



Determinants of Digital Payment Adoption in India: Fintech Innovation, Fraud Risk Management, and User Convenience with Regulatory Framework as a Moderator

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Abstract

While digital payments have surged in India, the role of regulatory frameworks in balancing technological innovation and security remains under-explored. Drawing on Institutional Theory and the Technology Acceptance Model, this study evaluates the effects of fintech innovation, fraud risk management, and user convenience on digital payment adoption, with regulatory frameworks as a moderator. Adopting a positivist philosophy and deductive approach, data were collected from 324 active digital payment users in India. These data were analysed using Structural Equation Modelling. Findings indicate that fintech innovation is the strongest predictor of adoption, followed by fraud risk management, while user convenience also exerts a significant influence on digital payment adoption. Regulatory frameworks strengthen the relationship between security perceptions and adoption quite significantly, while negatively moderating the relationship between fintech innovation and adoption, indicating a constraining effect of regulation on innovation-driven adoption. The findings highlight the need for smart regulatory approaches and regulatory sandboxes to balance innovation and consumer protection in India's fintech ecosystem.

Keywords: Digital Payment Adoption, Fintech Innovation, Fraud Risk Management, User Convenience, Regulatory Framework, India

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Introduction

The world financial ecosystem is in the midst of a radical change, which is expected to be catalysed by the swift development of financial technology (fintech). Online payments have become a core component rather than merely a complementary service to a fundamental financial utility, and the volume of transactions worldwide is expected to surpass \$15 trillion by 2027 (BIS, 2024). This change is particularly significant in India. With the assistance of the Digital India project and the incredible popularity of the Unified Payments Interface (UPI), the nation has become the leader in real-time digital transactions, with over 100 billion transactions per year (NPCI, 2024).

This rapid growth, however, poses a major paradox: adoption has been quicker, but user trust in the system has not evolved at the same pace. This growing technological complexity has been linked to the explosion of cyber fraud and data security risk, and the world is losing over 48 billion dollars due to such fraud (Juniper Research, 2023). This implies that the problem is not confined to adoption encouragement anymore, but extends to understanding the conditions under which users sustain trust in digital payment systems.

The literature has studied the determinants of digital payment adoption comprehensively by focusing primarily on technology-related determinants, including perceived ease of use, usefulness, and relative advantage (Dahlberg et al., 2021; Luo et al., 2023). Although these models offer important insights, they are largely individualistic in perspective and overlook, to a significant extent, the broader institutional context within which digital payments are embedded. This weakness is especially pertinent to such emerging economies as India, where regulatory frameworks, policy implementation, and institutional trust play a decisive role in shaping user behaviour (Aljaradat & Shukla, 2025).

In addition, previous studies show mixed evidence concerning the part played by security. On the one hand, security mechanisms are considered to be the keys to trust and adoption promotion (Lee et al., 2022). Conversely, the presence of greater security can cause complexity and friction that can deter usage (Sarkar, 2024). Such contradictions suggest that the influences of technological factors cannot be fully appreciated in a vacuum, but have to be analysed within the regulatory and institutional framework within which they operate.

It is in relation to these factors that a critical research gap emerges. Despite earlier research that has focused on user convenience, fintech innovation, and perceived risk, few comprehensive studies have explored the effects of the regulatory frameworks under which these factors impact digital payment adoption, specifically in the Indian setting. The current literature prefers to consider regulatory mechanisms as background conditions, as opposed to active boundary conditions or moderating forces that shape the user decision-making process (Arner et al., 2021; Gomber et al., 2022).

To fill this gap, the current research concentrates on three important drivers, namely, user convenience, fintech innovation, and fraud risk management. The convenience of users is an indicator of the simplicity and effectiveness of dealings, and this has become a standard concept in advanced digital markets (Shalini & Sabitha, 2024). Fintech innovation represents the integration of advanced technologies such as artificial intelligence, biometrics, and real-time processing that enhance user experience (Bhatt et al., 2025). Fraud risk management is the apparatus that minimises perceived risk and enhances the trust of users in online transactions.

Notably, this paper considers the regulatory framework as a moderating construct, thus providing an extension to conventional adoption models. Based on the Institutional Theory, the paper assumes that regulatory practices, including policies by the Reserve Bank of India and governance systems, including the Unified Payments Interface, determine how users formulate and react to technological characteristics. The effectiveness of the trust-enhancing impact of fraud risk management and convenience is strengthened under a robust regulatory environment, while the effect of innovation can be constrained by such compliance and regulatory requirements.

This work combines technology determinants and institutional processes to contribute to the body of knowledge in the area in three ways. To begin with, it reframes the uptake of digital payments beyond conventional usability-oriented exegesis and scrutinises it according to a security and innovation-oriented view. Second, it presents empirical findings on the dual role of regulatory systems as facilitators and inhibitors. Third, it provides context-related information on the Indian fintech ecosystem, thereby contributing to the broader literature on digital adoption in emerging economies. Accordingly, this study examines the effects of user convenience, fintech innovation, and fraud risk management on digital payment adoption in India, and investigates the moderating role of regulatory frameworks in shaping these relationships.

The remainder of this paper is structured as follows. Section 2 presents the theoretical background and hypothesis development, drawing on the Technology Acceptance Model and Institutional Theory to develop the conceptual framework. Section 3 outlines the research methodology, including the research design, data collection, measurement, and analytical procedures. Section 4 reports the empirical results, including measurement model assessment, structural model testing, and moderation analysis. Section 5 discusses the key findings in relation to the existing literature, while Section 6 highlights the theoretical and managerial implications of the study, its limitations, and directions for future research.

Theoretical Background and Hypothesis Development

The Theoretical Foundations of Digital Payment Adoption

The adoption of digital payment systems is rooted in established models of technology acceptance, primarily the Technology Acceptance Model (TAM) (Davis, 1989) and the Unified Theory of the Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). These models explain adoption through cognitive evaluations such as perceived usefulness and ease of use, which shape behavioural intention and actual usage. However, these models predominantly assume a relatively stable technological environment and therefore offer limited explanatory power in contexts where institutional forces and security risks shape user evaluations dynamically.

In response to this limitation, the rapid growth of fintech applications necessitates an expanded perspective that integrates security-based trust formation and institutional conditioning mechanisms into traditional adoption logic. In the Indian context, the shift toward a "less-cash" economy has been accelerated not only by technological affordances but also by state-led digital infrastructure development and regulatory interventions, creating a structurally enabled, yet risk-sensitive, ecosystem for adoption (Aljaradat & Shukla, 2025). Accordingly, digital payment adoption is conceptualised in this study as a multi-level process shaped jointly by individual cognition, technological affordances, and institutional regulation.

User Convenience and Digital Payment Adoption

The convenience of the user is a determinant of adoption, reflecting the perceived effort, time efficiency, and transactional simplicity associated with using digital payment systems. Prior literature also demonstrates that simplified interfaces,

smooth navigation, and shorter transaction times have a considerable impact on user acceptance of digital payment systems (Alalwan et al., 2018; Fakriah et al., 2025). The introduction of advanced fintech features such as one-tap payments, biometric authentication, and real-time transaction processing in other parts of Asia and in India has only enhanced the perceived convenience of digital payments, reducing procedural friction and increasing transaction fluidity (Shaikh & Hussain, 2023; Utomo, 2025). Theoretically, Self-Determination Theory explains the reason why users are intrinsically motivated to use technologies that minimize effort and increase autonomy (Deci & Ryan, 2017).

In the Indian context, the expansion of smartphone penetration and UPI-based platforms has shifted convenience from a differentiating factor to a threshold expectation that conditions baseline adoption decisions rather than merely enhancing preference (Shalini & Sabitha, 2024; Alqudah et al., 2025). Thus, user convenience operates as a foundational, but increasingly commoditised, driver of adoption in mature digital payment ecosystems.

Fintech Innovation and Digital Payment Adoption

Fintech innovation is a disruptive technology that is redefining the digital payments ecosystem using technologies like blockchain, AI-based fraud detection, and contactless interfaces (Zhao et al., 2022; Bhatt et al., 2025). These innovations, according to the Disruptive Innovation Theory, upset traditional banking systems since they provide more agile and cost-efficient alternatives (Christensen, 1997; Lee & Shin, 2018).

The causal mechanism linking fintech innovation to adoption operates through perceived value enhancement and trust reinforcement, where users interpret technological advancement as an indicator of reliability, speed, and system legitimacy. Recent research (e.g. Al Mamum et al., 2025) suggests that not only does the convergence of fintech technologies make service delivery more effective, but also positively affects user experience and trust (Anifa et al., 2022; Kou et al., 2021). In emerging markets such as India, the development of digital wallets and neo-banking solutions has greatly impacted consumer behavior, shifting preferences towards mobile-first interfaces instead of traditional brick-and-mortar banking (Shalini & Sabitha, 2024; Aljaradat & Shukla, 2025). This indicates that fintech innovation functions not only as a utility enhancer but also as a symbolic signal of technological

modernity, thereby strengthening adoption intention through both functional and perceptual pathways.

Fraud Risk Management and Digital Payment Adoption

Although digital payments have been increasing very rapidly, issues surrounding cybersecurity threats and data breaches are becoming critical obstacles. When they perceive a robust security system that includes encryption, Multi-Factor Authentication (MFA), and real-time fraud detection, users prefer to use online payment systems (Karim et al., 2022; Kumar & Sethupathy, 2025). These mechanisms operate through a risk-reduction pathway, where perceived security directly reduces uncertainty and enhances willingness to transact.

Empirical research underlines the importance of effective fraud risk management, as it increases user trust and its perceived risk is lower, which is crucial to retaining users in the long term (Luo et al., 2023; Norbu et al., 2024). In India, perceived security has gained a pivotal position in the decision-making process of the user due to heightened awareness of cyber fraud, and aggressive regulatory intervention (Aljaradat & Shukla, 2025; Gupta & Shukla, 2024). In this sense, trust acts as a mediating cognitive mechanism between security systems and adoption outcomes.

In India, heightened exposure to cyber fraud incidents combined with increasing regulatory enforcement has elevated security perceptions as a central determinant of user decision-making (Aljaradat & Shukla, 2025; Gupta & Shukla, 2024). Accordingly, fraud risk management is not merely a technical safeguard but a trust-building institutional signal that conditions adoption behaviour directly.

Regulatory Framework as a Moderator

The regulatory framework serves as the overarching institutional structure that defines the "rules of the game" for the fintech ecosystem. In this study, the regulatory framework is defined operationally as the perceived effectiveness of legal protections, policy clarity, and government compliance mechanisms that ensure security and consumer rights (Arner et al., 2021). Grounded in Institutional Theory, this construct captures how formal rules and policy signals influence both organisational integrity and consumer confidence (DiMaggio & Powell, 1983).

In the Indian fintech context, regulatory instruments such as the Reserve Bank of India (RBI) guidelines on data localisation and the Unified Payments Interface

(UPI) standards have provided a standardised institutional mechanism that reduces uncertainty and enhances perceived system legitimacy, thereby lowering adoption barriers.

From a causal perspective, regulation operates through three distinct moderating mechanisms. First, a supportive regulatory environment strengthens the effect of user convenience on adoption by reducing transactional uncertainty and ensuring interoperability across platforms. For example, interoperable QR code mandates reduce switching friction across payment applications (Xue et al., 2021). Thus, regulation enhances the translation of convenience into actual usage by reducing structural friction and cognitive uncertainty. Second, the relationship between fintech innovation and adoption is often subject to a contingent constraint mechanism often described as the "regulatory burden-effect (Alsmadi et al. (2025). While innovation generally drives adoption, overly rigid or complex regulatory environments can dampen this positive impact by increasing compliance costs and delaying the deployment of disruptive features (Das et al., 2022). In India, the RBI's Regulatory Sandbox illustrates this tension, providing a controlled environment for innovation that balances speed with safety. Thus, the potency of innovation as a driver of adoption is contingent upon whether the regulatory framework is perceived as enabling or restrictive. Therefore, the effect of innovation on adoption is conditional on the perceived flexibility of the regulatory environment.

Third, regulatory frameworks reinforce the effectiveness of fraud risk management through a trust amplification mechanism. By mandating security standards such as multi-factor authentication and providing clear legal recourse for fraud victims, regulators reinforce consumer trust in the efficacy of a platform's internal security measures (Singh & Kaur, 2022; Gupta & Shukla, 2024). In an environment characterized by strong institutional oversight and the enforcement of the Digital Personal Data Protection (DPDP) Act, users are more likely to translate their perceptions of technical security into actual and sustained adoption behaviour.

Based on the preceding theoretical discussion and empirical review, the following hypotheses are proposed:

H1: *User convenience has a positive impact on digital payment adoption.*

H2: *Fintech innovation positively influences digital payment adoption.*

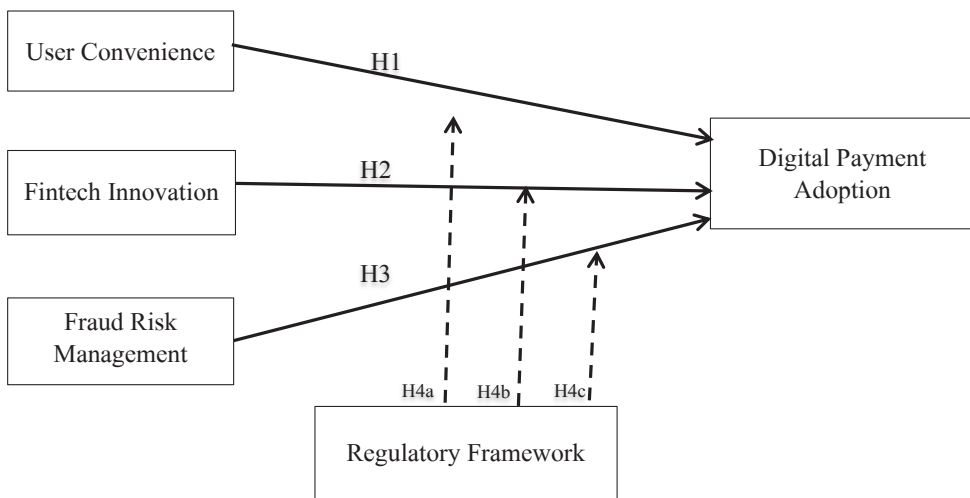
H3: *Effective fraud risk management positively influences digital payment adoption.*

H4a: *The relationship between user convenience and digital payment adoption is moderated by the regulatory framework.*

H4b: *The relationship between fintech innovation and digital payment adoption is moderated by the regulatory framework.*

H4c: *The relationship between fraud risk management and digital payment adoption is moderated by the regulatory framework.*

Figure 1 Conceptual Framework



Source: Authors constructed.

Research Methodology

Research Design and Philosophy

This study adopts a positivist research philosophy with a deductive approach, aimed at empirically testing the influence of fintech factors on digital payment adoption through a quantitative lens. A cross-sectional survey design was employed to capture a snapshot of user perceptions and behavioral intentions. This design is appropriate for examining the simultaneous interplay between convenience, innovation, fraud risk, and regulatory moderations within the Indian banking context (Hair et al., 2021).

Population and Sampling Technique

The empirical context of this study is the Indian digital payment ecosystem. According to the Reserve Bank of India (RBI, 2024) and the National Payments Corporation of India (NPCI, 2024), the active digital payment user base in India has surged to over 450 million.

Given the scale and diversity of this population, a purposive sampling technique was utilized to target "active digital payment users" across all ages, income brackets, and degrees of digital proficiency. This non-probability sampling approach ensures that respondents possess sufficient technological literacy and transaction experience specifically, a minimum of three digital transactions in the month preceding the survey, to provide informed responses regarding innovation and security (Dabhi & Chudasama, 2023). Data were collected from users across major Tier-1 and Tier-2 Indian hubs (including Bengaluru, Mumbai, and Delhi-NCR) to ensure broad coverage of urban digital payment users in India. The recruitment was conducted over an eight-week period (March to May 2025) through a highly targeted, digital outreach strategy. Specifically, 410 personalized invitations were disseminated via direct messaging to professionals in LinkedIn Fintech groups and verified institutional email contacts (Gmail). Following a rigorous data-cleaning process and eligibility screening, 324 valid and complete responses were retained for analysis, representing a robust response rate of approximately 79%.

Sample Size and Statistical Power

A final sample of $N = 324$ valid responses was retained. The sample adequacy was verified using G*Power 3.1 analysis, which indicated that for a model with five predictors and a medium effect size ($f^2 = 0.15$), a minimum sample of 200–300 is required to achieve a power of 0.95. The sample size also meets SEM recommendations of a minimum 10:1 ratio of observations to estimated parameters (Hair et al., 2021).

Data Collection and Instrumentation

Data were gathered via a structured, self-administered online questionnaire distributed through email, social media, and fintech-related forums. The survey was designed to take approximately 10–12 minutes to complete. To minimise common method bias (CMB) and ensure ethical integrity, respondents were assured of anonymity, confidentiality, and the purely academic nature of the study (Podsakoff et

al., 2023). A pilot study was carried out with 30 participants to refine item clarity and scale reliability. The results demonstrated strong internal consistency, with Cronbach's alpha values ranging from 0.78 to 0.89. Minor linguistic adjustments were made to the "Regulatory Framework" items to better align with local Indian policy terminology before final data collection.

Measurement and Operationalisation

All items were measured using a five-point Likert scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (5). The study operationalised five key constructs. Digital Payment Adoption (DPA) was measured in terms of consumers' behavioural intention and frequency of usage (Venkatesh et al., 2012). User Convenience (UC) captured the degree of perceived ease of use, accessibility, and time efficiency (Davis, 1989; Zhou, 2011). Fintech Innovation (FI) reflected respondents' perceptions of advanced technologies, such as artificial intelligence, contactless payment systems, and blockchain applications (Cheng et al., 2020). Fraud Risk Management (FR) was operationalised as the perceived efficacy of fraud prevention and security technologies, including encryption and detection mechanisms (Luo et al., 2010). Finally, the Regulatory Framework (RF) measured the perceived role of legal, policy, and compliance mechanisms in enhancing trust and ensuring secure transactions (Arner et al., 2015).

Data Analysis Strategy

The conceptual model was analyzed through a two-stage process using IBM SPSS and AMOS 26.0. First, Confirmatory Factor Analysis (CFA) was used to assess the measurement model's reliability and validity. Second, Structural Equation Modelling (SEM) was applied to test the hypothesised direct effects. The primary structural relationship is represented as follows:

The Hayes PROCESS Macro (Model 1) with 5,000 bootstrap resamples was used to analyse the moderating effect of the Regulatory Framework (RF). The structural model was specified to estimate the direct effects of latent constructs on digital payment adoption, as given below;

$$DPA = \beta_0 + \beta_1(UC) + \beta_2(FI) + \beta_3(FR) + \varepsilon$$

Separate moderation models were estimated for each independent variable that interacted with the regulatory framework, as given below;

$$DPA = \beta_0 + \beta_1(IV) + \beta_2(RF) + \beta_3(IV \times RF) + \varepsilon$$

Where *IV* represents the respective Independent Variable (UC, FI, or FR), and *RF* denotes the regulatory framework.

Exploratory Factor Analysis

Research constructs connected to digital payment acceptance in fintech services were evaluated using EFA to determine their factor structure. A value of 0.852 emerged through the Kaiser-Meyer-Olkin (KMO) test, which is considered adequate, surpassing the suggested 0.60 threshold. Bartlett's test of sphericity was significant at the 1% level. Factors were identified using principal component analysis with varimax rotation, based on Eigenvalues greater than 1, ensuring strong explanatory power. The analysis resulted in four factors explaining 75.04% of the total variance.

Assumption Testing

Prior to the structural model estimation in AMOS, the dataset was assessed for key statistical assumptions necessary for Maximum Likelihood (ML) estimation.

Multicollinearity

Multicollinearity was assessed at the regression level. A multiple regression model was performed where all independent variables (User Convenience, Fintech Innovation, and Fraud Risk Management) were entered simultaneously to predict Digital Payment Adoption (DPA). The resulting Variance Inflation Factor (VIF) values for User Convenience (1.635), Fintech Innovation (1.726), and Fraud Risk Management (1.640) were all significantly below the conservative threshold of 5.0 (Hair et al., 2021), confirming that multicollinearity has not biased the structural estimates.

Multivariate Normality and Estimation Robustness

Since AMOS would be used for hypothesis testing, the data were assessed for normality. Univariate skewness and kurtosis values for all observed indicators were within the acceptable range of ± 2 . While behavioural survey data often exhibit slight departures from multivariate normality, the Maximum Likelihood (ML) estimation method employed in this study is empirically recognised as robust to such deviations, particularly when the sample size exceeds 200 (Kline, 2016; Hair et al., 2021). Thus, the structural parameters estimated in this study are reliable and unbiased.

Independence of Residuals

The Durbin-Watson statistic was calculated to examine the independence of residuals. The obtained value of 1.170 falls within the acceptable range for behavioral research, indicating that autocorrelation does not pose a substantial threat to the validity of the structural model (Field, 2018).

Table 1 Constructs, Descriptive Statistics and VIF Values

Constructs	Items	Mean	Standard deviation	Skewness	Kurtosis	VIF values
User convenience	UC1	3.83	1.335	-.982	-.252	1.635
	UC2	3.52	1.092	-.386	-.626	
	UC3	3.65	1.283	-.697	-.664	
	UC4	3.61	1.277	-.757	-.456	
Fintech innovation	FI1	3.75	1.191	-.917	.014	1.726
	FI2	3.65	1.206	-.657	-.495	
	FI3	3.93	1.267	-1.028	-.053	
Fraud risk management	FR1	3.78	1.233	-.721	-.614	1.640
	FR2	3.73	1.146	-.910	.234	
	FR3	3.75	1.163	-.872	.005	
Digital payment adoption	DPA1	3.61	1.255	-.686	-.664	-
	DPA2	3.40	1.380	-.615	-.941	
	DPA3	3.57	1.446	-.581	-1.089	

Source: Authors constructed.

Assessment of the measurement model

The CFA results indicated a good model fit, which underscored the reliability and validity of the measurement constructs. The chi-square value (CMIN) was 111.686 with 59 degrees of freedom (CMIN/DF = 1.893), which suggested a strong model fit. The Comparative Fit Index (CFI = 0.975) and the Tucker-Lewis Index (TLI = 0.968) were greater than the threshold of 0.95, indicating excellent fit. Moreover, the Goodness-of-Fit Index (GFI = 0.951) was greater than 0.90, and the Root Mean Square Error of Approximation (RMSEA = 0.053) did not exceed the 0.08 threshold with PClose = 0.370 providing evidence for the model's adequacy. These findings confirm the goodness of fit of the measurement model for subsequent structural analysis (Hu & Bentler, 1999).

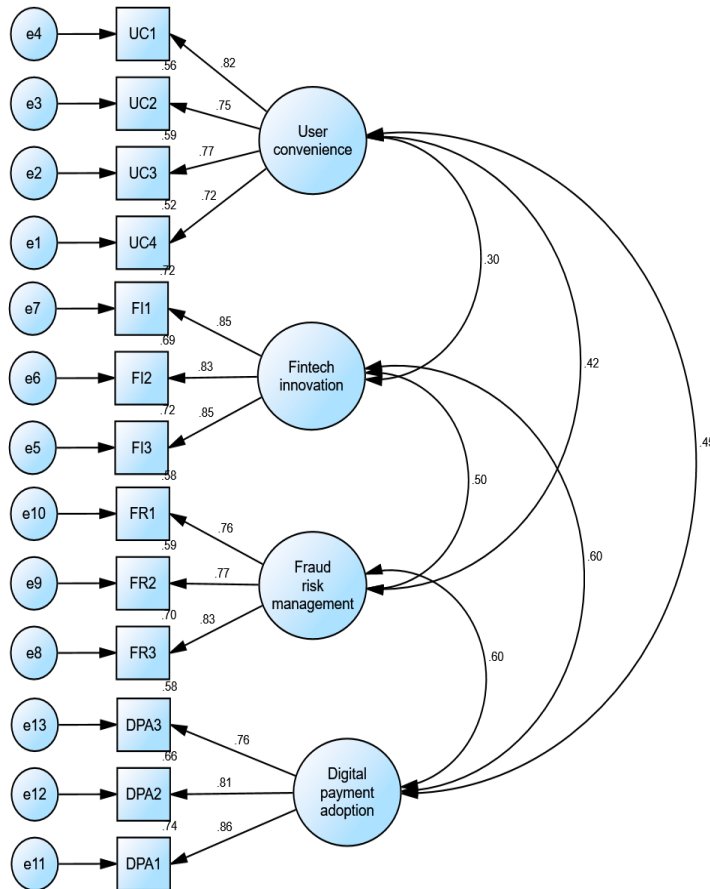
Construct Reliability

Composite Reliability (CR), Average Variance Extracted (AVE), and Cronbach's alpha were used to determine dependability. In order to confirm internal consistency, Cronbach's alpha values greater than 0.7 were used (Nunnally & Bernstein, 1994), while CR values above 0.7 indicated that items within each construct consistently measured the same concept (Hair et al., 2021). In addition, the AVE values above 0.5 indicated that the constructs explained a substantial part of the variance of the corresponding items (Fornell & Larcker, 1981). The results of these analyses are confirmatory in that all the constructs had sufficient reliability so they could build over the required limits.

Construct Validity

To determine convergent validity, the researchers used standardised factor loadings, AVE and CR values. Convergent validity of the constructs was warranted by the greater than 0.5 AVE values, along with the factor loadings being greater than 0.5 (the Hair et al. (2021) values). These statistics also confirmed to some measure the internal consistency of each of the CR values, which was greater than 0.7. In order to ascertain discriminant validity, the Fornell-Larcker criterion was examined and Maximum Shared Variance (MSV) was conducted. Fornell and Larcker (1981) revealed that each construct accounted for its own distinct variation since compared to its own correlation, the AVE of every construct was higher with other constructs. The fact that each MSV value was lower than its corresponding AVE value lends credence to the model's discriminant validity.

Figure 2 Digital Payment Adoption CFA Model



Source: Authors constructed.

Table 2 Reliability and Validity Measures

	Alpha	CR	AVE	MSV
User convenience	.848	0.849	0.585	0.203
Fintech innovation	.879	0.879	0.708	0.359
Fraud risk management	.828	0.830	0.620	0.361
Digital payment adoption	.848	0.852	0.659	0.361

Source: Authors constructed.

Structural Model for hypothesis testing

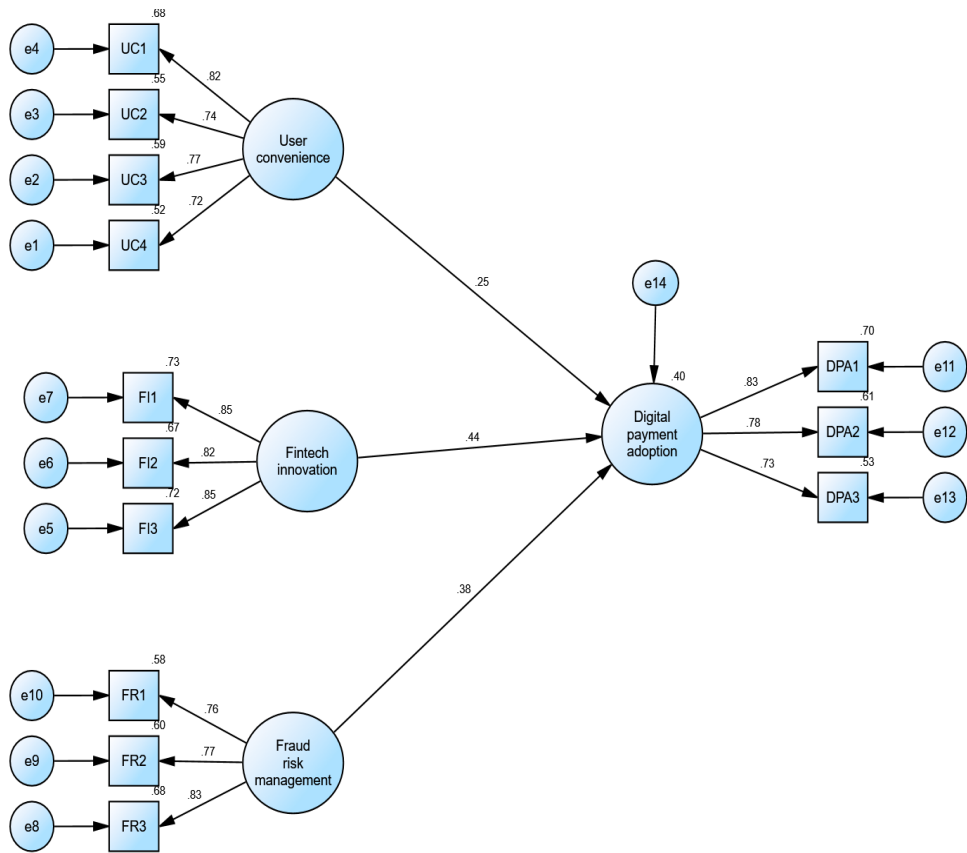
Structural Equation Modelling (SEM) was utilised to investigate the relationships among predictor variables and the outcome variable. The Maximum Likelihood Estimation (MLE) method was employed, given its robustness and suitability for estimating complex structural models (Blunch, 2013). The hypothesis testing framework incorporated unstandardized regression coefficients (B), standardized regression weights (β), standard errors (SE), critical ratios (CR/T), and p-values to assess the significance of the proposed relationships. A hypothesis was deemed statistically significant when the p-value was less than 0.05 and the T-value exceeded 1.96, ensuring rigorous validation of the theoretical model.

The results presented in Table 3 provide compelling evidence supporting the hypothesised relationships. More specifically, an increase in user convenience has a significant positive effect on digital payment adoption ($\beta = 0.249$, $p < 0.05$, $T = 4.289$). This is because both the p value, which is below the conventional level of 0.05, and the T value, which is higher than 1.96, indicate that there is sufficient statistical evidence to state that H1 is true, i.e. expanded convenience attracts users towards digital payment solutions.

It also proved that digital payment adoption is significantly determined through fintech innovation ($\beta = 0.438$, $p < 0.05$, $T = 7.435$). This confirms that technological advances in fintech significantly improve user adoption, where a p value less than 0.05 and a T value above 1.96 provided sufficient evidence to accept hypothesis H2. Similarly, fraud risk management also influences digital payment adoption significantly. The path coefficient for this relationship is $\beta = 0.385$, with $T = 6.368$ and $p < 0.05$. These results confirm the acceptance of H3.

The coefficient of determination (R^2) for digital payment adoption is 0.401, indicating that user convenience, fintech innovation, and fraud risk management collectively explain 40% of the variance in digital payment adoption.

Figure 3 The Causal Structure of Digital Payment Adoption



Source: Authors constructed.

Table 3 Hypotheses Test Results

Outcome variable	Predictor variables	B	β	S.E.	C.R.	P	Decision
Digital payment Adoption	<--- User convenience	.291	.249	.068	4.289	0.000	H1 supported
Digital payment adoption	<--- Fintech innovation	.381	.438	.051	7.435	0.000	H2 supported
Digital payment adoption	<--- Fraud risk management	.437	.385	.069	6.368	0.000	H3 supported

Source: Authors constructed.

Moderation analysis

The Hayes Process Macro (Model 1) was used for moderation analysis, and the analysis revealed that there were substantial interaction effects between the regulatory framework and key determinants of digital payment adoption, including user convenience, fraud risk management, and fintech innovation.

The link between potential fraud management and the regulatory framework demonstrated important statistical significance ($\beta = 0.3020$, $p < 0.05$). Thus, digital payment adoption depends more strongly on fraud risk management regulations when payments operated in highly regulated environments than in less regulated settings. The research shows that regulatory observance plays an essential role in developing trust and security measures that lead to greater adoption rates.

Conversely, the interaction effect between fintech innovation and the regulatory framework was negative and significant ($\beta = -0.2091$, $p < 0.05$). When regulatory restrictions were more stringent, fintech innovation had a weaker impact on digital payment adoption ($\beta = 0.3675$), whereas in a less restrictive environment, the effect was stronger ($\beta = 0.5766$). This indicates that overly strict regulations may limit the transformative potential of fintech innovations, while a more flexible framework allows for greater adoption and market penetration. These findings emphasise the critical role of regulatory frameworks in shaping the effectiveness of fintech-driven financial services.

Table 4 Regulatory Framework as a Moderator

Interaction effect	Coefficients	SE	t	p	95% Bootstrapped CI [LLCI, ULCI]
User convenience					
* Regulatory framework	0.2620	0.1238	2.1171	0.035	[0.0194, 0.5046]
	High=0.5492 Low=0.2873				
Fraud risk management					
* Regulatory framework	0.3020	0.1139	2.6509	0.008	[0.0787, 0.5253]
	High=0.4766 Low=0.1746				
Fintech innovation					
* Regulatory framework	-0.2091	0.1015	-2.0606	0.042	[-0.4080, -0.0102]
	High=0.3675 Low=0.5766				

Note: LLCI = Lower Limit Confidence Interval; ULCI = Upper Limit Confidence Interval. Based on 5,000 bootstrap samples.

Source: Authors constructed.

Discussion

The results of this paper affirm that user convenience, fintech innovation and fraud risk management are important factors that impact digital payment adoption amongst Indian users. Fintech innovation stands out as the most powerful predictor among them, suggesting that users increasingly evaluate digital payment platforms based on technological sophistication, system responsiveness, and perceived advancement rather than merely on basic transactional functionality. This result aligns with the existing literature that notes the transformative nature of fintech solutions like AI-powered systems and real-time payment subsystems in improving user experience and speeding up adoption (Bhatt et al., 2025; Kou et al., 2021). The finding further indicates that innovation operates not only as a functional utility enhancer but also as a symbolic signal of platform modernity and reliability within emerging digital ecosystems. It also lends credence to the Indian case, in which the swift advancements in UPI and mobile payment technologies have largely influenced consumer behaviour (Shalini & Sabitha, 2024).

Fraud risk management is the second most significant factor, which highlights the importance of perceived security in online financial transactions. This is in line with the current literature that advises that robust security measures such as encryption and multi-factor authentication make people feel more secure, lowering perceived risk (Kumar & Sethupathy, 2025; Norbu et al., 2024). This finding suggests that users increasingly perceive security mechanisms as integral components of service quality rather than as merely protective technical features. The outcome also supports the results stemming from emerging economies, where the issue of cybersecurity is the key factor in the decision-making process of adoption (Aljaradat & Shukla, 2025). Unlike earlier technology acceptance studies that predominantly emphasized usability, the present findings indicate a gradual shift toward trust-centric adoption behaviour in digitally evolving financial environments.

Significant, but with a relatively lesser impact on adoption, is user convenience. This result confirms recent reports that ease of use has stopped being a significant form of differentiation and has become a baseline in digital payment markets that are mature (Utomo, 2025; Fakriah et al., 2025). As digital payment ecosystems become more standardized and technologically familiar, users appear to place greater evaluative weight on innovation capability and institutional trust than on operational simplicity alone. In contrast to previous research conducted based on the TAM, which

focuses on convenience as the dominant predictor of adoption (Alalwan et al., 2018), the current results demonstrate that convenience now functions as a foundational requirement rather than a strategic differentiation.

The findings of the moderation analysis provide a clearer understanding of the importance of the regulatory framework. The positive moderating effect that exists in the relationship between fraud risk management and adoption reveals that the effects of security perceptions are enhanced by regulatory support. This result aligns with previous research that proves increase of trust and perceived risk reduction as a result of regulatory enforcement (Gupta & Shukla, 2024; Singh & Kaur, 2022). In the Indian fintech ecosystem, institutional safeguards such as the RBI guidelines and data protection regulations appear to reinforce the credibility of platform-level security mechanisms, thereby increasing users' willingness to engage in sustained digital transactions.

Similarly, the moderating effect on the relationship between the convenience of adoption and adoption rates is positive, indicating that a favourable regulatory climate positively increases the effectiveness of convenience by mitigating transaction uncertainty through the presence of a reliable system. This result is consistent with research highlighting the importance of regulation standardisation in enhancing user experience and in conducting transactions with greater facility (Xue et al., 2021; Fakriah et al., 2025). This suggests that convenience alone may not be sufficient to drive adoption unless supported by institutional arrangements that enhance predictability and transactional confidence.

Conversely, the negative moderating impact on fintech innovation indicates a crucial conflict between innovation and regulation. Although fintech innovation has a positive effect on adoption, the effect is diminished within strict regulatory environments. This result confirms the position of the regulatory burden, according to which too many compliance requirements can inhibit innovation and slow the process of technological dissemination (Das et al., 2022; Zhu et al., 2023). Importantly, the findings reveal the dualistic nature of regulation within emerging fintech ecosystems, where regulation simultaneously functions as a trust-enabling mechanism and an innovation-constraining force. Nevertheless, the current study also builds upon existing studies by illustrating this impact empirically in the context of the Indian fintech ecosystem, which implies that a balanced policy toward innovation should be implemented, one that does not undermine security and stability.

Theoretical Implications

This research builds on the literature relevant to digital payment adoption by demonstrating that fintech innovation and fraud risk management have overtaken user convenience as the key determinant of adoption, revealing that adoption behaviour has switched to a technology-based and security-based one (Bhatt et al., 2025; Kumar & Sethupathy, 2025). Rather than rejecting TAM assumptions, the findings suggest that the explanatory salience of traditional ease-of-use constructs may diminish as digital payment technologies become normalised within mature digital ecosystems.

Using the regulatory framework as a moderator, this research takes a step forward based on Institutional Theory by demonstrating that the regulatory impact is twofold. In particular, regulation reinforces the outcomes of convenience and fraud risk control and dilutes the effects of fintech innovation under difficult circumstances. This supports the regulatory burden point of view (Das et al., 2022) and, simultaneously, proves the trust-enhancing nature of institutional mechanisms (Arner et al., 2021). The result highlights the fact that institutional forces do not merely operate as passive contextual conditions but actively shape the translation of technological attributes into behavioural outcomes. The findings, therefore, provide integrated insights into digital payment adoption by jointly explaining how technological affordances and institutional mechanisms interact within emerging digital economies.

Practical Implications

The findings offer several targeted implications for fintech firms and policymakers. First, given that fintech innovation is the strongest predictor of adoption, firms should prioritise technology-driven differentiation, such as AI-enabled personalisation, real-time transaction processing, and enhanced user interfaces (Bhatt et al., 2025). However, the findings also indicate that innovation effectiveness depends heavily on regulatory compatibility, suggesting that firms should adopt “compliance-by-design” approaches when developing new fintech solutions. Second, the strong impact of fraud risk management suggests that firms should adopt a “security-first” strategy, emphasising visible and user-centric security features such as multi-factor authentication, fraud alerts, and encryption mechanisms. The findings indicate that security visibility itself contributes to adoption by strengthening users’ psychological confidence in digital transactions. (Kumar & Sethupathy, 2025; Gupta & Shukla, 2024). Third, as convenience is no longer a primary differentiator, firms should

move beyond promoting mere ease of use and instead, highlight trust, reliability, and technological superiority in their marketing strategies (Utomo, 2025).

From a policy perspective, the findings highlight the need for a balanced regulatory approach. While strong regulation enhances trust and strengthens the effect of fraud risk management on adoption, excessive rigidity may hinder innovation. Therefore, regulators such as the Reserve Bank of India should focus on adaptive and flexible policy frameworks that support innovation while maintaining security standards.

The expansion of regulatory sandbox initiatives can help mitigate the negative moderating effect observed for fintech innovation by allowing firms to test new technologies in controlled environments (Arner et al., 2021). Additionally, strengthening the enforcement of data protection laws and consumer grievance mechanisms can further enhance trust, thereby reinforcing the positive impact of security on adoption (Gupta & Shukla, 2024).

The findings further suggest that emerging digital economies require “enabling regulations” rather than purely restrictive oversight, where institutional mechanisms simultaneously facilitate experimentation, interoperability, and consumer protection.

Limitations and Future Research

Despite its contributions, this study has certain limitations. First, the cross-sectional design of the research restricts its ability to capture changes in user behaviour over time, particularly in a rapidly evolving fintech landscape. Future studies could adopt longitudinal approaches to examine how adoption patterns shift with technological and regulatory developments.

Second, the study focuses primarily on urban users in India, which may limit generalisability to rural populations where digital literacy and infrastructure differ significantly. Future research may therefore explore comparative rural urban adoption dynamics to better understand institutional and technological inequalities within digital financial ecosystems.

Finally, future studies may incorporate additional constructs such as trust, financial literacy, and perceived risk to further refine the model and provide a more comprehensive understanding of digital payment adoption behaviour. Comparative cross-country studies spanning several emerging economies may also help identify how differing institutional environments shape fintech adoption trajectories.

Conclusion

This study examined digital payment adoption in India by focusing on fintech innovation, fraud risk management, user convenience, and the moderating role of regulatory frameworks. The analysis was grounded in the Indian digital payment ecosystem shaped by UPI infrastructure, rapid fintech expansion, and regulatory oversight by the Reserve Bank of India. The findings reveal that fintech innovation is the strongest determinant of adoption, followed by fraud risk management and user convenience.

Adoption behaviour is, therefore, primarily driven by technological capability and perceived security, while convenience functions as a supporting condition rather than a primary driver. This reflects the structural characteristics of India's digital payment environment, where system standardisation has reduced variability in ease of use across platforms. The regulatory framework plays a differentiated role in shaping these relationships. It strengthens the effects of fraud risk management and user convenience by enhancing trust, reducing uncertainty, and reinforcing system legitimacy within the institutional environment. At the same time, it weakens the effect of fintech innovation, indicating that regulatory compliance conditions can slow the translation of technological advancement into user adoption.

The study demonstrates that digital payment adoption in India is determined through an interaction between technological factors and institutional regulation. The Indian context reveals that adoption is not explained by technology alone, but also by the manner in which regulatory structures shape trust formation, risk perception, and innovation diffusion within a rapidly expanding digital financial system.

Conflict of Interest

The authors declare that they have no conflict of interest that could have appeared to influence the work reported in this paper, whether financial or of any other nature.

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