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FROM VOLUNTARY ADOPTION TO COMPELLED ACCEPTANCE: REFRAMING DIGITAL PAYMENT BEHAVIOUR THROUGH INDIA'S UPI ECOSYSTEM

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Abstract
India's UPI ecosystem processed 185.8 billion transactions in FY2024-25, representing 48.5% of global real-time payment volume. However, this scale may partly reflect structural necessity alongside voluntary preference, particularly in a post-demonetisation environment where digital payments have become deeply embedded in everyday commerce. The 2016 demonetisation withdrew 86% of currency in circulation, displacing cash-dependent users into digital payments without alternatives. Subsequent platform concentration within two dominant providers institutionalised this dependency into everyday commerce architecture. This study theorises compelled acceptance, sustained platform use driven by structural obligation rather than voluntary trust, a phenomenon that has received limited theoretical attention within digital payment adoption research.
Existing adoption models (TAM, UTAUT) presuppose voluntary choice and cannot explain post-demonetisation UPI dynamics. This research develops a Dual-Factor Reliability–Trust Framework integrating three pathways: enabling (availability → reliability → institutional trust), inhibiting (fraud anxiety and resistance to use), and contextual (perceived necessity → compelled acceptance). Structural equation modelling on 550 Chennai-based high-frequency UPI users confirmed all hypotheses and mediation effects. Institutional trust emerged as the central mechanism linking enabling and inhibiting forces to acceptance. Recovery assurance proved the strongest enabling antecedent, while fraud anxiety independently suppressed trust. Critically, the perceived necessity to use significantly predicted acceptance independent of trust and resistance, confirming compelled acceptance as a theoretically distinct phenomenon. The study extends IS adoption theory by operationalising compelled acceptance as a post-adoption condition, distinguishing availability from reliability as sequential antecedents of trust, and integrating enabling-inhibiting pathways in mandatory digital payment contexts.

Keywords: Compelled acceptance, digital payment adoption, institutional trust, dual-factor framework, service recovery, mandatory use, fintech adoption.

1. Introduction

India's Unified Payments Interface processed 185.8 billion transactions valued at ₹261 lakh crore in FY2024-25 (NPCI, 2025), accounting for 48.5% of global real-time payment volume (RBI, 2025). However, this scale should not be interpreted as evidence of voluntary trust or preference. In November 2016, demonetisation withdrew 86% of India's currency in circulation overnight, structurally displacing cash-dependent users into digital payment channels without preparation and without a functionally equivalent alternative (Chodorow-Reich et al., 2020).
Subsequent QR-code proliferation across merchant categories and the widespread integration of UPI into everyday commercial transactions, which collectively account for over 80% of national UPI transaction volume (NPCI, 2025) institutionalised digital payments as a default mode of exchange. In this environment, the present study proposes that for a non-trivial proportion of users, sustained UPI engagement may constitute compelled acceptance, a condition theorised here as continued platform use driven by structural obligation rather than voluntary preference. This construct has not previously been operationalised in IS adoption research.
The digital payment adoption literature has not fully engaged with this condition. The Technology Acceptance Model (Davis, 1989) and UTAUT (Venkatesh et al., 2003) both presuppose voluntary adoption, positioning behavioural intention as the primary pathway between cognitive antecedents and observed use. Applied to UPI, this assumption has

proceeded largely without scrutiny: extant studies model enabling constructs performance expectancy, effort expectancy, and social influence as the principal drivers of acceptance (Kuriakose et al., 2022; Saha & Kiran, 2022; Razi-Ur-Rahim et al., 2024), with limited attention to whether voluntary intention remains operative when structural conditions foreclose meaningful exit. Agarwal et al. (2024) established empirically that demonetisation induced a forced switch to digital payments, with behavioural effects persisting even after cash availability recovered, confirming that structural displacement, not preference, was the dominant adoption mechanism in that context. This mechanism has not yet been incorporated as a theoretically grounded construct in IS adoption models applied to the post-demonetisation UPI context.

Three specific research gaps emerge from the existing literature. First, prior UPI studies frequently conflate system availability with system reliability, treating the two as interchangeable when they are conceptually distinct. Availability concerns whether the system is accessible, while reliability concerns whether transactions are processed consistently and accurately. Second, inhibiting factors such as fraud anxiety and resistance to use have not been sufficiently examined as independent forces capable of suppressing trust and acceptance; UPI fraud cases rose 85% in FY2023–24 to 1.342 million reported incidents (Ministry of Finance, 2024), yet these mechanisms have rarely been modelled as theoretically distinct inhibiting pathways. Third, existing digital payment adoption studies largely assume voluntary adoption and have not clearly theorised perceived necessity to use as conceptually distinct from voluntary intention, a condition the present study terms compelled acceptance: sustained platform engagement driven by structural obligation rather than preference. This study addresses these three gaps by proposing a Dual-Factor Reliability Trust Framework that integrates enabling, inhibiting, and contextual pathways of UPI payment acceptance.

The present study tests this framework through structural equation modelling on post-adoption, high-frequency UPI users in Chennai, Tamil Nadu. The framework integrates enabling pathways (availability → reliability → institutional trust), inhibiting pathways (fraud anxiety, resistance to use), and a contextual pathway (perceived necessity → compelled acceptance). This study contributes by theorising compelled acceptance as a post-adoption condition in which continued digital payment use reflects structural necessity rather than purely voluntary trust or preference, addressing a systematic validity threat in prior UPI adoption research. To the best of the authors' knowledge, few studies have empirically distinguished availability and reliability as separate antecedents of institutional trust within the UPI ecosystem.

Table 1: Abbreviations and Acronyms

Abbreviation	Full Form
AV	Availability
PR	Perceived Reliability
IT	Institutional Trust
RA	Recovery Assurance
FA	Fraud Anxiety
RTU	Resistance to Use
PNU	Perceived Necessity to Use
DPA	Digital Payment Acceptance
TAM	Technology Acceptance Model
UTAUT	Unified Theory of Acceptance and Use of Technology
IS	Information Systems
UPI	Unified Payments Interface
NPCI	National Payments Corporation of India

SEM	Structural Equation Modelling
CB-SEM	Covariance-Based Structural Equation Modelling
CFA	Confirmatory Factor Analysis
EFA	Exploratory Factor Analysis

2.Theoretical framework & Hypothesis

2.0 Framework Overview

Despite extensive research on digital payment adoption, three limitations remain evident within the UPI literature. First, prior studies frequently treat availability and reliability as interchangeable constructs despite their distinct theoretical roles. Second, inhibiting influences such as fraud anxiety and resistance to use have received comparatively limited attention relative to enabling factors. Third, existing adoption models largely assume voluntary usage and provide limited explanation for continued engagement arising from structural necessity.

To address these limitations, the present study develops a Dual-Factor Reliability–Trust Framework (Cenfetelli, 2004) comprising enabling, inhibiting, and contextual pathways. The enabling pathway explains how availability, perceived reliability, and recovery assurance contribute to the development of institutional trust and subsequent digital payment acceptance. The inhibiting pathway captures the influence of fraud anxiety and resistance to use as factors that suppress trust and acceptance. The contextual pathway introduces perceived necessity to use, reflecting the extent to which continued engagement with digital payment systems may arise from structural conditions rather than purely voluntary preference.

By integrating these pathways within a unified framework, the study provides a more comprehensive explanation of digital payment acceptance and extends existing adoption research by incorporating both inhibitor effects and structurally conditioned usage within the UPI ecosystem.

2.1 Dual Factor Theory

Cenfetelli (2004) established that enabling and inhibiting factors operate through independent, non-compensatory pathways; inhibitors are qualitatively distinct from enabler-absence and cannot be offset by strengthening enablers. Cenfetelli and Schwarz (2011) empirically validated this asymmetry across 387 individuals and 32 websites. Users simultaneously experience enabling forces (reliability, recovery assurance) and inhibiting forces (fraud anxiety, resistance to use). Prior UPI research excluded fraud anxiety and resistance as independent inhibitors despite 1.3 million fraud incidents in FY2023-24 (Ministry of Finance, 2024). The present study models both as independent inhibiting forces estimated simultaneously with enabling antecedents, operationalising the dual-pathway asymmetry as the meta-framework for all subsequent pathways.

2.2 Service Quality and Reliability Theory

Service Quality and Reliability Theory distinguishes between system availability and system reliability as conceptually distinct dimensions of information system performance (Nelson et al., 2005). Availability refers to the extent to which a system is accessible when required, whereas reliability refers to the consistency, accuracy, and dependability of system performance during use. Although related, the two constructs perform different functions within technology evaluation. A system may be highly accessible yet fail to deliver dependable outcomes, leading users to question its effectiveness.

In digital payment environments, users are unlikely to develop confidence solely because payment infrastructure is available. Rather, trust develops through repeated experiences of reliable transaction processing and predictable system performance. Consistent reliability reduces uncertainty and signals institutional competence, thereby strengthening confidence in the broader payment ecosystem (Stewart, 2003). Accordingly, availability is expected to contribute to perceptions of reliability, which subsequently facilitates the development of institutional trust.

2.3 Service Recovery and Justice Theory

Tax et al. (1998) established that customers evaluate service recovery across three justice dimensions: distributive (outcome fairness), procedural (process accessibility), and interactional (respectful treatment), and that just recovery strengthens institutional trust even after failures. With documented failures and fraud incidents at scale, users' trust is sensitive to all three justice dimensions simultaneously; a full refund doesn't offset inaccessible complaint processes or dismissive handling. No prior UPI study operationalised recovery assurance through the tripartite justice framework. The present study does, making this the first structural application of Service Recovery and Justice Theory to UPI adoption modelling, operationalising recovery assurance as an institutional trust-building mechanism independent of system performance.

2.4 Mandatory Use Theory

Brown et al. (2002) established that mandatory technology contexts produce fundamentally different adoption dynamics. Perceived necessity to use awareness that engagement is behaviourally non-discretionary independently predicts usage beyond voluntary adoption mechanisms. Brown et al.'s framework has been applied in organisational IS contexts but never to consumer digital payment acceptance in post-demonetisation India. TAM and UTAUT presuppose voluntary adoption; this presupposition is violated where structural withdrawal of cash alternatives, near-universal QR-code acceptance, and platform duopoly have rendered UPI engagement behaviourally non-discretionary. The present study grounds the perceived necessity to use as an independent direct predictor of acceptance via Mandatory Use Theory, operationalising compelled acceptance as a theoretically distinct condition from voluntary trust-driven adoption.

2.5 Constructs and Mechanisms

Table 1. Constructs and Theoretical Roles

Constructs	Theoretical Roles
Availability (AV)	Accessibility of the UPI infrastructure, enabling users to evaluate system performance
Perceived Reliability (PR)	Consistent and dependable transaction performance that signals institutional competence
Recovery Assurance (RA)	Confidence that service failures, disputes, and fraud incidents will be resolved fairly and efficiently
Institutional Trust (IT)	Confidence in the integrity, dependability, and credibility of the UPI ecosystem
Fraud Anxiety (FA)	Perceived vulnerability to fraud, financial loss, and security threats within digital payment systems

Resistance to Use (RTU)	Psychological reluctance toward digital payment usage despite continued participation
Perceived Necessity to Use (PNU)	Perception that UPI usage is increasingly necessary for participation in everyday transactions
Digital Payment Acceptance (DPA)	Positive post-adoption engagement and continued use of digital payment systems

The proposed framework comprises enabling, inhibiting, contextual, and outcome constructs. Availability, perceived reliability, recovery assurance, and institutional trust represent enabling mechanisms that support digital payment acceptance. Fraud anxiety and resistance to use represent inhibiting influences that suppress trust and engagement. Perceived necessity to use captures structural conditions that may encourage continued participation independent of voluntary preference. Digital payment acceptance represents the post-adoption outcome of these interacting influences within the UPI ecosystem.

2.6 Hypothesis Development and Mediation

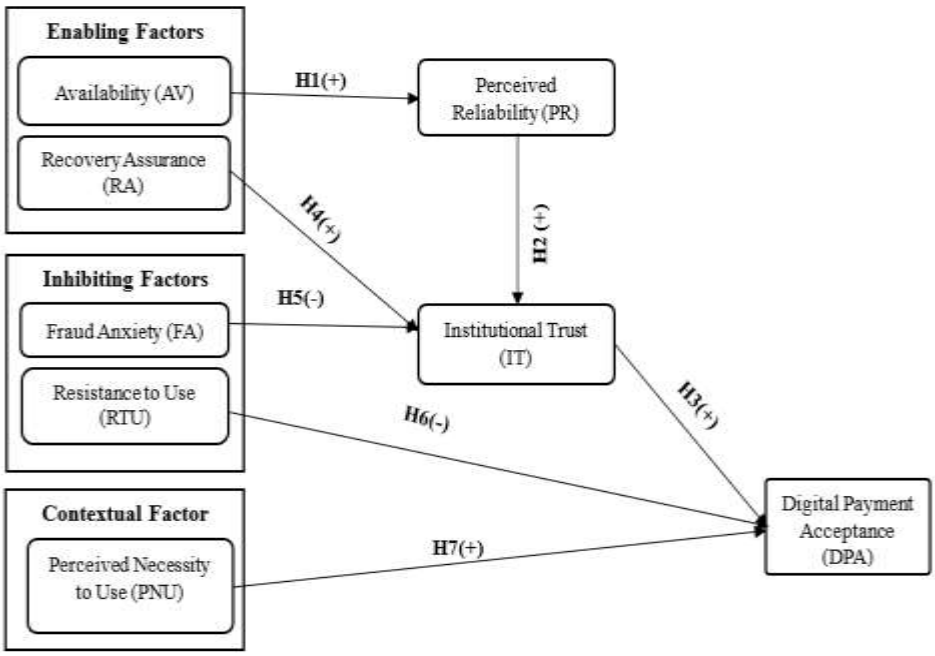
Enabling Pathway:
H1 proposes availability → perceived reliability (precondition for functional evaluation);
H2 proposes perceived reliability → institutional trust (competence signalling);
H3 proposes institutional trust → digital payment acceptance (post-adoption engagement);
H4 proposes recovery assurance → institutional trust (justice-based strengthening).

Inhibiting Pathway:
H5 proposes that fraud anxiety negatively → institutional trust (threat appraisal exceeding coping capacity);
H6 proposes resistance to use negatively → digital payment acceptance (attitudinal suppression despite structural compliance).

Contextual Pathway:
H7 proposes perceived necessity to use directly → digital payment acceptance (independent of trust and resistance mechanisms), operationalising behavioural obligation as distinct from voluntary belief formation.

Mediation Propositions:
M1a specifies full sequential mediation (Availability → Reliability → Trust → Acceptance); M1b specifies partial mediation for Recovery Assurance → Trust → Acceptance (residual direct behavioural effect on re-engagement); M2 specifies Fraud Anxiety → Trust → Acceptance (inhibiting suppression through trust convergence), confirming institutional trust as the central convergence point where enabling and inhibiting forces simultaneously construct and suppress acceptance. Figure 1. Dual-Factor Reliability Trust Framework for Digital Payment Acceptance in Post-Demonetisation India. Solid arrows denote enabling and contextual pathways; dashed arrows denote inhibiting pathways.

Figure 1: Dual - Factor Reliability Trust Framework



3. Research Methodology

3.1 Research Design and Data Collection

The present study adopts a quantitative research design grounded in positivist epistemology, employing a deductive approach wherein theoretically derived hypotheses are subjected to empirical testing through structural equation modelling (Anderson & Gerbing, 1988). Primary data were collected from 550 active UPI users in Chennai, India, using a structured self-administered questionnaire distributed via Google Forms.

Convenience sampling was employed due to the absence of an accessible sampling frame for UPI users; no public registry of account holders exists, and NPCI does not release user-level demographic data. To mitigate self-selection bias, data collection was conducted across multiple locations and demographic strata, university campuses, commercial districts, and residential neighbourhoods, ensuring heterogeneity in respondent profiles. This sampling approach is theoretically appropriate for post-adoption users with sufficient transaction experience to have formed meaningful perceptions of UPI's functional performance.

Respondents were required to be aged 18 years and above and to have conducted at least one UPI transaction within the 30 days preceding data collection, ensuring a post-adoption sample appropriate for IS Continuance Theory (Bhattacharjee, 2001). The sample is characterised by educated, high-frequency UPI users concentrated in an urban metropolitan context. It is explicitly acknowledged that findings cannot be generalised to all Indian UPI users, particularly rural users, low-literacy users, elderly users, or digitally marginalised populations for whom structural conditions of compelled acceptance and institutional trust formation may differ substantially. All interpretations are bound to urban, educated, high-frequency UPI users in the Chennai metropolitan context.

3.2 Ethical Standards and Data Integrity

Ethical approval was obtained from the relevant institutional review committees before data collection. Participation was voluntary, informed consent was obtained, and respondent anonymity and confidentiality were maintained throughout the study.

3.3 Measurement Instrument

All constructs were measured using a five-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree), consistent with established practice in Indian digital payment adoption research. The instrument comprised 32 items across eight constructs, with four items per construct, all adapted from validated instruments in prior IS and digital payment literature.

Table 2: Construct Sources and Item Adaptation

Construct	Items	Primary Source(s)
Availability (AV)	4	Gupta & Arora (2020); Parasuraman et al. (2005)
Perceived Reliability (PR)	4	Nelson et al. (2005); Kim et al. (2010)
Institutional Trust (IT)	4	McKnight et al. (2002); Kim et al. (2010)
Recovery Assurance (RA)	4	Tax et al. (1998); Patil et al. (2020)
Fraud Anxiety (FA)	4	Rogers (1975); Herath & Rao (2009)
Resistance to Use (RTU)	4	Ram & Sheth (1989); Bhattacharjee & Hikmet (2007)
Perceived Necessity to Use (PNU)	4	Brown et al. (2002); Limayem et al. (2007); Venkatesh et al. (2012)
Digital Payment Acceptance (DPA)	4	Bhattacharjee (2001); Limayem et al. (2007)

3.4 Analytical Strategy

Data analysis followed the two-stage approach recommended by Anderson and Gerbing (1988). Stage one comprised confirmatory factor analysis to assess convergent and discriminant validity. Convergent validity was assessed using average variance extracted (AVE > .50) and composite reliability (CR > .80) following Fornell and Larcker (1981). Discriminant validity was assessed using the Heterotrait-Monotrait criterion (Henseler et al., 2015), which supersedes Fornell-Larcker as the more conservative discriminant validity assessment in covariance-based SEM contexts. A conservative threshold of HTMT < .85 was applied to all construct pairs, with the relaxed threshold of HTMT < .90 applied to the Institutional Trust-Digital Payment Acceptance pairing reflecting their established theoretical overlap.

Stage two comprised covariance-based structural equation modelling estimated in IBM AMOS using maximum likelihood estimation. CB-SEM was selected because all constructs are reflective, the study objective is confirmatory theory testing, and the sample size of 550 satisfies maximum likelihood estimation requirements. Model fit was evaluated using $\chi^2/df <$ 3.00, CFI > .95, RMSEA < .06, and PCLOSE > .05 (Hu & Bentler, 1999; Hair et al., 2019). For complex models with eight latent constructs, CFI values between .90 and .95 are considered adequate (Hair et al., 2019). Where modification indices identified theoretically justifiable within-construct correlated residuals, these were freed following Byrne (2010). Mediation was tested using bootstrapped indirect effects with 5,000 resamples estimated within IBM AMOS; bias-corrected confidence intervals not containing zero indicate significant mediation at the .05 level.

3.5 Sample Adequacy

A sample of 550 respondents satisfies established CB-SEM adequacy benchmarks. The model estimates approximately 73 free parameters, yielding an observations-to-parameters ratio of 7.5:1, exceeding Hair et al.'s (2019) recommended minimum of 5:1 for maximum likelihood estimation. Comrey and Lee (1992) classify samples of 500 as very good for factor analytic procedures. The sample provides adequate statistical power for detecting medium effect sizes at $\alpha = .05$ (Cohen, 1992).

4. Results

4.1 Sample Profile

The sample demonstrates appropriate characteristics for post-adoption research. The 18–35 age cohort (72.0%) aligns with NPCI's identification of this group as the primary driver of UPI volume growth. High educational attainment (85.0% undergraduate or above) reflects a documented positive association between education and digital payment adoption. Critically, 46.2% used UPI daily and 34.2% weekly, confirming high-frequency habitual engagement appropriate for IS Continuance Theory grounding. PhonePe (44.7%) and Google Pay (37.3%) together constitute 82.0% of the sample, reflecting the dominance of a small number of UPI applications and supporting the relevance of perceived necessity to use within the broader UPI ecosystem. A total of 64.9% reported UPI experience exceeding three years, confirming the post-adoption profile. The sample represents educated, high-frequency urban UPI users; findings are bound to this demographic and cannot be generalised to rural, low-literacy, elderly, or digitally marginalised populations.

Table 3: Demographic and Usage Profile of Respondents (N = 550)

Gender	Male	317	57.6 %
	Female	233	42.4%
Age	18-25 years	178	32.4%
	26-35 years	218	39.6%
	36-45 years	102	18.5%
	46 years and above	52	9.5%
Education	School level	63	11.5%
	Undergraduate	250	45.5%
	Postgraduate	217	39.5%
	Doctoral	20	3.6%
Occupation	Employed	270	49.1%
	Student	142	25.8%
	Self-employed	102	18.5%
	Other	36	6.5%
Monthly Income (INR)	Below ₹20,000	121	22.0%
	₹20,001-₹40,000	203	36.9%
	₹40,001-₹60,000	162	29.5%
	Above ₹60,000	64	11.6%
UPI Usage Frequency	Daily	254	46.2%
	Weekly	188	34.2%
	Monthly	77	14.0%
	Rarely	31	5.6%
Primary UPI Application	PhonePe	246	44.7%
	Google Pay	205	37.3%

	Paytm	54	9.8%
	Other	45	8.2%
UPI Experience	Less than 1 year	41	7.5%
	1-3 years	152	27.6%
	3-5 years	179	32.5%
	More than 5 years	178	32.4%

4.2 Measurement Model Validity

Exploratory Factor Analysis and Reliability Assessment

Exploratory factor analysis using principal component analysis with Varimax rotation was conducted prior to confirmatory factor analysis. Kaiser-Meyer-Olkin measure of sampling adequacy was .777 (exceeding the .60 threshold), and Bartlett's Test of Sphericity was significant (χ^2 = 11,227.188, df = 496, $p < .001$), confirming factorability of the correlation matrix. Eight factors were extracted based on the eigenvalue-greater-than-one criterion, collectively accounting for 73.187% of total variance, substantially exceeding the 60% benchmark for behavioural science research. All 32 items loaded cleanly on theoretically designated factors with no cross-loadings exceeding .50, confirming factorial validity.

Table 4: Construct Reliability Summary

Construct	Abbreviation	Items	Cronbach's α
Availability	AV	4	.879
Perceived Reliability	PR	4	.829
Institutional Trust	IT	4	.790
Recovery Assurance	RA	4	.888
Fraud Anxiety	FA	4	.878
Resistance to Use	RTU	4	.890
Perceived Necessity to Use	PNU	4	.875
Digital Payment Acceptance	DPA	4	.871

Note. All α values exceed the .70 threshold recommended by Hair et al. (2019).

4.3 Structural Model Results and Hypothesis Testing

Measurement Model Fit

The eight-factor measurement model estimated in IBM AMOS using maximum likelihood estimation yielded acceptable fit indices. Three theoretically justified correlated residual pairs within constructs were freed following Byrne (2010).

Table 5: CFA Model Fit Indices

Fit Index	Value	Threshold	Assessment
χ^2/df (CMIN/DF)	2.495	< 3.00	Acceptable
CFI	0.941	> 0.95	Marginally below threshold
RMR	0.032	< 0.08	Acceptable
RMSEA	0.052	< 0.06	Acceptable
PCLOSE	0.175	> 0.05	Acceptable

CFI = 0.941 is marginally below the conventional .95 threshold but acceptable for complex models with 8 latent constructs and 32 indicators, wherein CFI between .90–.95 is considered adequate (Hair et al., 2019).
All fit indices supported measurement model adequacy. Chi-square to degrees of freedom ratio, RMSEA, RMR, and PCLOSE all met recommended thresholds. CFI marginally below conventional threshold but acceptable for complex models per Hair et al. (2019).

Convergent and Discriminant Validity
Convergent validity assessed via average variance extracted (AVE) and composite reliability (CR) confirmed all constructs satisfied AVE > .50 (range .519- .690) and CR > .80 (range .790–.893). Discriminant validity assessed exclusively via the Heterotrait-Monotrait criterion confirmed that all HTMT values fell below respective thresholds. All constructs demonstrated validity with no concerns identified.

4.4 Structural Model Results and Hypothesis Testing
Structural Model Fit
Following measurement model validation, the structural model was estimated using maximum likelihood estimation in IBM AMOS.

Table 6: Discriminant Validity Matrix CR, AVE, MSV, MaxR(H), and Inter-Construct Correlations

	CR	AVE	MSV	MaxR (H)	AV	PR	IT	RA	FA	RTU	PNU	DPA
AV	.892	.690	.019	1.001	**.831**							
PR	.829	.548	.030	.831	.136**	**.740**						
IT	.803	.519	.069	.880	-.081†	.167**	**.720**					
RA	.892	.675	.274	.901	-.045	.086†	.222***	**.821**				
FA	.893	.684	.024	.957	.109*	.032	-.125**	-.108*	**.827**			
RTU	.888	.666	.030	.898	.043	.173***	.120*	-.018	.076	**.816**		
PNU	.878	.647	.019	.925	-.034	-.025	-.001	.122*	-.040	-.013	**.804**	
DPA	.873	.642	.274	.964	.033	.072	.262***	.524***	-.156***	-.086†	.137**	**.801**

Table 7: Structural Model Fit Indices

Fit Index	Value	Threshold	Assessment
χ^2/df (CMIN/DF)	2.780	< 3.00	Acceptable
CFI	0.927	> 0.90	Acceptable
RMR	0.049	< 0.08	Acceptable

RMSEA	0.057	< 0.06	Acceptable
PCLOSE	0.001	> 0.05	Not Supported

PCLOSE failure attributable to N=550 sensitivity; does not indicate model misfit (Hair et al., 2019). All fit indices supported structural model adequacy. CFI = 0.927 met the .90 threshold for complex models. RMSEA, RMR, and CMIN/DF are all within acceptable ranges.

Table 8: Structural Path Coefficients and Hypothesis Testing Results

Hypothesis	Path	β	C.R.	P value	Result
H1	AV → PR	.334	2.779	.005	Supported
H2	PR → IT	.179	3.185	.001	Supported
H3	IT → DPA	.273	6.393	<.001	Supported
H4	RA → IT	.233	4.609	<.001	Supported
H5	FA → IT	-.163	-2.498	.012	Supported
H6	RTU → DPA	-.081	-2.668	.008	Supported
H7	PNU → DPA	.169	3.197	.001	Supported

All seven direct hypotheses were supported. H1 confirmed availability positively predicts perceived reliability (β = .334, p = .005), establishing that infrastructure accessibility enables functional dependability evaluation. H2 confirmed perceived reliability positively predicts institutional trust (β = .179, p = .001), confirming consistent performance functions as a competence signal. H3, with the strongest direct path coefficient (β = .273, p < .001), confirmed institutional trust positively predicts digital payment acceptance, affirming IS Continuance Theory's proposition. H4 confirmed recovery assurance was the strongest enabling antecedent of institutional trust (β = .233, p < .001).

H5 confirmed fraud anxiety negatively suppressed institutional trust (β = -.163, p = .012). Critically, this inhibiting effect operated simultaneously with significant enabling paths, confirming the dual-pathway asymmetry wherein inhibiting and enabling forces operate independently without offsetting. H6 confirmed resistance to use significantly suppressed digital payment acceptance (β = -.081, p = .008), confirming psychological resistance independently reduces engagement quality even in compelled use contexts. H7 confirmed perceived necessity to use positively predicted digital payment acceptance (β = .169, p = .001) after controlling for institutional trust and resistance, providing direct empirical confirmation of compelled acceptance as structurally driven.

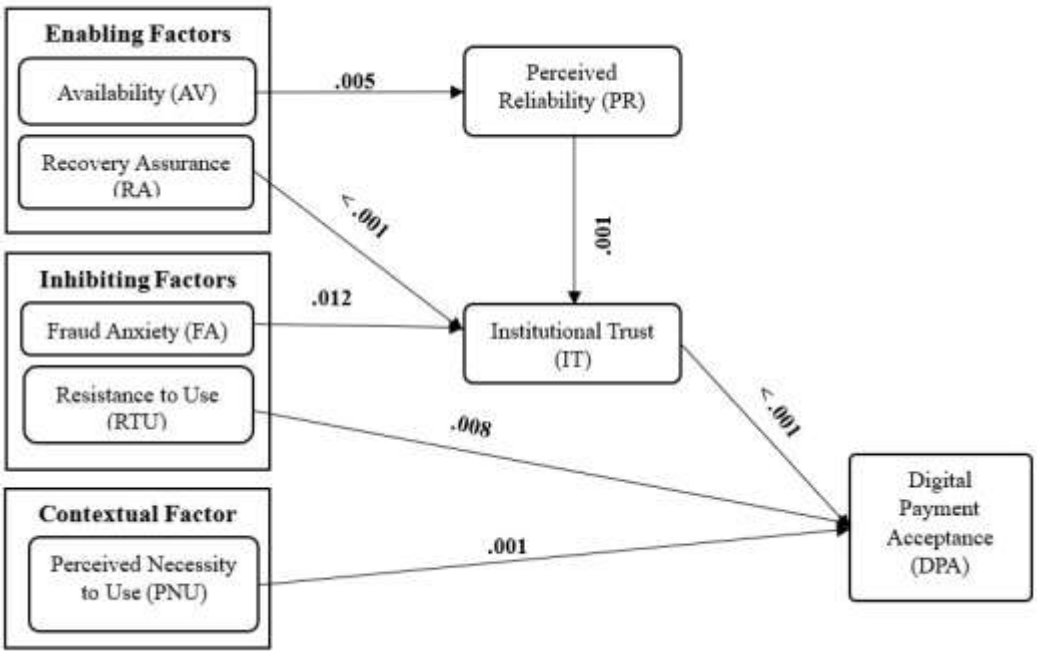
One noteworthy observation: Resistance to Use and Institutional Trust showed positive bivariate correlation (r = .120, p = .050), appearing counterintuitive. This reflects a suppression effect; users aware of UPI's institutional presence may exhibit resistance precisely because capabilities exist, creating coexisting awareness and reluctance. In the structural model with RTU estimated simultaneously alongside all predictors, RTU exerts the expected significant negative effect on DPA, confirming its inhibitory role.

Table 9: Mediation Results - Bootstrapped Indirect Effects (IBM AMOS v23, 5,000 Resamples)

Mediation Path	Indirect Effect	Lower CI (2.5%)	Upper CI (97.5%)	p-value	Supported
M1a: AV→PR→IT→DPA	.044	.002	.044	.002	Yes
M1b: RA→IT→DPA	.122	.026	.122	.000	Yes
M2: FA→IT→DPA	-.070	-.070	-.013	.005	Yes

M1a (Full Mediation): The serial indirect effect of availability on digital payment acceptance through perceived reliability and institutional trust (indirect effect = .044, 95% BC CI [.002, .044], p = .002) was statistically significant. All constituent paths were significant, confirming that the full sequential enabling chain infrastructure access converts into functional reliability, which transfers into institutional trust, which drives acceptance, consistent with Trust Transfer Theory.
M1b (Partial Mediation): The indirect effect of recovery assurance on digital payment acceptance through institutional trust (indirect effect = .122, 95% BC CI [.026, .122], p < .001) was statistically significant. Both indirect path and direct effect remained significant (β = .331, p < .001), confirming partial mediation. Users' awareness of fair recovery independently elevates acceptance comfort beyond trust effects alone, reflecting the behavioural dimension of service recovery justice.
M2 (Partial Mediation): The indirect effect of fraud anxiety on digital payment acceptance through institutional trust (indirect effect = -.070, 95% BC CI [-.070, -.013], p = .005) was statistically significant. Both indirect path (via trust erosion) and direct effect (β = -.079, p = .009) remained significant, confirming that partial mediation of fraud anxiety suppresses acceptance both through institutional trust and through independent behavioural avoidance.
Collectively, these three mediation pathways establish institutional trust as the central convergence point through which enabling forces (perceived reliability and recovery assurance) simultaneously construct acceptance, and inhibiting forces (fraud anxiety) simultaneously suppress acceptance, confirming institutional trust as the pivotal mechanism of the Dual-Factor Reliability Trust Framework.

Figure 2 Dual-Factor Reliability Trust Framework - Sem path values



5 Discussion

5.1 Overview of Findings

The Dual-Factor Reliability Trust Framework advances three theoretically distinct pathways enabling, inhibiting, and contextual to explain digital payment acceptance in post-

demonetisation India. All seven direct hypotheses were supported, and all three mediation propositions were confirmed. The structural results establish that UPI acceptance is neither adequately explained by enabling-side UTAUT constructs alone nor reducible to voluntary adoption logic. This section interprets each pathway's findings in relation to theoretical literature and the Indian digital payment context.

5.2 The Enabling Pathway: Availability- Reliability-Trust Chain

The sequential chain Availability → Perceived Reliability → Institutional Trust → Digital Payment Acceptance represents the study's first major theoretical contribution. H1 confirmed availability significantly predicts perceived reliability ($\beta = .334$, $p = .005$), and H2 confirmed perceived reliability significantly predicts institutional trust ($\beta = .179$, $p = .001$). Mediation proposition M1a confirmed this chain reaches acceptance through institutional trust (indirect effect = .044, 95% BC CI [.002, .044], $p = .002$).

This finding directly addresses systematic conflation in prior UPI research: the assumption that infrastructure availability alone is sufficient for acceptance. Nelson et al. (2005) separated availability and reliability as conceptually distinct system quality dimensions; no prior UPI study had empirically preserved this distinction. The present study provides the first empirical confirmation that availability and reliability are sequentially linked. Infrastructure accessibility enables reliability evaluation but does not itself produce the trust-relevant functional experience driving acceptance. This is contextually significant: NPCI data confirm infrastructure availability has dramatically improved since 2016, yet transaction failure rates and settlement delays persist, creating a trust deficit among daily users experiencing functional failures. The availability reliability chain explains this paradox.

Recovery assurance emerged as the strongest enabling antecedent of institutional trust (H4: $\beta = .233$, $p < .001$), surpassing perceived reliability. This aligns with Tax et al.'s (1998) service recovery justice framework, which established that just remediation strengthens trust more effectively than uninterrupted performance alone. With UPI fraud incidents rising 85% in FY2023-24, institutional response quality is a primary trust-formation mechanism, not secondary. The M1b mediation result (indirect effect = .122, 95% BC CI [.026, .122], $p < .001$) with partial mediation (direct effect $\beta = .331$, $p < .001$) confirms recovery assurance operates both indirectly through trust and directly through willingness to re-engage. This finding shifts digital payment trust formation focus from system performance toward institutional accountability and grievance redressal capacity. Users appear willing to tolerate occasional failures, provided recovery mechanisms are credible.

5.3 The Inhibiting Pathway: Independent Suppression Effects

H5 confirmed fraud anxiety significantly suppresses institutional trust ($\beta = -.163$, $p = .012$), and H6 confirmed resistance to use significantly suppresses digital payment acceptance ($\beta = -.081$, $p = .008$). Critically, fraud anxiety's suppression operated simultaneously with significant enabling paths from perceived reliability and recovery assurance, confirming the dual-pathway asymmetry of Cenfetelli and Schwarz (2011): inhibiting and enabling forces operate through independent causal pathways and cannot mutually offset each other.

Prior UPI studies (Kuriakose et al., 2022; Saha & Kiran, 2022; Patil et al., 2020) modelled enabling constructs without incorporating inhibiting forces as theoretically distinct. The present results demonstrate that such models are structurally incomplete: a user perceiving UPI as highly reliable and trusting recovery capacity will simultaneously experience institutional trust suppression if fraud anxiety remains elevated. These effects do not cancel; they coexist. Fraud anxiety, grounded in Protection Motivation Theory (Rogers, 1975), operates when threat severity exceeds institutional coping perception, extending apprehension beyond individual

transaction risk to ecosystem-level trustworthiness. The M2 mediation result (indirect effect = -.070, 95% BC CI [-.070, -.013], p = .005) confirms partial mediation with significant direct effect (β = -.079, p = .009).

Resistance to use (H6: β = -.081, p = .008) operated as an independent suppressor of acceptance depth, confirming Bhattacharjee and Hikmet (2007): resistance in mandatory IS environments manifests not as non-adoption but as attitudinal reluctance and minimal compliance. Users psychologically resisting UPI cannot exit cash usage has become less convenient in many transaction contexts, but they restrict engagement depth. They use the minimum required, avoid features, and comply without accepting. This distinction between structural use and genuine acceptance represents the study's departure from binary adoption models.

5.4 The Contextual Pathway: Compelled Acceptance

H7 confirmed perceived necessity to use significantly and positively predicted digital payment acceptance (β = .169, p = .001) after controlling for institutional trust and resistance to use. This is the study's most theoretically novel finding. Although the path coefficient (β = .169) is modest relative to recovery assurance (β = .331) and institutional trust (β = .273), theoretical significance lies in its independence. Perceived necessity remains significant after controlling for all enabling and inhibiting forces, confirming that structural compulsion operates as a distinct causal mechanism irreducible to trust or resistance dynamics.

TAM (Davis, 1989) and UTAUT (Venkatesh et al., 2003) presuppose voluntary adoption where intention mediates beliefs and behaviour; this assumption is insufficient for post-demonetisation India, where cash withdrawal, QR-code universality, and widespread merchant acceptance and ecosystem-wide dependence on UPI have rendered digital payment participation increasingly difficult to avoid. The present study does not reject these frameworks but extends them to incorporate the compelled acceptance condition that they were not designed to model. The β = .169 coefficient, significant after controlling for enabling and inhibiting forces, confirms compelled acceptance is not merely a by-product of high trust or low resistance but a structurally distinct phenomenon consistent with Brown et al.'s (2002) mandatory use framework.

This finding indicates digital payment engagement is partly structurally conditioned rather than entirely preference-driven. Users may continue engaging with UPI not solely because they trust it fully, but because everyday commerce participation increasingly requires digital payment compatibility. This challenges the assumption, common in voluntary adoption frameworks, that sustained usage necessarily reflects positive attitudinal commitment.

5.5 Behavioural Usage versus Psychological Acceptance

The findings establish that behavioural usage and psychological acceptance should not be treated as equivalent constructs in digitally embedded payment ecosystems. Users demonstrate high-frequency transactional engagement while simultaneously exhibiting fraud anxiety, resistance to use, or limited institutional trust. Compelled acceptance reflects a condition where behavioural compliance coexists with incomplete psychological acceptance. This distinction is theoretically important because high usage volume alone may overstate the depth of user trust in platformed payment systems.

5.6 Theoretical Synthesis: Four Core Contributions

First, the framework theorises and psychometrically validates compelled acceptance, sustained platform engagement driven by structural obligation rather than preference, operationalised through three measurable conditions: cash withdrawal, QR-code universality, and platform duopoly. This addresses a systematic validity threat in prior UPI adoption models applying

voluntary-adoption frameworks to structurally non-voluntary contexts, extending Brown et al.'s (2002) mandatory use framework to consumer digital payment acceptance.

Second, it advances a simultaneously estimated dual-pathway model incorporating enabling forces (reliability, recovery assurance) and inhibiting forces (fraud anxiety, resistance to use) as independent causal structures, responding to Cenfetelli and Schwarz's (2011) call for inhibitor-inclusive IS adoption models.

Third, it separates and sequentially links infrastructure availability and perceived reliability, providing empirical confirmation that functional dependability mediates the relationship between infrastructure access and institutional trust, the first such operationalisation in the UPI literature.

Fourth, it grounds each construct in precisely specified theoretical mechanisms: Trust Transfer Theory (Stewart, 2003) for reliability-to-trust and recovery-to-trust chains; Service Recovery and Justice Theory (Tax et al., 1998) for recovery assurance; Protection Motivation Theory (Rogers, 1975) for fraud anxiety; Innovation Resistance Theory (Ram & Sheth, 1989) extended by Bhattacharjee and Hikmet (2007) for resistance in mandatory contexts; and IS Continuance Theory (Bhattacharjee, 2001) for post-adoption outcome framing.

6 Practical Implications

6.1 Implications for NPCI and Policymakers

Recovery assurance, emerging as the strongest enabling antecedent of institutional trust ($\beta = .233$), carries direct operational consequences for NPCI and the Reserve Bank of India. Persistent gaps between fraud incidence and complaint resolution attributable to procedural complexity, low awareness of redressal mechanisms, and perceived futility of formal processes are not merely consumer protection gaps; they represent the single most consequential lever for building institutional trust on which long-term UPI acceptance depends.

Recovery assurance must be operationalised across all three dimensions of Tax et al.'s (1998) justice framework. Distributive justice requires shortened fraud recovery timelines and reliably adequate outcomes. Procedural justice requires simplified complaint pathways accessible within the UPI application interface as a single-step submission. Interactional justice requires transparent, personalised, timely institutional communication with affected users. Rising transaction volume should not be interpreted as evidence of complete public trust; structural dependence may sustain usage despite concerns regarding fraud handling and institutional reliability. Policy attention should extend beyond transaction growth toward improving dispute resolution transparency, recovery responsiveness, and consumer protection mechanisms. The finding that educated, high-frequency users exhibit compelled acceptance perceptions suggests that digitally marginalised populations, rural users, low-literacy users, and elderly users likely experience structural compulsion at significantly higher intensities with correspondingly weaker voluntary trust foundations.

6.2 Implications for Payment Service Providers

Fraud anxiety independently suppresses institutional trust ($\beta = -.163$) indicates platform-level fraud communication strategies require redesign. Currently, PhonePe, Google Pay, and Paytm communicate fraud risk primarily reactively. Protection Motivation Theory suggests a more effective approach: proactive communication of institutional coping capacity, specific protective, detection, and recovery measures deployed at the transaction point.

Long-term ecosystem legitimacy depends not only on transactional efficiency but also on visible recovery assurance systems. Rapid complaint handling, transparent refund mechanisms, and fraud resolution support function as strategic trust-building mechanisms in digitally

dependent payment environments. Resistance to use independently suppresses acceptance depth (β = -.081) even among users structurally unable to exit the system, identifying a strategically important segment: users who comply minimally without genuinely accepting. Targeting this segment with a frictionless UPI feature discovery, reducing the effort overhead, and generating attitudinal reluctance could convert structural compliance into genuine acceptance.

6.3 Implications for IS Research Practice

This study's methodological contribution, the simultaneous estimation of enabling and inhibiting pathways within a single structural model, provides a practical template for future IS adoption research. Cenfetelli and Schwarz (2011) made the theoretical case for inhibitor-inclusive models over a decade ago; the present study demonstrates full operationalisation in a high-stakes digital service context. Researchers extending UTAUT or TAM to mandatory digital service adoption (electronic health records, government digital service portals, compulsory fintech platforms) should incorporate perceived necessity to use, cognitive burden, and resistance as theoretically distinct inhibiting forces rather than treating them as inversely scaled enabling constructs.

7 Limitations and Future Research

7.1 Limitations

Several limitations should be considered when interpreting the findings of this study.

First, the study employed convenience sampling and was limited to active UPI users in Chennai. Consequently, the findings may not be generalisable to the broader Indian population, particularly rural users, low-literacy users, elderly users, and digitally marginalised groups whose experiences with digital payment adoption and institutional trust may differ substantially.

Second, the study adopted a cross-sectional research design, which limits the ability to establish causal relationships among the constructs. Although the proposed relationships are grounded in established theory, longitudinal research would provide stronger evidence regarding the evolution of trust, fraud anxiety, resistance to use, and perceived necessity over time.

Third, the study relied on self-reported survey responses. As with all perceptual measures, responses may be influenced by social desirability bias, recall bias, or common method variance. Future studies may benefit from incorporating behavioural indicators such as transaction frequency, feature utilisation, or digital payment usage records to complement self-reported measures.

Finally, the study focused on urban, educated, and high-frequency UPI users. While this population is appropriate for examining post-adoption behaviour, the findings may not fully capture the experiences of users with lower levels of digital literacy or limited access to digital infrastructure. Future research should examine whether the proposed relationships remain stable across different demographic and socio-economic contexts.

7.2 Future Research Directions

Equity-Sensitive Digital Divide Research: Stratified rural and low-literacy sampling would test whether perceived necessity to use, fraud anxiety, and resistance to use exhibit significantly different magnitudes and structural relationships, providing an empirical foundation for equity-sensitive digital financial inclusion policy design.

Longitudinal Dynamics: Panel design tracking users across 12-24 months would capture temporal dynamics of trust formation and compulsion perception, enabling causal modelling of enabling and inhibiting pathways that cross-sectional designs can only correlate.
Cross-National Generalisation: Comparative extension testing compelled acceptance mechanism generalisation beyond India to Kenya's M-PESA, China's Alipay/WeChat duopoly, and Brazil's PIX instant payment infrastructure, where structurally analogous mandatory adoption conditions exist.
Qualitative Phenomenology: Phenomenological or grounded theory approaches would complement structural findings by illuminating users' subjective interpretations of structural compulsion, its emotional valence, and effects on long-term digital payment identity.
Future research may decompose fraud anxiety into separate threat-appraisal and coping-appraisal dimensions to provide a more nuanced understanding of how perceived risk influences institutional trust and digital payment acceptance.

8 Conclusion

India's UPI ecosystem presents IS research with a theoretically generative paradox: 185.8 billion annual transactions coexisting with 1.342 million fraud incidents, institutionalised infrastructure dependency, and documented institutional trust deficits. Existing IS adoption frameworks, TAM, UTAUT, and their extensions, were designed for voluntary adoption contexts where availability implies reliability, enabling forces dominate, and users exercise genuine choice. None of these conditions fully obtains in post-demonetisation India.
The Dual-Factor Reliability Trust Framework developed and tested in this study addresses this explanatory gap through three theoretically grounded innovations. First, it empirically separates and sequentially links availability and perceived reliability, establishing that infrastructure access is necessary but insufficient for trust-relevant functional experience driving genuine acceptance. Second, it simultaneously models enabling and inhibiting forces as independent causal pathways, confirming that fraud anxiety suppresses institutional trust independently of and without being offset by reliability and recovery assurance. Third, it extends Mandatory Use Theory to digital payment acceptance, capturing perceived necessity to use as an independent direct driver of acceptance in compelled adoption contexts.
The practical consequence is unambiguous: aggregate UPI adoption metrics may not fully capture genuine acceptance. They measure a combination of voluntary trust-driven engagement and structurally compelled participation. Until policymakers, regulators, and platform operators distinguish between these components, measuring and designing for genuine institutional trust rather than structural use volume, India's digital payment ecosystem will remain vulnerable to the trust deficit that fraud incidence, recovery inadequacy, and ecosystem dependence on UPI infrastructure.
Authentic digital payment acceptance, willing, confident, full-depth engagement is built not by expanding infrastructure availability, which India has already achieved at scale, but by converting that availability into perceived reliability, ensuring institutional responses to failures are fair and accessible, and systematically reducing the fraud anxiety that suppresses the trust sustained digital financial inclusion requires.

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