

Determinants of Digital Payment Adoption Among Rural Consumers in Bihar

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Abstract

This paper investigates the key determinants influencing the adoption of digital payment systems—such as Unified Payments Interface (UPI), mobile wallets, and debit/credit cards—among rural consumers in Bihar. Despite the rapid expansion of India’s digital financial ecosystem, rural areas continue to lag behind urban counterparts in terms of adoption, largely due to infrastructural constraints, socio-economic disparities, and behavioural barriers. To address this issue, the study employs a cross-sectional survey dataset of 600 rural households drawn from five districts of Bihar. An econometric model, specifically a binary logistic regression, is used to analyse the relationship between household-level socio-economic characteristics and the probability of adopting digital payment systems. The variables considered include age of household head, years of education, monthly income, financial literacy, trust in banks, smartphone ownership, and distance to the nearest bank branch. The results reveal that education level, household income, and financial literacy emerge as the most significant positive determinants of adoption. Households with higher education are more capable of understanding digital tools, those with greater income are better equipped to afford smartphones and internet services, and financially literate households are more confident in using digital platforms. Conversely, age is found to have a negative impact, indicating that older consumers are less likely to embrace digital technologies, often due to unfamiliarity or discomfort with mobile-based applications. In addition, lack of trust in digital systems and banks reduces adoption, highlighting the importance of confidence-building measures and consumer protection. Overall, the study demonstrates that digital adoption in rural Bihar is not only a question of access to technology but also a function of human capital and trust in institutions. The findings provide critical insights for policymakers, banks, and development agencies to design targeted interventions—such as financial literacy campaigns, simplified digital interfaces, and stronger grievance redressal mechanisms—to accelerate digital inclusion in rural India.

Key words; Digital Payment Adoption, Consumer Behaviour, Rural India, Financial Literacy

Introduction

Consumer behaviour in financial services is undergoing rapid transformation due to the rise of digital payment systems. India's digital payment ecosystem has expanded rapidly in the last decade, led by Unified Payments Interface (UPI), Aadhaar-enabled Payment Systems (AePS), and mobile wallets. Yet, consumer adoption is uneven across rural and urban areas. While digital transactions are common in urban India, rural regions continue to rely heavily on cash. Bihar, one of India's most rural and agrarian states, presents a unique case where financial inclusion efforts through Regional Rural Banks (RRBs), self-help groups (SHGs), and banking correspondents (BCAs) intersect with government initiatives such as *Digital India*. Despite this push, adoption rates remain low. This study explores the determinants of digital payment adoption among rural consumers in Bihar through an econometric analysis. While urban consumers have embraced UPI and mobile wallets, rural adoption remains uneven. Understanding these determinants is critical for policymakers, banks, and financial institutions aiming to enhance financial inclusion.

Research Questions:

1. What socio-economic factors affect the adoption of digital payments in rural areas?
2. How significant are education and financial literacy in influencing consumer behaviour?
3. Does trust in banking institutions moderate adoption?

Objectives:

1. To analyse socio-economic and behavioural factors affecting digital payment adoption.
2. To test whether education, income, and financial literacy are significant predictors.
3. To provide policy recommendations for enhancing financial inclusion.

Hypotheses:

- H1: Higher education increases the likelihood of digital payment adoption.
- H2: Younger consumers are more likely to adopt digital payments.
- H3: Financial literacy positively affects adoption.
- H4: Trust in banks moderates digital adoption.

Literature Review

Several studies across different contexts provide insights into the determinants and barriers of digital payment adoption.

Dixit and Prasad (2020) note that the spread of digital payments in India has been largely urban-centric, with much higher adoption rates in metropolitan and semi-urban areas compared to rural regions. They attribute this disparity to better infrastructure, higher literacy, and easier access to smartphones and internet connectivity in urban areas. The rural-urban gap highlights the need for policies tailored to rural socio-economic conditions.

Econometric evidence from China presented by Zhou (2021) shows that household income and digital literacy are strong predictors of digital payment adoption. Households with higher income levels are more likely to own smartphones and access internet services, while digital literacy improves the confidence and ability of consumers to use mobile-based financial platforms. The findings, though from a different country, have strong relevance to India's rural context where similar divides exist.

Li and Lee (2019) provide evidence that younger consumers are more open to adopting mobile-based technologies compared to older age groups. Younger individuals are typically more adaptable, have higher exposure to digital ecosystems, and show lower resistance to technological change. In contrast, older consumers often display reluctance due to perceived complexity or lack of familiarity with digital systems.

Kumar and Arora (2021) demonstrate that awareness and knowledge of digital platforms significantly increase the probability of adoption. Households that are exposed to demonstrations, training programs, or peer usage are more likely to experiment with and eventually adopt digital financial services. This reinforces the importance of financial literacy initiatives in rural India.

Singh and Sahu (2022) highlight that one of the most common barriers to adoption in rural areas is fear of fraud, misuse of personal data, and general mistrust of formal banking systems. Negative experiences or lack of adequate grievance redressal mechanisms create skepticism among rural consumers, discouraging them from moving away from cash-based transactions. Building robust consumer protection frameworks and trust in formal institutions is therefore critical for scaling adoption.

Data & Methodology

Data Source

Primary data were collected in 2025 from 600 rural households across five districts in Bihar (Patna, Nalanda, Bhagalpur, Gaya, and Buxar). Stratified random sampling ensured representation of different income groups and demographics.

Variables

Dependent Variable:

- *Digital Adoption (binary)* = 1 if the household uses UPI/mobile wallets/debit card for payments, 0 otherwise.

Independent Variables:

- Age (years)
- Gender (1=male, 0=female)
- Education (years of schooling)
- Monthly Income (INR)
- Financial Literacy Score (0–10, from quiz-based test)
- Trust in Bank (Likert scale 1–5)

Control Variables:

- Household size
- Distance to nearest bank branch
- Smartphone ownership

Econometric Model

To estimate the determinants of digital payment adoption among rural consumers, we use a binary logistic regression model, since the dependent variable (*Digital Adoption*) takes the value 1 if a household has adopted digital payments (UPI, mobile wallets, debit/credit cards) and 0 otherwise.

The logistic model is specified as:

$$\text{Logit}(P_i) = \ln[P_i / (1 - P_i)]$$

$$= \beta_0 + \beta_1(\text{Age}_i) + \beta_2(\text{Education}_i) + \beta_3(\text{Log Income}_i) + \beta_4(\text{Financial Literacy}_i) + \beta_5(\text{Trust}_i) + \beta_6(\text{Smartphone}_i) + \beta_7(\text{Distance to Bank}_i) + \beta_8(\text{Household Size}_i) + \epsilon_i$$

Where:

- P_i = probability that household i adopts digital payments
- Age = age of household head (in years)
- Education = years of schooling
- Log Income = natural logarithm of monthly household income
- Financial Literacy = score from 0–10 test
- Trust = trust in banks (Likert scale 1–5)
- Smartphone = 1 if household owns a smartphone, 0 otherwise
- Distance to Bank = distance to nearest bank branch (km)
- Household Size = number of family members

For robustness, a Probit regression is also estimated using the same set of explanatory variables.

Result

Descriptive Statistics

- Average age of household head: 44 years.
- Education: mean of 6.8 years.
- Monthly income: ₹12,500 (median).
- 45% of households adopted at least one form of digital payment.

Regression Results

Table 1: Logistic Regression Estimates

Variable	Coefficient (β)	Std. Error	Odds Ratio	Significance
Age	-0.040	0.012	0.96	***
Education (years)	0.180	0.032	1.20	***
Log(Income)	0.050	0.021	1.05	**
Financial Literacy	0.210	0.046	1.23	***

Variable	Coefficient (β)	Std. Error	Odds Ratio	Significance
Trust in Banks	0.120	0.059	1.13	**
Smartphone Ownership	0.560	0.144	1.75	***
Distance to Bank	-0.090	0.037	0.91	**
Constant	-1.340	0.522	—	**

Pseudo $R^2 = 0.312$ $N = 600$

Table 2: Probit Regression Estimates (Robustness Check)

Variable	Coefficient (β)	Std. Error	Significance
Age	-0.022	0.009	***
Education (years)	0.102	0.021	***
Log(Income)	0.028	0.013	**
Financial Literacy	0.120	0.026	***
Trust in Banks	0.071	0.033	**
Smartphone Ownership	0.310	0.082	***
Distance to Bank	-0.052	0.024	**
Constant	-0.740	0.310	**

Significance codes: *** $p < 0.01$, ** $p < 0.05$

Result

- Education ($\beta=0.18$, $p<0.01$) significantly increases adoption.
- Income ($\beta=0.05$, $p<0.05$) has a positive effect.
- Age ($\beta=-0.04$, $p<0.01$) negatively impacts adoption.
- Financial Literacy ($\beta=0.21$, $p<0.01$) strongly predicts adoption.
- Trust in Bank ($\beta=0.12$, $p<0.05$) is significant.

Marginal Effects:

- One extra year of education $\rightarrow$ 2% higher probability of adopting digital payments.
- 10% increase in income $\rightarrow$ 1% higher probability.

Findings;

The findings confirm that **education and financial literacy are crucial drivers** of digital adoption. Age and resistance to technology hinder rural adoption. Policymakers must enhance financial literacy programs and improve trust-building measures (e.g., fraud prevention campaigns). Banks should leverage BCAs and SHGs to spread awareness.

Conclusion & Policy Implications

The findings of this study highlight several important policy implications that can enhance digital payment adoption among rural households in Bihar and similar contexts:

1. Promote rural financial literacy campaigns

Lack of awareness and limited financial knowledge remain major barriers to the uptake of digital payments in rural areas. Government agencies, banks, and local self-help groups should jointly organize **financial literacy camps, school-level programs, and village workshops** to demonstrate the benefits of digital payments, the steps involved, and safety measures against fraud. Campaigns delivered in local languages and using folk media or community radio can significantly increase understanding and acceptance among rural consumers.

2. Subsidize smartphone ownership and strengthen digital infrastructure

Smartphone penetration and reliable internet access are critical enablers of digital payment adoption. However, affordability constraints limit access in rural regions. Policymakers should consider **subsidies, installment purchase schemes, or trade-in programs** to make smartphones affordable for low-income households. At the same time, investment in rural **4G/5G network expansion, village-level Wi-Fi hotspots, and solar-powered charging stations** is essential to ensure uninterrupted access. Bridging the digital divide will directly translate into higher adoption rates.

3. Strengthen consumer protection policies to build trust

Trust in banks and digital platforms is a decisive factor for adoption. Many rural users remain hesitant due to fears of fraud, unauthorized deductions, or lack of grievance redressal. Regulators and banks should design **strong consumer protection mechanisms**, including easy reporting channels for fraud, quick dispute resolution systems, and transparent transaction records accessible in local languages. Regular communication about these

safeguards will build confidence among hesitant consumers and reduce resistance to digital adoption.

4. **Target elderly and low-education households with simplified digital interfaces**

Older consumers and those with limited education face challenges in navigating complex digital apps. Service providers should develop **simplified, user-friendly interfaces** with large fonts, voice-assisted commands in local dialects, and minimal steps for completing a transaction. Training “digital volunteers” or leveraging local Banking Correspondents (BCs) to provide one-on-one assistance can further ease adoption. Designing for inclusivity ensures that vulnerable groups are not left behind in the digital transition.

Limitations and Future Research

While the study provides important insights into the determinants of digital payment adoption among rural consumers, a few limitations must be acknowledged. These limitations also highlight areas for future research:

1. **Use of cross-sectional data**

The present study relies on cross-sectional survey data collected at a single point in time. Although such data are valuable in identifying correlations between socio-economic factors and digital payment adoption, they cannot fully capture the dynamic nature of adoption behavior. Digital usage is often shaped by changing factors such as seasonal income flows, evolving banking infrastructure, government policies, and peer influence over time. Future studies employing **panel data or longitudinal surveys** would enable a more nuanced understanding of how adoption evolves, which factors persist, and which ones diminish in importance across different periods.

2. **Exclusion of behavioral biases**

The analysis is largely restricted to socio-economic and institutional variables such as education, income, financial literacy, and trust in banks. However, **behavioral biases**—including risk aversion, status quo bias, or overconfidence—may significantly influence consumer decisions to adopt or reject digital financial tools. For instance, highly risk-averse individuals may avoid digital payments due to fear of fraud, while others may prefer cash because of entrenched habits. Incorporating behavioral economics approaches in future research would enrich the understanding of digital adoption by highlighting the psychological and attitudinal dimensions that go beyond measurable socio-economic indicators.

3. Geographic scope limited to Bihar

This study is confined to three districts of Bihar, which provides an important but localized picture of rural digital payment behavior. However, Bihar's socio-economic and infrastructural conditions may not be representative of all Indian states. Differences in literacy levels, financial inclusion policies, digital infrastructure, and cultural attitudes toward technology mean that determinants of adoption may vary widely across regions. Future research should therefore **replicate this study in other states or undertake cross-state comparisons** to test the robustness and generalizability of the findings. Such replication would help in designing region-specific strategies while also contributing to a more comprehensive national perspective on digital adoption.

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