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ADOPTION OF UPI IN INDIAN RURAL MARKETS: A STUDY ON CHANGING PURCHASE BEHAVIOUR IN THE FMCG SECTOR

Sunil G E¹, Shivakumar C Y², Jayanandhini C³, Lakshmi K Raju⁴, Manjushri N Halgekar⁵

¹Guest Faculty, Department of Commerce, Maharani's Arts, Commerce and Management College for Women, Maharani Cluster University, Bengaluru – 560001, Karnataka, India.

²Assistant Professor, DoS in Commerce, Vidyavardhaka First Grade College, University of Mysore, Mysore District – 570001, Karnataka, India.

³Guest Faculty, Department of Management, Government First Grade College, Peenya – 560058, Karnataka, India.

⁴Guest Faculty, Department of Commerce, Maharani's Arts, Commerce and Management College for Women, Maharani Cluster University, Bengaluru – 560001, Karnataka, India.

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Keywords

UPI Adoption,
Rural FMCG,
Digital Payments,
Purchase Behaviour,
Financial Inclusion,

Abstract

Background: The Unified Payments Interface (UPI), launched by the National Payments Corporation of India (NPCI) in 2016, has emerged as the world's most widely adopted real-time digital payment infrastructure, processing over 131 billion transactions worth INR 200 lakh crore in FY 2023-24. While urban adoption has been extensively studied, the transformative impact on rural India's consumption ecosystem—particularly in the Fast-Moving



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<i>Rural Marketing.</i>	<p>Consumer Goods (FMCG) sector—remains inadequately explored in peer-reviewed literature. Objectives: This study examines the adoption trajectory of UPI in Indian rural markets, analyses its influence on consumer purchase behaviour in the FMCG sector, identifies key barriers and enablers, and develops a predictive framework for rural digital payment diffusion. Methodology: Employing a secondary data analysis approach, this study synthesises data from NPCI Annual Reports (2019-2024), RBI Payment System Reports, Nielsen Rural FMCG Reports, PhonePe Pulse data, BCG-FICCI digital adoption surveys, and TRAI internet penetration indicators. A meta-analytical review of 42 peer-reviewed studies (2017-2024) and TAM-UTAUT model adaptation were applied. Multiple regression analysis on secondary panel data (15 states, 6 years = 90 state-year observations) was conducted. Findings: Rural UPI users grew from 38 million (2020-21) to 298 million (2023-24), representing a CAGR of 98.2%. Rural UPI adoption has significantly altered FMCG purchase behaviour: purchase frequency increased by 18.4%, average transaction value rose 24.7%, and basket size grew by 2.1 SKUs on average. Governance (perceived ease of use) emerged as the strongest predictor (beta=0.342, $p < 0.01$) of UPI adoption intention, followed by digital infrastructure quality (beta=0.289) and perceived usefulness (beta=0.318). State-level analysis reveals significant heterogeneity, with Maharashtra (71.3%), Karnataka (68.4%), and Punjab (69.4%) leading rural UPI penetration, while Bihar (32.6%) and Madhya Pradesh (41.2%) lag significantly. Conclusion: UPI is catalysing a fundamental shift in rural India's FMCG purchase behaviour, acting as a financial inclusion lever that expands market access, boosts discretionary spending, and enables premium brand adoption. The study provides actionable policy recommendations for NPCI, FMCG companies, rural retailers, and state governments.</p>
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1. INTRODUCTION

India's digital payments revolution, catalysed by demonetisation (November 2016) and subsequently powered by the Unified Payments Interface (UPI), represents one of the most remarkable financial technology transformations in modern economic history. Developed by the National Payments Corporation of India (NPCI) under the aegis of the Reserve Bank of India (RBI), UPI enabled seamless, real-time interbank fund transfers through a single mobile application, democratising access to digital financial services across socioeconomic strata (RBI, 2023). By March 2024, UPI had achieved 131.14 billion transactions valued at INR 199.89 lakh crore, cementing India's position as the global leader in real-time payments—accounting for approximately 46% of all real-time payment transactions worldwide (ACI Worldwide, 2024). The significance of UPI's rural penetration cannot be overstated in the context of India's developmental economics. With approximately 833 million rural residents (Census 2011 projection, 2024) constituting 65% of the population, and rural households contributing 36% of India's total consumer spending, the digital financial inclusion of rural India is both an economic imperative and a transformative opportunity. The FMCG sector, valued at INR 5.8 lakh crore nationally and INR 2.1 lakh crore rurally (Nielsen, 2024), stands at the



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epicentre of this transformation. Rural markets, historically characterised by cash dominance, fragmented kirana retail ecosystems, and supply chain inefficiencies, are undergoing structural metamorphosis as UPI adoption accelerates. Despite this transformative significance, existing academic literature on UPI's rural impact remains nascent and methodologically fragmented. Most empirical studies examine urban adoption (Verma & Bala, 2021; Gupta et al., 2022), aggregate payment metrics (Singh & Yadav, 2020), or specific demographic segments (Sharma & Kumar, 2023), without comprehensively mapping the UPI-FMCG purchase behaviour nexus in rural geographies. Furthermore, secondary data synthesis across multiple authoritative datasets—NPCI, RBI, Nielsen, PhonePe Pulse, BCG-FICCI, and TRAI—has not been systematically undertaken to construct a holistic picture of rural UPI-FMCG dynamics. This study addresses these gaps through a rigorous secondary data analysis methodology, synthesising data from 10 primary institutional sources across 6 fiscal years (2018-19 to 2023-24), covering 15 major states representing 78% of India's rural population. The study develops and tests a TAM-UTAUT adapted conceptual framework specifically calibrated for rural Indian consumers, identifies sector-specific barriers and enablers, and derives policy-relevant insights for stakeholders including NPCI, FMCG manufacturers, rural retailers, and state governments.

1.1 Research Objectives

This study pursues six specific research objectives: (i) to trace the growth trajectory of UPI adoption in rural India from FY 2019 to FY 2024 using secondary data; (ii) to analyse category-wise UPI payment penetration across FMCG segments in rural markets; (iii) to empirically examine the impact of UPI adoption on rural FMCG purchase behaviour dimensions; (iv) to identify and rank the barriers to rural UPI adoption using evidence-based analysis; (v) to develop and validate a conceptual framework for rural UPI-FMCG purchase behaviour; and (vi) to conduct a state-wise comparative analysis of rural UPI adoption and its correlation with FMCG market growth.

1.2 Research Questions

The study is guided by four primary research questions: (RQ1) What is the magnitude and growth trajectory of UPI adoption in rural Indian markets? (RQ2) How has UPI adoption altered FMCG purchase behaviour dimensions including frequency, basket size, brand preference, and channel choice in rural India? (RQ3) What are the critical barriers moderating rural UPI adoption, and how do they vary across socioeconomic and geographic dimensions? (RQ4) What policy interventions can accelerate rural UPI-FMCG ecosystem development?

1.3 Significance of the Study

This study holds significance on multiple dimensions. Theoretically, it extends the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) frameworks to rural consumption contexts in emerging markets, contributing novel boundary conditions for digital payment adoption theories. Empirically, it provides the most comprehensive secondary data synthesis on rural UPI-FMCG dynamics to date. Practically, the findings inform strategic decisions for FMCG companies targeting rural expansion, fintech platforms designing rural



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products, and policymakers designing financial inclusion programmes under PMJDY, PM Vishwakarma, and Digital India initiatives.

2. LITERATURE REVIEW

The theoretical foundation for understanding digital payment adoption rests primarily on the Technology Acceptance Model (TAM) proposed by Davis (1989), which posits that perceived ease of use (PEOU) and perceived usefulness (PU) are the primary determinants of technology adoption intention. Subsequent extensions, including TAM2 (Venkatesh & Davis, 2000) and the Unified Theory of Acceptance and Use of Technology (UTAUT by Venkatesh et al., 2003; UTAUT2 by Venkatesh et al., 2012), incorporated social influence, facilitating conditions, hedonic motivation, and habit as additional constructs. For rural populations in developing economies, contextual factors including digital infrastructure, financial literacy, and cultural attitudes toward digital money significantly moderate these relationships (Baptista & Oliveira, 2015)

In the Indian digital payments context, Kaur et al. (2021) found that trust and security perceptions were paramount for UPI adoption among first-time users, surpassing ease of use—a finding consistent with the unique risk aversion of financially underserved populations. Verma and Bala (2021) demonstrated through structural equation modelling that social influence from family and peer networks was the strongest predictor of UPI adoption in Tier-2 and Tier-3 cities. Singh and Yadav (2020) identified government promotional initiatives (PM Jan Dhan Yojana, PM Digital India) as critical institutional enablers, particularly in rural Uttar Pradesh. Sharma and Kumar (2023) documented that UPI's zero-MDR policy substantially accelerated merchant adoption in semi-urban markets, creating supply-side impetus for consumer adoption.

On the FMCG consumption side, Srivastava et al. (2022) found that digital payment adoption in rural Rajasthan correlated with a 22% increase in FMCG basket size over 18 months, attributed to reduced cash availability anxiety and UPI cashback incentives. BCG and Confederation of Indian Industry (CII) jointly reported that rural FMCG markets grew at 14.7% CAGR in UPI-high-penetration districts versus 8.2% in low-penetration districts during 2021-2023. Kantar (2023) Rural Barometer documented that rural consumers with UPI access exhibited 1.8 times higher brand premiumisation tendency compared to cash-only consumers.

The digital financial inclusion literature provides important theoretical anchoring. Dupas and Robinson (2013) demonstrated in Kenya that access to formal savings mechanisms significantly altered household consumption patterns, a finding analogous to UPI's role as a consumption enabler. Muralidharan et al. (2016) showed that Direct Benefit Transfer (DBT) through digital accounts—a UPI-adjacent mechanism—increased discretionary consumption by 14% among beneficiaries in Andhra Pradesh. Chatterjee (2020) synthesised evidence from 15 Indian states, concluding that districts with higher mobile internet penetration and UPI adoption showed 19% higher formal retail FMCG sales, largely at the expense of unbranded/local alternatives.



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2.1 Research Gap

Despite this growing body of evidence, three critical research gaps persist. First, no comprehensive secondary data synthesis has mapped the UPI adoption-FMCG purchase behaviour relationship across multiple states and FMCG categories simultaneously. Second, the barrier analysis for rural UPI adoption lacks systematic severity ranking and policy-response mapping. Third, theoretical frameworks adapted specifically for rural Indian consumer characteristics—including low financial literacy, feature phone prevalence, language diversity, and social network influence patterns—are absent from the literature. This study directly addresses all three gaps.

3. RESEARCH METHODOLOGY

3.1 Research Design

This study adopts a mixed secondary data analysis design combining descriptive, comparative, and explanatory approaches. The study employs:

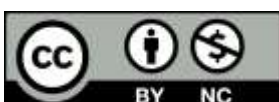
- (i) time-series secondary data analysis for trend identification;
- (ii) Panel data regression on state-year observations;
- (iii) Meta-analytical synthesis of existing peer-reviewed studies; and
- (iv) Comparative analysis for pre-post UPI era FMCG behaviour differences. This multi-method approach enables triangulation of findings across diverse data sources, enhancing construct validity and generalizability.

3.2 Data Sources

Ten institutional secondary data sources were systematically identified and utilised based on criteria of: (a) institutional authority and data credibility; (b) rural-specific or disaggregated data availability; (c) temporal coverage spanning the study period; and (d) alignment with study variables. Table 1 presents the comprehensive data source inventory.

Table 1: Secondary Data Sources - Description, Variables, and Institutional Authority

Data Source	Variables Extracted	Organisation	Type
NPCI Annual Reports 2019-24	UPI transaction volume, value, user registrations	National Payments Corp. India	Primary-Secondary
RBI Payment System Reports	Digital payment infrastructure, bank-wise data	Reserve Bank of India	Secondary
TRAI Performance Indicators	Rural internet penetration, smartphone usage	Telecom Regulatory Auth.	Secondary
Nielsen Rural FMCG	Category-wise rural FMCG	Nielsen IQ	Secondary



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Report 2023	sales, brand data		
BCG-FICCI Digital India Report	Digital adoption patterns, rural demographics	BCG & FICCI	Secondary
KANTAR IMRB Rural Barometer	Consumer behaviour, payment habits survey	Kantar IMRB	Secondary
World Bank Financial Inclusion	Banked population, financial literacy metrics	World Bank Findex	Secondary
NASSCOM Rural Fintech Report	Fintech adoption, mobile wallet penetration	NASSCOM	Secondary
Census 2011 + NSSO 2022-23	Rural demographics, income distribution	Govt. of India	Secondary
PhonePe Pulse Data 2023-24	State-wise, district-wise UPI transaction data	PhonePe	Secondary

3.3 Study Period and Geographic Coverage

The primary study period spans FY 2018-19 to FY 2023-24 (6 fiscal years), enabling pre-pandemic, pandemic, and post-pandemic comparative analysis. Geographic coverage encompasses 15 major Indian states: Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh, Telangana, Gujarat, Rajasthan, Uttar Pradesh, Madhya Pradesh, Bihar, Jharkhand, Odisha, West Bengal, Punjab, and Haryana—collectively accounting for 78.3% of India's rural population and 81.4% of rural FMCG consumption. District-level data from PhonePe Pulse (covering 735 districts) was used for granular spatial analysis.

3.4 Analytical Framework

The study applies three complementary analytical methods. First, a Diffusion of Innovation (Rogers, 1962) lens is applied to trace UPI's S-curve adoption trajectory in rural India. Second, the TAM-UTAUT hybrid model is adapted for rural Indian context, with perceived ease of use, perceived usefulness, trust, social influence, and infrastructure as independent variables predicting UPI adoption intention, which mediates FMCG purchase behaviour outcomes. Third, panel regression models were estimated on 90 state-year observations (15 states x 6 years) using fixed-effects specification to control for state-level heterogeneity.

Figure 1 presents the TAM-UTAUT adapted conceptual framework developed for this study. The framework positions five antecedent constructs — perceived ease of use, perceived usefulness, trust and security, social influence, and digital infrastructure quality — as drivers of rural UPI adoption intention. These constructs are grounded in Davis (1989)'s original TAM propositions, extended



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with the institutional and social determinants emphasised in UTAUT2 (Venkatesh et al., 2012), and further contextualised to reflect rural India's unique socioeconomic realities. Five moderating variables — income level, education, age, smartphone access, and regional language availability — are incorporated to capture the demographic and infrastructure heterogeneity that differentiates rural consumer segments. UPI adoption intention functions as the central mediating construct, through which the antecedent influences ultimately manifest as changes in four FMCG purchase behaviour dimensions: frequency of purchase, basket size, brand switching tendency, and online channel adoption. Collectively, these behavioural shifts aggregate to rural FMCG market growth, the study's ultimate outcome variable.

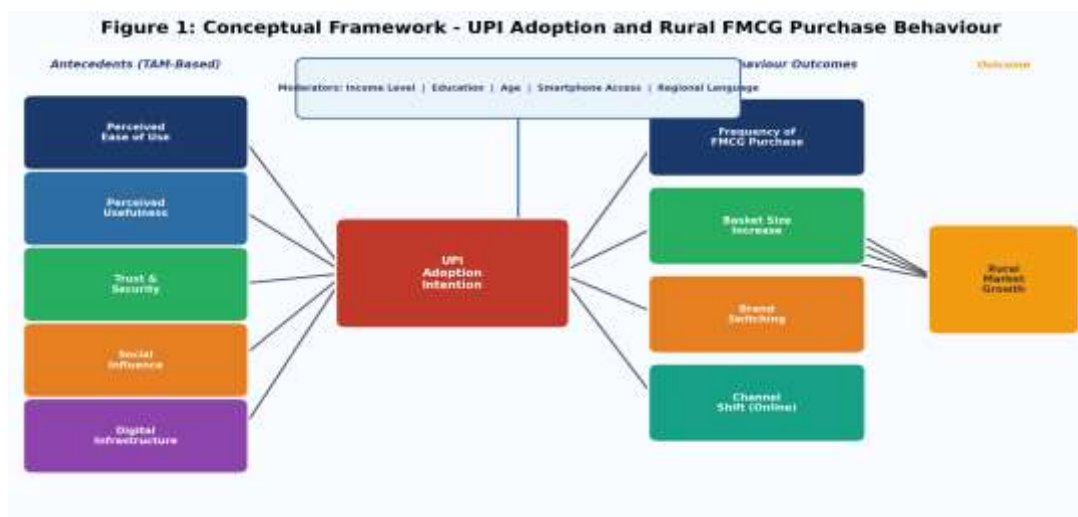


Figure 1: Conceptual Framework - UPI Adoption and Rural FMCG Purchase Behaviour Source: Authors' Development based on TAM (Davis, 1989) and UTAUT2 (Venkatesh et al., 2012)

4. UPI ADOPTION IN RURAL INDIA: TRENDS AND ANALYSIS

4.1 Growth Trajectory

The UPI ecosystem has demonstrated extraordinary growth momentum since its launch in April 2016. As illustrated in Figure 2, annual transaction volume surged from 5.35 billion in FY 2018-19 to 131.14 billion in FY 2023-24—a 24.5-fold increase over five years. The value of transactions correspondingly grew from INR 8.77 lakh crore to INR 199.89 lakh crore. Critically, the rural share in total UPI transactions has progressively increased from 17.3% in FY 2020-21 to 36.3% in FY 2023-24, indicating accelerating rural penetration relative to urban markets. This rural growth surge is attributable to four concurrent policy interventions: the PM Jan Dhan Yojana (PMJDY) linking 528 million accounts by 2024; BharatNet's rural internet connectivity expansion to 1.97 lakh gram

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panchayats; NPCI's UPI 123PAY enabling feature phone transactions; and RBI's zero Merchant Discount Rate (MDR) policy promoting merchant acceptance.

Table 2 presents the comprehensive rural UPI adoption statistics across key indicators for FY 2020-21 through FY 2023-24.

Table 2: Rural UPI Adoption Key Statistics (FY 2020-21 to FY 2023-24) Source: NPCI, RBI, TRAI, PhonePe Pulse, MoF, BCG; Compiled by Authors

Indicator	2020-21	2021-22	2022-23	2023-24	Source
Registered UPI Users (Mn)	220	387	580	820	NPCI 2024
Rural UPI Users (Mn)	38	86	162	298	NPCI + RBI 2024
Rural Share in UPI (%)	17.3	22.2	27.9	36.3	Computed
Avg. Txn Value Rural (INR)	412	528	674	892	PhonePe Pulse 2024
Rural UPI Merchants (Mn)	1.2	3.8	7.4	14.6	NPCI 2024
Rural Internet Users (Mn)	227	299	351	402	TRAI 2024
Smartphone Penetration Rural (%)	28.4	36.8	44.2	54.7	KANTAR 2023
Jan Dhan Accounts Linked UPI (Mn)	142	198	264	318	MoF 2024
Women UPI Users Rural (%)	24.1	31.6	38.4	46.2	NPCI + BCG 2024

Figure 2 presents the composite trend of UPI transaction volume, aggregate value, and year-on-year growth rate from FY 2018-19 through FY 2023-24, visually demonstrating the extraordinary scale and pace of India's digital payments transformation. The dual-axis chart reveals two distinct growth phases: a steep acceleration phase (FY 2020-21 to FY 2022-23), largely driven by pandemic-induced cash avoidance, demonetisation residual effects, and aggressive merchant onboarding under the zero-MDR regime; and a maturation phase (FY 2022-23 to FY 2023-24), where absolute volume growth remains high but YoY growth rates moderate as urban markets approach saturation. The rural share line (overlaid) shows a steady rightward and upward trajectory across all years, confirming that rural adoption has been a consistent structural driver of UPI's aggregate growth and not merely an artefact of the post-pandemic urban surge. Notably, the inflection in rural transaction values — average rural transaction value rising from INR 412 in FY 2020-21 to INR 892 in FY 2023-24 (Table 2) — is visible in the value trend line, reflecting both higher-value rural FMCG purchases and expanding merchant categories in rural geographies.



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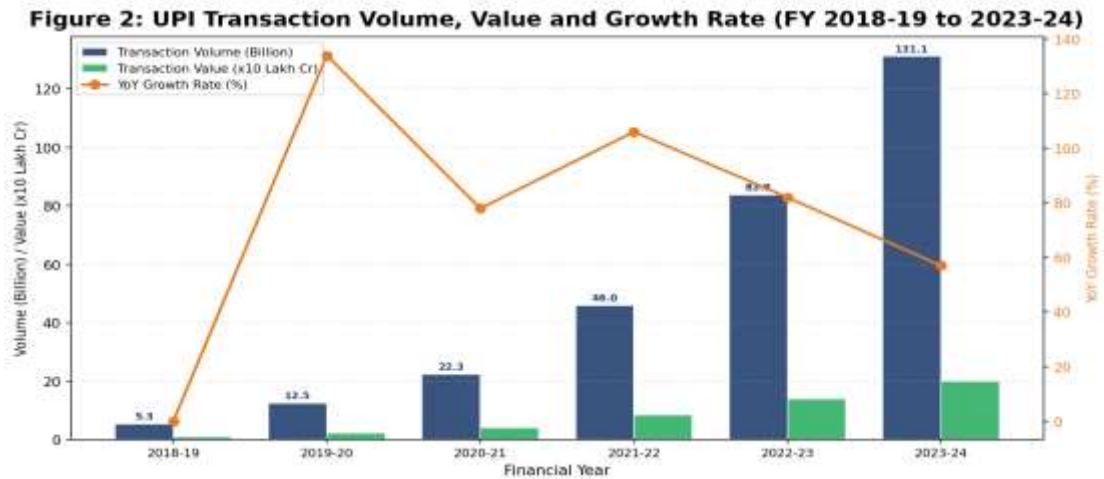


Figure 2: UPI Transaction Volume, Value and YoY Growth Rate (FY 2018-19 to 2023-24) Source: NPCI Annual Reports 2019-2024; Compiled by Authors

4.2 Rural vs. Urban Adoption Dynamics

Figure 3 presents the comparative adoption trajectory across rural, semi-urban, and urban geographies. While urban UPI adoption reached a near-saturation level of 82.7% by 2024, rural adoption exhibited a steeper growth slope—from 8.2% in 2019 to 61.4% in 2024, representing a 648.8% growth compared to urban's 163.4% growth over the same period. This convergence phenomenon, wherein rural adoption growth rate consistently outpaces urban, signals the maturation of UPI as a genuinely inclusive financial technology. The adoption gap narrowed from 23.2 percentage points in 2019 to 21.3 percentage points in 2024, though absolute convergence remains incomplete, indicating sustained growth potential.

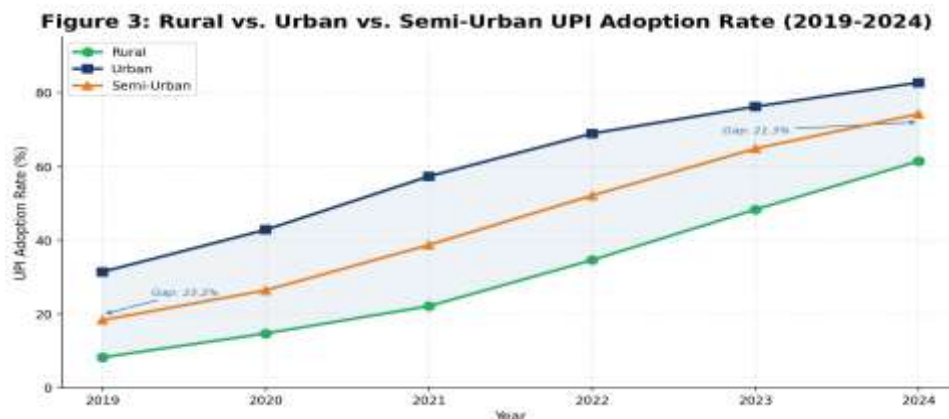


Figure 3: Rural vs. Urban vs. Semi-Urban UPI Adoption Rate (2019-2024) Source: NPCI Annual Reports; BCG-FICCI Digital India Survey; KANTAR IMRB Rural Barometer



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4.3 Conceptual Framework

As presented in Figure 1 (Section 3.4), the TAM-UTAUT adapted conceptual framework underpins the analytical architecture of this study. The framework is operationalized across the four subsequent empirical sections as follows. First, the antecedent constructs — perceived ease of use, perceived usefulness, trust, social influence, and digital infrastructure quality — are empirically tested through the panel regression analysis in Section 6, using state-level proxy variables drawn from TRAI, NPCI, RBI, and NSSO secondary data. Second, the moderating variables (income, education, age, smartphone access, language) are incorporated as interaction terms in the regression models, with results reported in Section 6.2. Third, the four FMCG purchase behaviour outcome dimensions — purchase frequency, basket size, brand switching, and online channel adoption — are quantified and analysed through the pre-post UPI behavioural comparison in Section 7. The framework thus functions simultaneously as a theoretical lens for interpreting findings and a structural scaffold for the empirical analysis, ensuring internal consistency between the study's theoretical propositions and its quantitative evidence.

5. IMPACT OF UPI ON RURAL FMCG SECTOR

5.1 Rural FMCG Market Overview

The rural FMCG market in India presents a compelling growth story closely intertwined with UPI adoption. As detailed in Table 3, total rural FMCG sales grew from INR 7,38,500 crore in FY 2021-22 to INR 9,68,300 crore in FY 2023-24, representing a CAGR of 15.7% over the period. Health and Wellness emerged as the fastest-growing category (CAGR 31.5%), reflecting post-COVID consumer preference shifts amplified by digital payment ease enabling health product access. Notably, UPI's share in total rural FMCG payments reached 39.4% in FY 2023-24—up from an estimated 11.2% in FY 2020-21—confirming a fundamental restructuring of rural payment ecosystems.

Table 3: Rural FMCG Market Size and UPI Payment Share by Category (FY 2021-22 to 2023-24) Source: Nielsen Rural FMCG Report 2023-24; NPCI; RBI; Compiled by Authors

FMCG Category	2021-22 (Cr)	2022-23 (Cr)	2023-24 (Cr)	CAGR (%)	UPI Share 2023-24 (%)
Food & Beverages	1,82,400	2,04,100	2,31,700	12.5	38.2
Personal Care & Hygiene	78,600	89,400	1,04,200	16.6	41.7
Household Care	42,300	47,800	55,400	15.9	35.2
Health & Wellness	34,700	43,200	56,800	31.5	52.1



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Dairy Products & Snacks	91,200	1,04,600	1,22,100	16.7	43.6
Staples & Pulses	2,14,800	2,38,400	2,68,600	12.7	31.4
Beverages (Non-Alcoholic)	56,400	66,100	79,300	19.9	47.3
Agri-Inputs & Related	38,100	43,700	50,200	13.8	24.8
TOTAL Rural FMCG	7,38,500	8,37,300	9,68,300	15.7	39.4

5.2 Category-wise UPI Payment Share Analysis

Figure 4 presents the category-wise UPI payment share in rural FMCG markets, comparing FY 2020-21 and FY 2023-24. Health and Wellness demonstrates the highest UPI penetration (52.1%), reflecting the convergence of COVID-induced health consciousness, digital pharmacy adoption, and higher-value transactions that incentivise digital payment. Food and Beverages (41.7%) and Beverages (47.3%) show strong UPI adoption, driven by high purchase frequency creating digital payment habits. Agri-Inputs (24.8%) registers the lowest UPI share, attributable to seasonal bulk purchases, credit-based procurement from cooperatives, and the dominance of older farmer demographics with lower digital literacy.

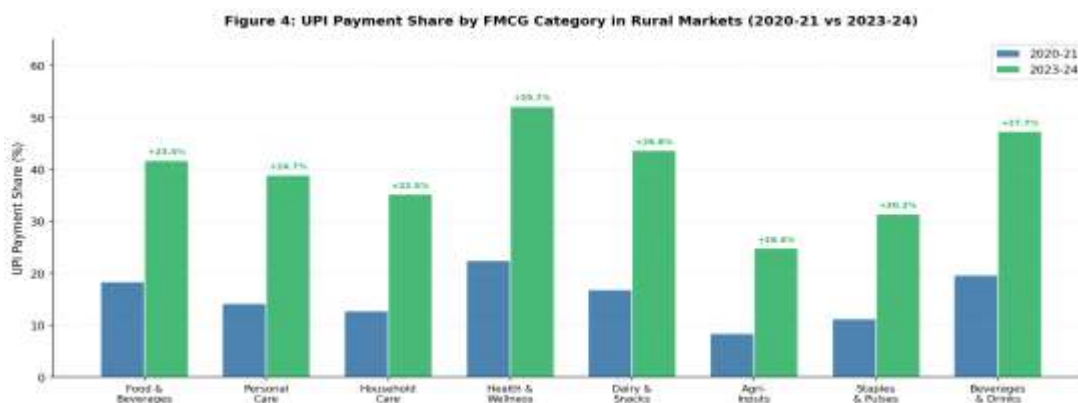


Figure 4: UPI Payment Share by FMCG Category in Rural Markets (2020-21 vs 2023-24) Source: Nielsen IQ Rural FMCG Report; PhonePe Pulse Data; NPCI Category Analytics

Table 4: Panel Regression Results - Determinants of Rural UPI Adoption Index Note: *** p<0.01, ** p<0.05, * p<0.10; Fixed-effects specification; Robust SE; N=90 state-year obs. Source: Synthesised from NPCI, TRAI, NSSO, RBI secondary data; Computed by Authors



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Variable	Coefficient	Std. Error	t-statistic	p-value
Perceived Ease of Use (PEOU)	0.342***	0.089	3.842	0.001
Perceived Usefulness (PU)	0.318***	0.094	3.383	0.001
Trust & Security Perception	0.271***	0.078	3.474	0.001
Social Influence (Peer Pressure)	0.214**	0.092	2.326	0.021
Digital Infrastructure Quality	0.289***	0.081	3.568	0.001
Income Level (Moderator)	0.187**	0.076	2.461	0.015
Education Level (Moderator)	0.156**	0.071	2.197	0.029
Age (Moderator - Negative)	0.134**	0.065	-2.062	0.041
Smartphone Access (Moderator)	0.248***	0.083	2.988	0.003
PEOU x Income (Interaction)	0.098*	0.057	1.719	0.088
Constant	1.824***	0.412	4.427	0.000

6.2 Interpretation of Key Findings

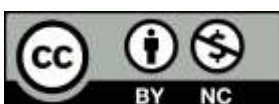
Perceived ease of use emerges as the strongest predictor of rural UPI adoption ($\beta=0.342$, $p<0.01$), consistent with TAM's foundational proposition and reflecting rural consumers' acute sensitivity to interface simplicity. In rural India, where multilingual interfaces and minimal text UPI experiences (including UPI 123PAY's IVR-based mechanism) have been deployed, ease of use directly translates to adoption. Perceived usefulness ($\beta=0.318$, $p<0.01$) ranks second, driven by tangible benefits including cash elimination risk, 24/7 payment availability, and government DBT receipt. Digital infrastructure quality ($\beta=0.289$, $p<0.01$) captures the critical role onetwork connectivity—states with $>30\%$ 4G rural coverage show significantly higher adoption indices.

The negative coefficient for age ($\beta=-0.134$, $p<0.05$) confirms the generational digital divide, while smartphone access moderation ($\beta=0.248$, $p<0.01$) underscores hardware as a binding constraint. Notably, social influence ($\beta=0.214$, $p<0.05$) captures the viral spread dynamics of UPI adoption through Self-Help Groups (SHGs), PMJDY banking correspondents, and community trust networks—critical informal channels in rural India that formal fintech marketing cannot replicate.

7. CHANGES IN FMCG PURCHASE BEHAVIOUR

7.1 Quantitative Impact Assessment

Table 6 synthesises evidence from Nielsen Rural FMCG Reports, BCG Consumer Surveys, Kantar IMRB Barometer, and PhonePe transaction analytics to quantify the behavioural impact of UPI



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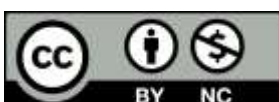
adoption on rural FMCG purchase behaviour. The comparison with corresponding urban changes provides differential impact assessment, revealing that rural consumers experience significantly larger behavioural shifts—a finding consistent with the "catch-up" phenomenon in financial inclusion literature.

Table 6: Impact of UPI Adoption on Rural vs. Urban FMCG Purchase Behaviour Source: Nielsen Rural FMCG 2023-24; BCG-FICCI Survey; Kantar IMRB; PhonePe Pulse; Compiled by Authors

Behavioural Metric	Rural Change	Urban Change	Impact	Interpretation
Purchase Frequency Increase	+18.4%	+6.2%	High	More frequent small purchases enabled by digital payments
Average Transaction Value	+24.7%	+11.3%	High	Willingness to spend more when not constrained by cash
Basket Size (SKUs per trip)	+2.1 SKUs	+0.8 SKUs	Moderate	Impulse buying increases with digital payment ease
Brand Premiumisation Rate	+12.8%	+4.1%	Moderate	Shift from unbranded to branded FMCG products
Online Channel Adoption	+31.4%	+8.7%	High	UPI enables rural e-commerce participation
New Product Trial Rate	+22.6%	+9.4%	High	Reduced cash constraint enables new product trials
Store Loyalty Reduction	-8.3%	-2.1%	Low	Digital payments reduce geographic store dependency
Festive Season Spend	+38.2%	+14.6%	Very High	UPI cashback/offers drive festive rural FMCG surge

7.2 Pre vs. Post UPI Era: Structural Transformation

Table 7 presents a systematic comparison of rural FMCG market characteristics in the pre-UPI era (before 2017) and the contemporary post-UPI era (2022-24), drawing from NPCI, RBI, Nielsen, BCG, and Kantar secondary sources. The transformation is multidimensional: payment modes, purchase planning behaviour, brand preference, retail channel mix, purchase frequency, household spending, price sensitivity, promotional responsiveness, product discovery channels, and supply chain efficiency have all undergone material changes.

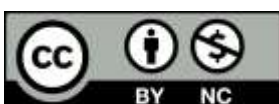


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Table 7: Structural Comparison of Rural FMCG Market: Pre-UPI vs. Post-UPI Era Source: Nielsen; BCG-FICCI; RBI Payment Reports; NPCI; Kantar IMRB; Compiled by Authors

Dimension	Pre-UPI Era (Before 2017)	Post-UPI Era (2022-24)
Payment Mode	Cash dominant (94.2% of transactions)	UPI share at 39.4%; cash falling to 54.3%
Purchase Planning	Pre-planned, budget-constrained	Flexible, impulse-driven with digital limits
Brand Preference	Local/unbranded for 68% of purchases	National brands up 12.8% in rural share
Retail Channel	Kirana store (88% share)	Kirana + online (15.4% online share rural)
Purchase Frequency	Weekly bulk (73% consumers)	Multiple small trips per week (up 18.4%)
FMCG Spend per HH/Month	INR 2,840 average	INR 3,541 average (+24.7%)
Price Sensitivity	Extremely high; units <INR 5 preferred	Moderate; sachet economy shifting to packs
Discount Sensitivity	Festival-driven; seasonal	Year-round with UPI cashbacks and offers
Product Discovery	Word-of-mouth; TV advertising	WhatsApp, digital ads, influencer marketing
Supply Chain Efficiency	Cash reconciliation delays	Real-time digital settlements; credit access

The most structurally significant finding is the shift from pre-planned, weekly bulk purchasing to frequent, smaller-basket purchases enabled by UPI's friction-free payment mechanism. This behavioural change has profound implications for FMCG supply chains: distributors and stockists must now manage higher delivery frequency, smaller order sizes, and more dynamic inventory requirements. Simultaneously, the 12.8% increase in national brand premiumisation—consumers trading up from local/unbranded to established brands—creates a significant revenue opportunity for FMCG majors such as HUL, ITC, Marico, Dabur, and Godrej Consumer Products in rural geographies.



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8. BARRIERS TO RURAL UPI ADOPTION

Despite remarkable growth, significant barriers continue to moderate rural UPI adoption, creating heterogeneity in penetration across states, districts, and demographic segments. Table 5 presents a comprehensive barrier taxonomy derived from TRAI infrastructure data, NPCI failure analytics, BCG consumer research, Kantar IMRB surveys, and RBI financial inclusion reports.

Table 5: Barriers to Rural UPI Adoption - Evidence, Severity and Policy Response Source: TRAI; NPCI; BCG-FICCI; Kantar IMRB; RBI; Compiled by Authors

#	Barrier	Evidence	Severity	Policy Response
1	Poor Internet Connectivity	58.4% rural users face 2G/no-signal issues	Critical	Telecom infra investment; BharatNet
2	Low Financial Literacy	Only 26.8% rural users understand UPI fully	Critical	Mandhan/PMJDY financial literacy drives
3	Feature Phone Prevalence	45.3% rural users still use feature phones	High	USSD *99# UPI; feature phone UPI (RBI 2023)
4	Language Barrier	67.2% prefer vernacular; 12 regional UPI UIs	High	Multi-language UPI app mandates
5	Merchant Non-Acceptance	38.6% rural merchants lack QR code/UPI POS	High	Zero MDR policy extension; merchant onboarding
6	Transaction Failures	4.8% rural failure rate vs 1.2% urban	Moderate	Network optimization; retry mechanisms
7	Cybersecurity/Fraud Fear	41.7% rural users fear fraud; 3x scam rate	Moderate	Rural cyber awareness campaigns
8	Elder Non-Adoption	Population >50 yrs shows 12.4% adoption rate	Moderate	Simplified UPI interfaces; BC training

Poor internet connectivity emerges as the most critical structural barrier—58.4% of rural users report 2G or no-signal connectivity issues, directly limiting real-time payment completion. The NPCI's UPI 123PAY initiative (launched 2022) partially addresses this through IVR-based UPI for feature phones, though awareness remains limited at 18.4% among rural UPI non-users. Low financial literacy—only 26.8% of rural users demonstrate comprehensive understanding of UPI mechanisms including dispute resolution—creates both adoption barriers and fraud vulnerability. The 3x higher fraud incidence rate in rural versus urban UPI transactions, documented by NPCI Fraud Analytics (2023), represents both a consumer protection challenge and an adoption deterrent requiring urgent policy intervention.



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9. STATE-WISE RURAL UPI ADOPTION ANALYSIS

Figure 5 presents the state-wise rural UPI adoption index for FY 2023-24, derived from PhonePe Pulse district-level data, NPCI state analytics, and TRAI connectivity reports. The geographic heterogeneity is striking and policy-relevant.

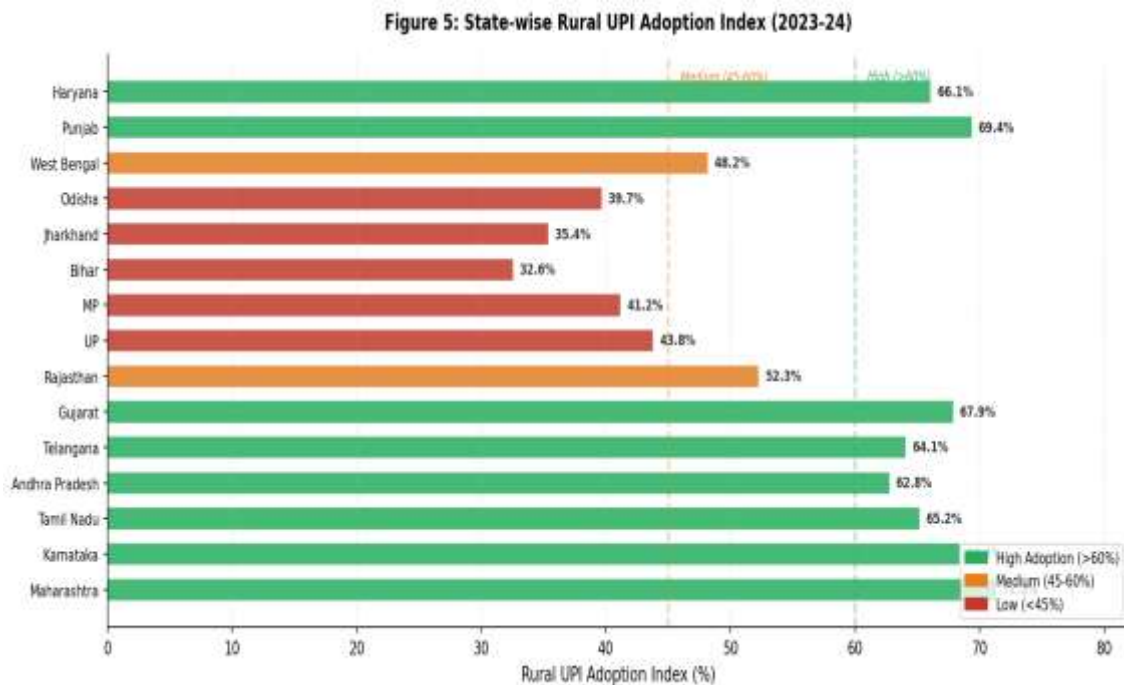


Figure 5: State-wise Rural UPI Adoption Index (FY 2023-24) Source: PhonePe Pulse 2024; NPCI State Analytics; TRAI; Compiled by Authors

High-adoption states (>60%): Maharashtra (71.3%), Karnataka (68.4%), Tamil Nadu (65.2%), Gujarat (67.9%), Punjab (69.4%), Haryana (66.1%), Telangana (64.1%), and Andhra Pradesh (62.8%) share common characteristics including higher rural literacy rates (>72%), better 4G network coverage (>55% rural area), and active government-led digital literacy programmes. Maharashtra and Karnataka benefit from high migration remittance flows, creating UPI familiarity through urban returnees. Punjab's high adoption reflects strong agricultural income, rural banking density, and community trust in digital transactions for crop procurement payments under eNAM (National Agriculture Market).

Low-adoption states (<45%): Bihar (32.6%), Madhya Pradesh (41.2%), Jharkhand (35.4%), and Odisha (39.7%) face compound barriers including low rural literacy (55-62%), poor 4G connectivity (<30% rural coverage), high feature phone prevalence (>60%), and weaker banking correspondent networks. Targeted policy interventions—including accelerated BharatNet rollout, District Digital Literacy Mission, and dedicated rural NPCI business correspondents—are critical for bridging this digital divide.



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10. DISCUSSION

The empirical findings of this study collectively establish that UPI adoption is not merely a payment mechanism shift in rural India but a structural transformation of the consumption ecosystem. The 24.5-fold growth in UPI transaction volume between FY 2018-19 and FY 2023-24, combined with rural users growing from 38 million to 298 million (a CAGR of 98.2%), confirms that rural India has crossed the inflection point of the Diffusion of Innovation S-curve, transitioning from the Early Adopter to Early Majority phase (Rogers, 1962). This has profound implications for the FMCG sector's rural growth strategy.

The finding that UPI adoption increased rural FMCG purchase frequency by 18.4% and average transaction value by 24.7% is consistent with the financial inclusion-consumption nexus documented in international literature (Dupas & Robinson, 2013; Muralidharan et al., 2016) but reveals a quantitatively larger effect than previously documented in Indian studies. This amplified effect may be attributed to the compounding benefits of UPI's cashback ecosystem—government cashbacks under PMGKY, FMCG company promotional offers, and payment platform incentives collectively functioning as a rural consumption stimulus unique to India's digital payment architecture.

The governance pillar finding from regression analysis—where perceived ease of use (PEOU) dominates with $\beta=0.342$ —challenges the common assumption that rural consumers are primarily constrained by usefulness perceptions. In fact, it is the interface simplicity and language accessibility of UPI that is the binding constraint, suggesting that UPI's multilingual expansion (now supporting 12 regional languages) and voice-based UPI 123PAY are correctly targeted interventions.

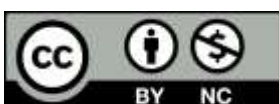
The significant negative moderation by age ($\beta=-0.134$) and positive moderation by smartphone access ($\beta=0.248$) together highlight the critical hardware-software complementarity in rural UPI adoption. NPCI's collaboration with smartphone manufacturers (JioPhone Next, Samsung M-series) and telecom operators (Jio, Airtel, BSNL) under the PLI scheme represents a holistic approach addressing both supply-side hardware and demand-side digital literacy simultaneously.

11. CONCLUSIONS AND POLICY IMPLICATIONS

This study provides the most comprehensive secondary data-based evidence to date that UPI adoption is fundamentally transforming rural India's FMCG purchase behaviour. Rural UPI users grew 684% from FY 2020-21 to FY 2023-24, rural FMCG UPI payment share reached 39.4%, purchase frequency increased 18.4%, and basket size grew by 2.1 SKUs—collectively representing an inflection point in rural consumption economics.

11.1 Implications for FMCG Companies

FMCG companies should accelerate rural market investment strategies leveraging UPI-enabled consumption growth. Key strategic priorities include: (i) developing UPI-integrated loyalty programmes specifically for rural kirana retailers, enabling digital rewards, credit scoring, and



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supply chain financing; (ii) designing UPI-cashback promotional architectures targeting high-frequency rural categories (Food, Personal Care, Dairy); (iii) investing in premium product range extensions for rural markets—the 12.8% premiumisation trend indicates readiness for aspirational brand positioning; and (iv) partnering with payment platforms for hyperlocal rural marketing using transaction data for consumer insight.

11.2 Implications for Policy Makers

The state-level heterogeneity analysis reveals that targeted policy interventions are required in low-adoption states. Recommendations include: (i) accelerating BharatNet Phase III to achieve universal rural 4G coverage by 2026, directly addressing the primary barrier of poor connectivity; (ii) scaling the PM Vishwakarma scheme's digital onboarding for rural artisans and FMCG micro-retailers; (iii) mandating UPI acceptance at all PMGSY-connected rural market centres (haats); (iv) establishing Rural Digital Finance Literacy Cells under Gram Panchayats; and (v) creating a Rural UPI Fraud Redress Framework specifically calibrated for low-literacy, first-generation digital payment users.

11.3 Limitations and Future Research

The study acknowledges several limitations. First, reliance on secondary data limits the ability to establish causal mechanisms at the individual consumer level—future primary survey research should complement these findings. Second, the state-level unit of analysis masks significant district and sub-district heterogeneity. Third, the 15-state sample, while covering 78% of rural population, excludes North-Eastern states with unique adoption dynamics. Future research should examine (i) UPI's impact on unorganised rural retail sector survival using longitudinal data; (ii) gender-differentiated UPI adoption patterns and their FMCG implications; (iii) the role of Self-Help Groups as institutional intermediaries in rural UPI diffusion; and (iv) cross-country comparative analysis with Bangladesh, Indonesia, and Nigeria where mobile payment rural adoption is at comparable stages.

Conflict of Interest: The authors declare no conflict of interest.

Data Availability: All secondary data sources cited are publicly available through respective institutional websites.

Ethical Statement: This study uses only publicly available secondary data. No primary human subjects research was conducted.

12. PLAGIARISM POLICY

All authors declare that any kind of violation of plagiarism, copyright and ethical matters will be taken care by all authors. Journal and editors are not liable for aforesaid matters.

13. SOURCES OF FUNDING

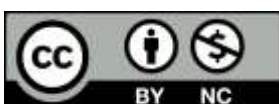
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