives UPI payments regularly, whether most sales remain cash-based, or whether use is driven by customer pressure rather than perceived merchant benefit.

The distinction between access and use is crucial. A displayed QR code is evidence of acceptance capability, not necessarily frequent use, trust, or business benefit. A merchant can accept UPI while retaining cash for customers who prefer it, for supplier purchases, or as a fallback during network problems.

Problem statement

Digital-payment adoption is often framed as an infrastructure or awareness challenge. Research from Jaipur suggests that basic prerequisites alone do not fully explain adoption patterns: 98.6% of the surveyed firms were considered feasible prospective users, but 58% had not adopted any digital-payment method [2,3]. This suggests that incentives, demand, perceived risks, and business routines deserve equal attention.

Aim and contribution

This paper integrates merchant-level evidence with national infrastructure and policy context. It contributes a transparent descriptive calculation section, a four-layer conceptual framework, and recommendations for research and programme evaluation. It does not claim to establish causality or to represent all Indian merchants.

II. Literature Review

2.1 Micro-merchant perspectives

The Center for Financial Inclusion's 2020 article reports interviews and discussions with 50 micro-merchants in Delhi, Krishnagiri, Guntur, and Hyderabad. It highlights the gap between having basic prerequisites and deciding to use digital payments. Awareness, customer demand, supplier payment routines, and practical concerns emerge as important themes [1]. The study's small sample is useful for understanding experiences, but it should not be interpreted as a national prevalence survey.

2.2 Jaipur merchant study

Ligon, Malick, Sheth, and Trachtman analysed survey data from 1,003 small fixed-store merchants in Jaipur collected in 2017. They found that 58% had not adopted digital payments. They also reported that, among digital-payment users, an average
81.37% of transaction value with customers remained cash or cheque and only 18.63% was digital. For supplier payments,
90.81% was cash or cheque and 9.19% digital [2,3]. The study found evidence that perceived lack of customer demand and concerns about tax liability may matter, while supply-side prerequisites alone did not explain low adoption.

2.3 UPI-specific merchant behaviour

The user-provided Research Archive preprint discusses UPI adoption and use among small merchants and payers [6]. As a preprint, it should be treated as provisional evidence. Its value for this synthesis is as a source of hypotheses about consumer-led adoption and context-dependent payment choices; its claims should not be generalized without checking the full methods, sample, and peerreview status.

2.4 Digital payments and financial inclusion

Digital records may potentially support bookkeeping and interactions with formal financial institutions, but records do not automatically result in credit approval. Benefits depend on whether merchants understand the service, institutions accept the records, data are handled transparently, and merchants trust the terms. Policy links between digital payments and credit should therefore be evaluated rather than assumed.

III. National Context: Growth of UPI

The scale of UPI growth is important context for the merchant adoption question. Government statistics published in August 2026 report annual UPI volume of 1.78 crore transactions in FY 2016–17 and 24,161.69 crore in FY 2025–26. The same release reports annual transaction value increasing from ■0.07 lakh crore to approximately ■314 lakh crore [4,5].

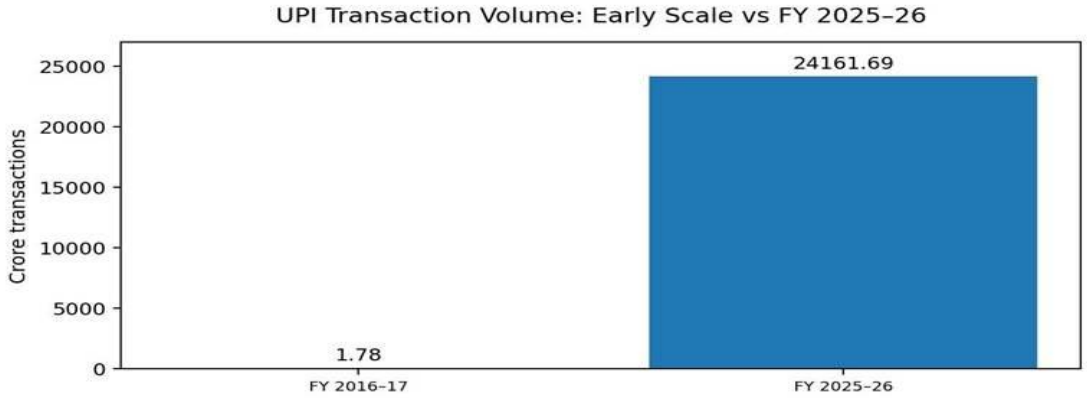


Figure 1. UPI transaction volume at two reported fiscal-year points. The large scale difference is shown using the published values; this chart does not display every intervening year.

Calculation 1 — transaction-volume multiple:

24,161.69 crore ÷ 1.78 crore = approximately 13,574 times.

This is a simple ratio of the two reported annual totals, not a causal estimate. It indicates the magnitude of infrastructure expansion, but it does not show how evenly use is distributed among merchants.

IV. Transaction Value and Descriptive Calculations

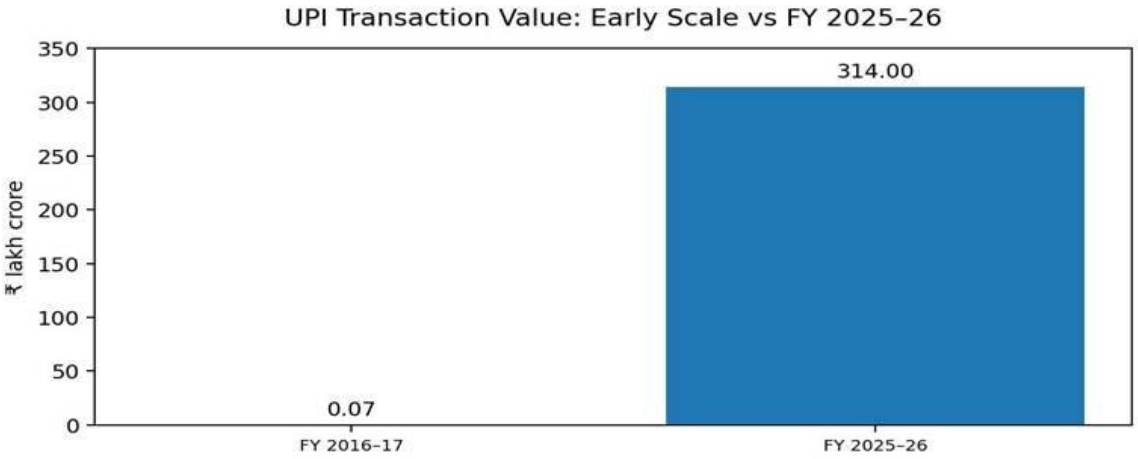


Figure 2. UPI annual transaction value at the beginning and end of the reported period. Source values are rounded in the official release [4,5].

Calculation 2 — transaction-value multiple:
■314 lakh crore ÷ ■0.07 lakh crore = approximately 4,486 times.
Because the starting value is rounded to two decimal places, this ratio should be interpreted as approximate.
Calculation 3 — approximate average transaction value in FY 2025–26
Reported annual value: ■314 lakh crore = ■314 × 100,000 crore rupees. Reported volume: 24,161.69 crore transactions.
Approximate average = (314 × 100,000) ÷ 24,161.69 = about ■1,299 per transaction.
This is an ecosystem-wide arithmetic average. It is not the average transaction size of a small merchant, nor does it imply that most payments are around ■1,299. A distribution of transaction sizes would be needed to understand typical merchant payments.

Annual growth rates reported by government
The government release reports year-on-year growth of 30.0% in volume and 20.59% in value for FY 2025–26 [4]. These reported growth rates are cited as published, rather than reconstructed from rounded totals.

V. Merchant Adoption: The Jaipur Evidence

National totals describe the payment system; merchant surveys describe behaviour within a specific setting. The Jaipur study surveyed 1,003 small fixed-store merchants. It reported that 42% had adopted some digital-payment method and 58% had not
[2,3].

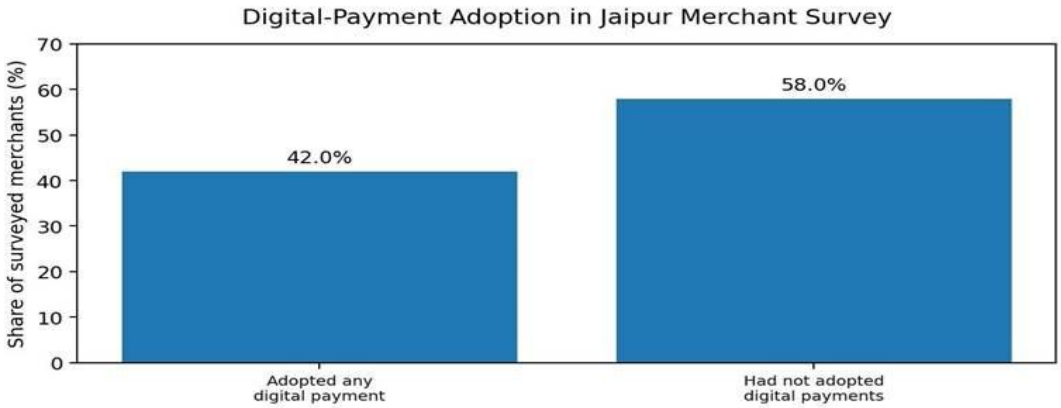


Figure 3. Adoption status in the 2017 Jaipur survey. The percentages refer to that sample and should not be treated as current national rates.

Calculation 4 — approximate counts in the sample:
Adopters: 1,003 × 0.42 = 421.26, approximately 421 merchants. Non-adopters: 1,003 × 0.58 = 581.74, approximately 582 merchants.
These are approximate reconstructed counts because the published percentages are rounded. The study itself reports the sample size and percentages; the calculation does not replace its original table.

Readiness is not the same as adoption

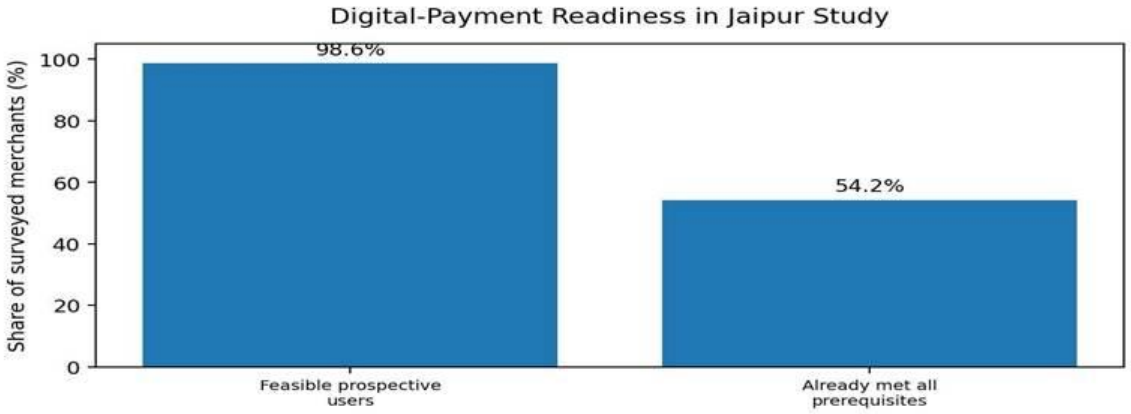


Figure 4. Two readiness measures reported by the Jaipur study. "Feasible prospective users" and "already met all prerequisites" are different categories, not complementary parts of one total [2,3].

VI. How Much of Merchants' Business Was Digital?

The Jaipur study found that digital-payment adopters still relied heavily on cash or cheques. For transactions with customers, the reported average mix was 81.37% cash/cheque and 18.63% digital. For payments to suppliers, it was 90.81% cash/cheque and 9.19% digital [2,3].

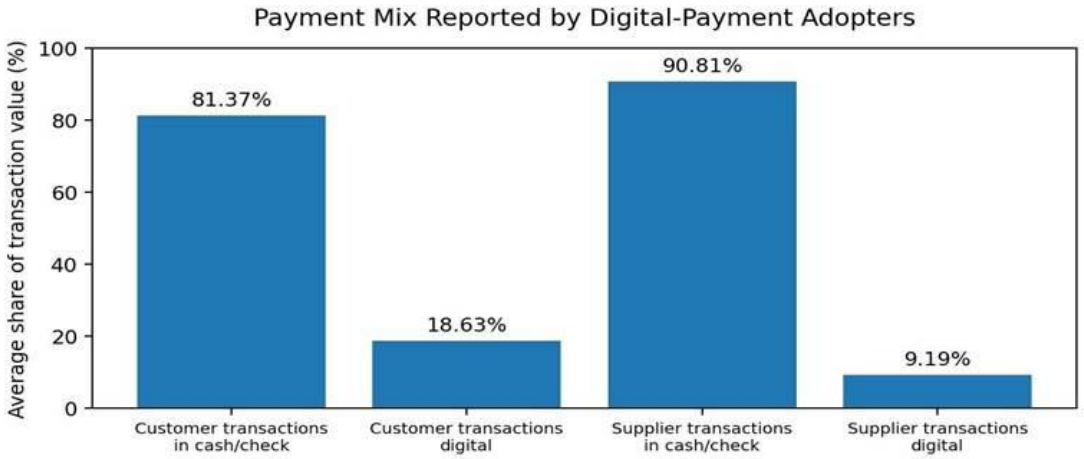


Figure 5. Reported average transaction-value mix among merchants using digital-payment technologies. The figures describe different payment directions and the adopter subgroup only.

Calculation 5 — customer-side digital share versus supplier-side digital share:
18.63% − 9.19% = 9.44 percentage points.
The reported digital share was 9.44 percentage points higher for customer receipts than supplier payments. This is a descriptive difference, not a test of statistical significance. The figures concern average transaction value shares and should not be confused with the percentage of merchants who use digital payments.

Interpretation
The gap suggests that accepting digital payments from customers does not necessarily digitize the merchant's expenditure side. If suppliers continue to demand cash or cheques, merchants may still need cash on hand. Future research should examine both incoming and outgoing payments.

VII. Proposed Conceptual Framework

The evidence supports a framework with four interacting layers. It is a proposed synthesis to guide future fieldwork, not a statistically validated model.

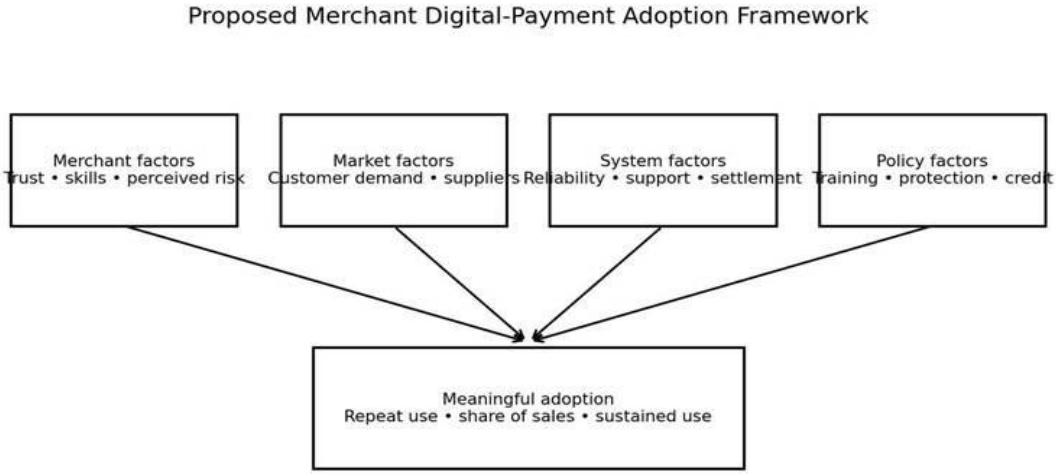


Figure 6. Proposed framework linking merchant, market, system, and policy factors to meaningful adoption.

Operational definition of meaningful adoption

For future research, meaningful adoption should be measured across several stages: (1) awareness; (2) access to a working payment method; (3) first successful transaction; (4) repeated use; (5) share of eligible transactions made digitally; and (6) continued use over time. This avoids treating a QR code or one-time transaction as proof of sustained use.

Research propositions

P1: Perceived customer demand is associated with active UPI use. P2: Confidence in payment confirmation and complaint resolution is associated with continued use. P3: Supplier acceptance is associated with the share of business expenses paid digitally. P4:
Practical training plus follow-up support is associated with more sustained use than one-time onboarding. P5:
Perceived record-keeping or credit benefits influence use when the link is understandable and trusted.
These propositions need testing; they are not empirical findings established by this desk review.

VIII. Methodology and Analytical Plan

8.1 Design and source selection

This is a qualitative desk-based synthesis of selected academic, institutional, and government sources. Sources were included because they address merchant adoption, payment-system scale, public programmes, or statistical methods. The analysis identifies repeated themes and contrasts their contexts. The source set is not exhaustive and this paper should not be described as a systematic review.

8.2 Qualitative coding

A future field study could code interviews under: perceived benefits; customer demand; supplier practices; trust and transaction failure; awareness and digital confidence; perceived formalization risk; bookkeeping; access to support; and policy experiences. Coding should preserve contradictory cases and include reflexive notes so that researchers can explain how interpretations were developed.

8.3 Proposed quantitative component

A structured survey could collect categorical variables such as adoption status (yes/no), awareness (aware/not aware), business type, and customer demand (often/sometimes/rarely). These can be cross-tabulated. A chi-square test of independence may be suitable if observations are independent and expected cell counts are adequate [8].
Formula for the chi-square statistic: $\chi^2 = \Sigma\ (O - E)^2 / E$

O represents observed counts and E represents counts expected under the null hypothesis. The test evaluates whether categorical variables are associated; it does not prove causation. Report χ^2, degrees of freedom, sample size, p-value, and preferably an effectsize measure such as Cramér's V.

Example hypothesis — no invented result
H■: UPI adoption and digital-payment awareness are independent in the sampled merchant population. H■: UPI adoption and awareness are associated. Without raw cross-tabulated counts, no chi-square statistic or p-value can be calculated. This paper therefore does not fabricate a test result.

IX. Discussion and Recommendations

9.1 Make reliability visible
Merchants need clear payment-status information, searchable receipts, accessible complaint channels, and a predictable process for failed or disputed transactions. Evaluation should track how quickly problems are resolved, not just the number of QR codes distributed.

9.2 Support the entire payment ecosystem
Customer demand can encourage merchants to adopt, but supplier-side acceptance matters too. Market associations, wholesalers, payment providers, and local authorities can coordinate practical support so merchants do not carry the burden alone.

9.3 Replace one-time awareness with practical confidence
Local-language demonstrations should cover checking payment status, identifying suspicious proof of payment, reconciling transactions, and getting help. Training should be followed by support and should not assume smartphone ownership guarantees confidence.

9.4 Evaluate outcomes beyond registrations
Programmes should track first use, repeat use, share of eligible transactions, continued use after incentives change, complaint resolution, and user understanding. Results should be disaggregated by business type, location, and relevant demographic characteristics when ethically and legally appropriate.

9.5 Communicate formalization and credit links accurately
Perceived tax concerns appear in the Jaipur research [2,3], but this does not establish that UPI use automatically changes tax liability. Public communication should provide accurate guidance and avoid unsupported promises that transaction records will automatically result in loans.

9.6 Future fieldwork protocol
A feasible exploratory study could interview 25–40 merchants across two or three market settings, including adopters, non-adopters, discontinued users, and merchants who accept digital payments but mostly transact in cash. Questions should ask about recent payment experiences, customer requests, supplier payments, record keeping, and dispute handling. This is a proposed design; no such interviews are claimed in this paper.

X. Limitations

The review is limited by its selected source set, varying publication dates, different sample designs, and reliance on published summaries for some findings. The Jaipur study reflects fixed-store merchants surveyed in 2017, not all vendors or current conditions. A preprint is provisional evidence. Aggregate UPI statistics cannot explain individual merchant experience. Calculations use rounded published figures and therefore are approximate. No original fieldwork or raw-data reanalysis was conducted.

XI. Conclusion

India's UPI infrastructure has expanded to an enormous scale, but system growth and meaningful merchant adoption are different questions. The Jaipur evidence shows why: a substantial share of surveyed merchants had not adopted digital payments, and cash or cheques still represented most transaction value even among adopters. Customer demand, trust, supplier routines, system reliability, and institutional support all shape how useful digital payments are in everyday commerce.

The recommended approach is ecosystem-based. Providers should improve confirmation and dispute resolution; programmes should support practical, sustained use; suppliers and market associations should be included; and researchers should measure outcomes beyond registrations. Qualitative inquiry is especially valuable for explaining how merchants interpret benefits and risks, while representative surveys and carefully

selected statistical tests can estimate patterns. The paper's framework and propositions should be treated as starting points for future testing, not as causal conclusions.

Research integrity statement

All quantitative calculations shown are arithmetic based on published figures and are labeled as approximate where source values are rounded. Graphs are original visualizations of cited data. No synthetic survey data, p-values, or fieldwork results have been presented as real observations.

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