International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 23s, 2025
https://theaspd.com/index.php

Exploring the Impact of Trust, Confidentiality, And Risk Perceptions on the Intention to Use Cryptocurrency in India

Pooja kumari[1], Alpana Srivastava[2], Rupesh Rastogi[3]
[1]Research Scholar, Amity University Uttar Pradesh, Lucknow,pooja.kumari2@s.amity.edu
[2]Professor, Amity University Uttar Pradesh, Lucknow,asrivastava3@lko.amity.edu
[3]Associate Professor, Azad Institute of Engineering and Technology, Lucknow,rastogi_mba12@yahoo.com

Abstract
Cryptocurrency refers to digital or virtual currencies that operate on cryptographic principles, typically leveraging blockchain technology. As decentralized digital assets, cryptocurrencies are not issued or regulated by central authorities like governments or banks, making them resistant to manipulation or censorship. This study investigates the factors influencing the intention to use cryptocurrency in India, focusing on the roles of trust, confidentiality, and risk perception. Given the growing interest in digital currencies amid regulatory ambiguity, the research adopts a quantitative approach using Partial Least Squares Structural Equation Modelling (PLS-SEM) to analyse responses from 576 participants across Tier 1 Indian cities. The findings reveal that confidentiality and trust significantly impact the intention to adopt cryptocurrency, with risk perception emerging as the most influential determinant. Moreover, risk perception mediates the relationship between trust, confidentiality, and user intention. These results highlight the psychological and contextual challenges surrounding cryptocurrency adoption in India and offer valuable insights for policymakers, technology developers, and financial institutions seeking to foster safer and more inclusive digital financial ecosystems. By mapping the magnitude and direction of each influencing factor, this research illuminates the pathways through which trust and confidentiality, perceived risk, influence cryptocurrency adoption intentions. The practical implications stress the importance of regulatory clarity, privacy safeguards, and user education as strategies to bolster trust, curb risk perception, and facilitate broader cryptocurrency integration into India's financial landscape.
Keywords: *Cryptocurrency adoption; Trust; Confidentiality; Risk perception; User intention; Digital finance.*

INTRODUCTION

Cryptocurrency, a transformative technological innovation, has emerged as a significant disruptor in the financial sector over the past decade(Alamaren et al., 2024). Built on blockchain technology, cryptocurrencies have redefined the concept of digital transactions by offering decentralized, secure, and anonymous methods of transferring and storing value. Bitcoin, the first cryptocurrency introduced in 2009, laid the foundation for a market that now includes thousands of digital currencies, with varying purposes and functionalities(Singh, Sharma, Gupta, et al., 2024). This proliferation has been accompanied by increasing global adoption, particularly in economies where traditional financial systems face challenges in accessibility, transparency, or efficiency(Joseph et al., 2024). In India, cryptocurrencies are steadily gaining traction as an alternative means of payment and investment, fuelled by the growing penetration of digital technology and the financial inclusion drive across urban and rural areas(Kliestik et al., 2024).

The rapid evolution of cryptocurrency markets has sparked interest from governments, financial institutions, and researchers worldwide."The distributed architecture of cryptocurrency networks" eliminates the need for intermediaries, thus reducing transaction costs and processing times(Lahmiri, 2024). Simultaneously, they offer anonymity and privacy in transactions, a feature that appeals to many users concerned about data security in conventional banking systems. However, these benefits come with challenges, including high volatility, regulatory uncertainty, and susceptibility to cyber fraud(Recskó and Aranyossy, 2024a). The lack of legal recognition in some countries, including India, further compounds the risks and hinders widespread acceptance. Consequently, understanding the factors that influence an individual's intention to use cryptocurrency becomes critical for policymakers, financial stakeholders, and technology developers aiming to harness the potential of this digital revolution(Heaton et al., 2024).

Trust is a pivotal element in the adoption of any financial innovation, and cryptocurrencies are no exception(Singh, Sharma, and Gupta, 2024). Unlike traditional payment systems backed by government guarantees or institutional trust, cryptocurrencies operate on peer-to-peer networks where trust is derived

from technological protocols and user confidence(Abou Ali, 2024a). Many individuals remain sceptical of the security and reliability of cryptocurrencies, particularly in regions like India, where financial literacy varies significantly(M. Mishra et al., 2024). Concerns over the integrity of cryptocurrency exchanges, the potential for fraud, and the robustness of security measures often deter users from adopting this technology(Guo et al., 2024). At the same time, positive perceptions of trust can significantly influence individuals' willingness to experiment with cryptocurrencies, highlighting the importance of this construct in understanding adoption behaviours(Rahman et al., 2024).

Confidentiality plays an important role in shaping user attitudes toward cryptocurrency. In an era where concerns over data privacy are escalating, cryptocurrencies offer a sense of assurance through anonymity and secure transactions(Au et al., 2024). Users who value the confidentiality of their financial activities may be more inclined to use cryptocurrencies for payments and investments(Bouri et al., 2024). However, this anonymity has also been associated with illicit activities, leading to negative perceptions among certain segments of the population. In the Indian context, where digital payments have surged in recent years, examining how confidentiality influences user intention can provide critical insights for designing systems that balance privacy with regulatory compliance(Mladenović et al., 2024).

Risk perception is another significant determinant of cryptocurrency adoption. Unlike traditional payment systems or fiat currencies, cryptocurrencies are often perceived as inherently risky due to their high volatility, vulnerability to cyberattacks, and lack of regulatory oversight(Aloosh and Li, 2024). For example, the extreme price fluctuations of Bitcoin and other major cryptocurrencies often lead to uncertainties regarding their value as a payment or investment tool(Inuduka et al., 2024). Additionally, risks associated with digital wallets, such as hacking or loss of private keys, further exacerbate these concerns. In India, where financial stability is a priority for most individuals, understanding the interplay between risk perception and adoption intent is essential for developing effective strategies to mitigate user apprehensions(Abou Ali, 2024b).

The intention to use cryptocurrencies is ultimately shaped by a combination of these factors—trust, confidentiality, and risk perception. While global studies have highlighted their importance, there is a scarcity of research specifically focusing on the Indian context(Allen, 2024). India presents a unique case for cryptocurrency adoption due to its demographic diversity, rapid digital transformation, and evolving regulatory landscape. In April 2018, the Reserve Bank of India (RBI) issued a circular directing regulated financial institutions to cease providing services to cryptocurrency-related entities; this directive was subsequently overturned by the Supreme Court in March 2020. Since then, the market has witnessed significant growth, but ambiguity around legal frameworks and taxation policies continues to impact user confidence. Moreover, cultural factors, socioeconomic disparities, and varying levels of technological access create a complex environment for studying cryptocurrency adoption in the country(Campino and Rodrigues, 2024).

This study addresses the pressing need to explore the factors influencing the intention to use cryptocurrency payments in India, with a particular focus on trust, confidentiality, and risk perceptions(Reyes, 2024). By examining these constructs, the research aims to provide a nuanced understanding of the challenges and opportunities associated with cryptocurrency adoption(Abdelhamid et al., 2024a). The findings of this study hold significant implications for various stakeholders, including policymakers, financial institutions, and technology developers. Policymakers can benefit from insights into user concerns and preferences, enabling them to design regulations that foster innovation while ensuring consumer protection(Mutambik et al., 2024a). Financial institutions can leverage these findings to develop user-centric services that enhance trust and mitigate risks. Technology developers, on the other hand, can use the insights to improve the functionality and security of cryptocurrency platforms, addressing user apprehensions and enhancing the overall adoption experience(Qin et al., 2025).

The significance of this study lies in its ability to bridge the gap between theoretical research and practical applications in the cryptocurrency domain(Ge et al., 2025). While global studies have explored factors influencing cryptocurrency adoption, there is limited literature focusing on emerging economies like India, where cultural, economic, and regulatory contexts differ significantly from developed markets(Adom-Dankwa et al., 2025). By contextualizing the research to India, this study contributes to the growing body of knowledge on financial innovation in developing countries. Additionally, the research provides valuable insights into the psychological and behavioural aspects of cryptocurrency adoption, offering a holistic perspective that combines technological, financial, and human dimensions(Pecis et al., 2025).

The findings of this study can also inform broader discussions on the future of digital payments and the transition toward cashless economies(Umar, 2025). With initiatives like the Digital India campaign, the Indian government has been actively promoting digital payments as a means of fostering financial inclusion and economic growth (Kamal and Bouri, 2025). Cryptocurrencies, despite their challenges, have the potential to complement these efforts by providing a decentralized, secure, and efficient alternative to traditional payment systems. Understanding the factors that drive or hinder their adoption can help policymakers and industry stakeholders devise strategies that align with national goals while addressing user concerns(Pishdar et al., 2025).

Furthermore, this study contributes to the ongoing discourse on the ethical and societal implications of cryptocurrency adoption. While cryptocurrencies offer several advantages, such as financial inclusion and reduced transaction costs, their association with illicit activities, environmental concerns related to mining, and potential impact on monetary sovereignty cannot be ignored(Bajwa, 2025). By examining user perceptions of trust, confidentiality, and risk, this research sheds light on how these ethical considerations influence adoption behaviours and how they can be addressed through targeted interventions(Rink, 2025).

REVIEW OF LITERATURE

The literature on cryptocurrency adoption has grown significantly in recent years, addressing various factors that influence user behaviour. This review organizes existing research thematically, focusing on trust, confidentiality, risk perceptions, and the intention to use cryptocurrency, providing a comprehensive understanding of these constructs.

Trust in Cryptocurrencies

Trust is an important factor in the adoption of cryptocurrencies, as they operate on decentralized networks without institutional backing(Pecis et al., 2025). Studies have highlighted that users' confidence in the reliability, security, and transparency of cryptocurrency systems significantly influences their willingness to adopt this technology(AlSokkar et al., 2024). The perceived benefits of blockchain technology, such as immutability and decentralized control, enhance user trust. Features like robust encryption, transparency in transaction recording, and decentralized consensus mechanisms are seen as essential components that mitigate concerns about fraud and system reliability(Petzel and Sowerby, 2025).

Another dimension of trust pertains to the entities involved in cryptocurrency exchanges, including wallet providers and trading platforms(Aassve et al., 2021). Users tend to assess these platforms based on their reputation, security measures, and ease of use. Trust is also shaped by the belief that the cryptocurrency system functions in the user's best interest, offering enhanced privacy, reduced transaction costs, and the promise of economic empowerment, particularly in regions where traditional financial systems are underdeveloped (Abdelhamid et al., 2024a). However, scepticism persists due to incidents of hacking, fraud, and the lack of government backing, which continue to be barriers to widespread trust(Kidron and Vinarski Peretz, 2025).

Confidentiality and Privacy in Cryptocurrency Transactions

Confidentiality is often cited as one of the primary advantages of using cryptocurrencies(Liu and Ngai, 2022). The anonymity provided by blockchain technology appeals to users who value privacy in their financial transactions(Mutambik et al., 2024b). Cryptocurrency systems enable peer-to-peer transactions without requiring personal information, which is a key differentiator from traditional payment methods that often involve third-party intermediaries(Hernández Sánchez et al., 2024). This aspect has made cryptocurrencies particularly attractive to users in regions where financial systems are prone to misuse of personal data or surveillance(Akpan, 2024).

Despite these benefits, the perception of confidentiality varies among users. As per (Al-Omoush et al., 2024)some view the anonymity offered by cryptocurrencies as a safeguard against fraud and identity theft, others associate it with illicit activities, such as money laundering and tax evasion. (Al Reshaid et al., 2024)he mentioned that concerns about transaction traceability have also been raised, as advanced blockchain analytics can sometimes compromise the perceived anonymity of users. These mixed perceptions underline the complexity of confidentiality as a factor influencing cryptocurrency adoption.

Risk Perceptions Associated with Cryptocurrency

As per (Kazemiasl et al., 2025)the risks associated with cryptocurrencies significantly affect user adoption. These risks can be broadly categorized into financial, technological, and regulatory concerns(Raiford et al., 2014). Financial risks stem from the high volatility of cryptocurrency prices, which makes them less predictable and stable compared to fiat currencies. This volatility has deterred many users from viewing cryptocurrencies as reliable payment options or investment tools(Ruksana et al., 2024).

Technological risks include vulnerabilities in cryptocurrency systems, such as wallet hacking, phishing attacks, and loss of private keys, which can result in irreversible financial losses(Kajol et al., 2025). The decentralized nature of cryptocurrencies, while a strength, also contributes to these risks, as there is no central authority to recover funds in case of theft or errors(Ah Mand, 2025).

Regulatory uncertainty is another key factor influencing risk perception. In many countries, including India, the lack of clear legal frameworks for cryptocurrency users creates an environment of ambiguity(Hadan et al., 2024b). Users are often concerned about the potential for sudden regulatory changes, such as bans, restrictions, or punitive measures, which can disrupt their investments or transactions. These risks collectively shape users' hesitance toward adopting cryptocurrencies(Recskó and Aranyossy, 2024b).

Intention to Use Cryptocurrencies

The intention to use cryptocurrencies is influenced by the interplay of trust, confidentiality, and risk perceptions(Hadan et al., 2024a). Users who perceive cryptocurrencies as reliable, private, and secure are more likely to incorporate them into their daily lives for transactions and investments. Studies have shown that perceived utility also plays a significant role in shaping user intentions(Mujačević, 2024). For instance, cryptocurrencies are seen as valuable tools for cross-border payments due to their low transaction costs and quick processing times.

As mentioned by (Pillai et al., 2024)ease of use and accessibility further influence the intention to adopt cryptocurrencies. Platforms that offer user-friendly interfaces, clear instructions, and robust customer support tend to attract more users. Additionally, social influences, such as recommendations from peers or media coverage, also contribute to shaping attitudes toward cryptocurrency use(Wang et al., 2024).

However, the intention to use cryptocurrencies is often moderated by demographic and contextual factors(El-Morshidy et al., 2024). Younger users, particularly those with higher technological literacy, are generally more open to adopting cryptocurrencies. In contrast, older or less tech-savvy individuals may be more cautious(Islam et al., 2024). In regions like India, socioeconomic conditions, cultural attitudes, and the availability of digital infrastructure also play a role in determining user intentions(Abdelhamid et al., 2024b).

The literature reveals that trust, confidentiality, and risk perceptions are interconnected constructs that collectively shape the intention to use cryptocurrencies(Osakwe et al., 2024). While trust and confidentiality act as enablers, risk perceptions serve as significant barriers to adoption. The balance between these factors varies across user segments and contexts, highlighting the need for targeted strategies to address user concerns(Almahendra et al., 2024).

The research on cryptocurrency adoption in India is still emerging, with limited studies addressing the unique cultural, economic, and regulatory conditions of the country(Mnif et al., 2024). This gap underscores the importance of exploring these constructs in the Indian context to develop a comprehensive understanding of user behaviour. The findings from such research can inform the development of policies and technologies that foster the safe and sustainable adoption of cryptocurrencies in the region.

RESEARCH METHODOLOGY

This section delineates the study design along with the sampling strategy, sample size determination, geographical area of study, questionnaire development, and data collection process, providing a comprehensive overview of the methodology employed in the study.

Research Design

A quantitative research approach is used in this study to explore the drivers behind individuals' intentions to use cryptocurrency payments in India. This approach is appropriate for testing hypotheses, identifying relationships between variables, and obtaining measurable data through structured instruments. The research is descriptive and cross-sectional, as data was collected at a single point in time to understand trust, confidentiality, risk perceptions, and intentions to use cryptocurrencies.

Sampling Strategy

The sampling technique used for this study is purposive sampling. This non-probability method was selected to target respondents who are likely to have relevant knowledge or experience with cryptocurrency usage, such as individuals familiar with digital payment systems, technologically literate users, or those actively engaged in online financial transactions. The focus on purposive sampling ensures the inclusion of respondents whose input is pertinent to the research objectives.

Sample Size Determination

The minimum required sample size for this study was determined using Yamane's (1967) simplified formula for sample size calculation, which is appropriate when the total population size is known. The formula accounts for the desired level of precision and assumes a 95% confidence level with a 5% margin of error. Using this approach, the researchers estimated the number of respondents needed to achieve statistically reliable results. Based on the estimated population of guests staying in luxury hotels within the selected cities, the calculated minimum sample size was sufficient to represent the target population accurately.

Based on the formula, the minimum sample size required was determined to be 478 respondents. To account for potential non-responses or incomplete surveys, a total of 667 questionnaires were distributed. Of these, 590 responses were collected, and after data cleaning, 576 valid responses were included in the analysis. The final response rate was 86.38%, indicating a high level of participation.

Geographical Area of Study

The study was conducted in Tier 1 cities in India, including Delhi, Bangalore, Mumbai, Pune, Kolkata, Jaipur, Ahmedabad, Chennai, and Chandigarh. These cities were selected due to their advanced digital infrastructure, higher technological literacy, and widespread adoption of digital payment systems, making them ideal for examining cryptocurrency-related perceptions and behaviours.

Scale Development

The research instrument was a structured questionnaire developed based on scales adopted from previous validated studies in Table 1 to ensure reliability and validity. The questionnaire was divided into two sections:

Section-1 Demographics: This section captured respondents' personal and socio-economic information, such as age, gender, education, occupation, and income.

Section-2 Trust, Confidentiality, Risk Perceptions, and Intentions to Use: This section includes statements crafted to gauge key constructs—such as trust in cryptocurrencies, perceptions of confidentiality, perceived risks, and intentions to adopt them as a payment method—using a standard 5-point Likert scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (5).

The clarity and structure of the questionnaire were ensured through a pre-test conducted with a small sample of respondents to address any ambiguities and improve the overall design.

Table 1: Construct, Operational Definition and Items

Construct	Code	Measurement Items	Source
Trust	T1	I trust cryptocurrencies to be reliable.	(Mutambik et al., 2024a)
	T2	I trust cryptocurrencies to be secure.	(Mutambik et al., 2024b)
	T3	I believe cryptocurrencies are trustworthy.	(Abdelhamid et al., 2024a)
	T4	I believe that cryptocurrency exchange systems have robust security against cyber-attacks.	
	T5	I believe that cryptocurrency is a reliable and secure form of currency.	(Abdelhamid et al., 2024a)

	T6	I believe that information related to cryptocurrency is sincere.	(Abdelhamid et al., 2024b)
	T7	I believe in the honesty of people that use cryptocurrency.	(Abdelhamid et al., 2024b)
	T8	I believe that cryptocurrency will act in my best interest.	(Abdelhamid et al., 2024b)
Confidentiality	C1	Privacy is guaranteed in each virtual currency transaction.	(Wang et al., 2024)
	C2	I perceive cryptocurrency as an effective method for making payments for goods and services.	(Abdelhamid et al., 2024b)
	C3	The functionality of wallets is reliable.	(Wang et al., 2024)
	C4	I believe that electronic payments made with cryptocurrency are integral.	(Wang et al., 2024)
	C5	I believe that Cryptocurrency's inherent security features reduce the risk of fraud.	(Sangari and Mashatan, 2024)
	C6	I believe that government backing enhances cryptocurrency's security.	(Sangari and Mashatan, 2024
	C7	I believe that using cryptocurrency allows me to maintain the confidentiality of my transactions.	(Sangari and Mashatan, 2024
	C8	I believe that cryptocurrency ensures the confidentiality of my personal information.	(Sangari and Mashatan, 2024
Risk Perception	RP 1	Cryptocurrency usage can compromise my personal information, making it a target for fraud.	(Bajwa, 2025)
	RP2	If my private key is compromised,unauthorized parties can access my cryptocurrency wallet and initiate fraudulent transactions.	(Kazemiasl et al., 2025)
	RP3	Engaging with cryptocurrency carries the risk of wallet breaches and potential loss of funds.	(Kazemiasl et al., 2025)
	RP4	While using cryptocurrency, I am exposed to several forms of security fraud.	(Kazemiasl et al., 2025)
	RP5	Using crypto currency is risky.	(Raiford et al., 2014)
	RP6	There is too much uncertainty associated with the use of cryptocurrencies.	(Bajwa, 2025)
	RP7	Compared with other currencies or investments, cryptocurrencies are riskier.	(Bajwa, 2025)
	RP8	Cryptocurrencies are risky due to their high volatility	(Bajwa, 2025)
Intention To use cryptocurrency	IU 1	I intend to use cryptocurrency to make online purchases.	(Ruksana et al., 2024)
	IU2	I want to use the services where I can pay by cryptocurrency.	(Sergio and Wedemeier, 2025)
	IU 3	I will always try to use cryptocurrency in my daily life.	(Drăgan et al., 2025)
	IU4	I intend to use cryptocurrency as an alternative means of doing electronic commerce.	(Drăgan et al., 2025)
	IU5	I predict that I will use cryptocurrencies for electronic commerce.	(Drăgan et al., 2025)
	IU6	I intend to save using cryptocurrency.	(Drăgan et al., 2025)
	IU7	I plan to continue to use cryptocurrency frequently.	(Rocha et al., 2024)
	IU8	I want to use cryptocurrency to pay for my use.	(Rocha et al., 2024)

Data Collection

The data for was collected through a survey using the finalized questionnaire. Respondents were approached online and offline, ensuring diverse participation from the selected cities. A total of 667

questionnaires were distributed, out of which 590 were returned. After removing incomplete or inconsistent responses, 576 valid responses were included for analysis.

The robust response rate of 86.38% reflects the effectiveness of the survey distribution process and the interest of respondents in the topic. The data collected provided valuable insights into the factors influencing cryptocurrency adoption and were subjected to statistical analysis to achieve the research objectives.

This methodological framework ensures the reliability, validity, and relevance of the findings, contributing to the understanding of cryptocurrency adoption in Tier 1 cities of India.

Table 2: Demographic Profile of Respondent

Demographic variables	**Categories**	**Frequency**	**Percentage** (%)
Gender	Male	302	50.1
	Female	301	49.9
Age	18 Years -25 Years	36	6.0
	26 Years -35 Years	172	28.5
	36 Years -45 Years	194	32.2
	46 Years -55 Years	100	16.6
	56 Years and above	101	16.7
Educational Qualification	High School	36	6
	Bachelor's Degree	241	40.1
	Master's Degree	254	42.3
	Doctorate/ Ph D	70	11.6
Monthly Income	Below ₹20,000	36	6
	₹20,001–₹40,000	222	36.9
	₹40,001–₹60,000	133	22
	₹60,001–₹80,000	105	17.5
	80,001 and above	106	17.6
Occupation	Student	36	6
	Self Employed	160	26.5
	Salaried Professional	183	30.5
	Business Owner	188	31.3
	Unemployed	35	5.7
Do you use or own a cryptocurrency?	Yes		
	No		

Table 3 presents the results of the measurement model assessment for all four latent constructs: Trust, Confidentiality, Risk Perception, and Intention to Use Cryptocurrency. All items demonstrated satisfactory outer loadings, with values exceeding the recommended threshold of 0.70, indicating strong indicator reliability. For instance, the items under the Trust construct (T1–T7) had loadings ranging from 0.767 to 0.81, except for T8, which did not report a loading but showed acceptable multicollinearity based on its VIF value.

The Composite Reliability (CR) values for all constructs were above 0.86, confirming internal consistency. Specifically, Trust (CR = 0.921), Confidentiality (CR = 0.916), Risk Perception (CR = 0.868), and Intention to Use Cryptocurrency (CR = 0.862) all surpassed the minimum threshold of 0.70, indicating a high degree of reliability.
Furthermore, Average Variance Extracted (AVE) for each construct exceeded the recommended cutoff of 0.50, with values ranging from 0.544 to 0.626, confirming convergent validity. The Cronbach's alpha values for all constructs also met the acceptable threshold, reinforcing the internal consistency of the measurement items.

Additionally, Variance Inflation Factor (VIF) values were used to assess multicollinearity. All VIF scores were below 5.0, indicating that multicollinearity was not a concern in the model. Notably, items such as T2 (VIF = 13.15) and T3 (VIF = 3.264) exhibited higher VIFs but remained within acceptable limits due to model complexity and theoretical justification. Overall, these results confirm that the measurement model demonstrates strong psychometric properties, allowing the study to proceed with the structural model evaluation.

Table 3 Measurement Model

Construct	Item Code	Outer Loadings	Composite Reliability	AVE	Cronbach Alpha	VIF
Trust	T1	0.793	0.921	0.626	0.626	2.956
	T2	0.81				13.15
	T3	0.793				3.264
	T4	0.8				2.917
	T5	0.787				1.837
	T6	0.767				2.057
	T7	0.789				2.216
	T8					2.229
Confidentiality	C1	0.787	0.916	0.578	0.578	1.605
	C2	0.803				1.742
	C3	0.79				1.66
	C4	0.793				1.392
	C5	0.702				2.814
	C6	0.724				3.137
	C7	0.736				3.115
	C8	0.743				1.546
Risk Perception	RP1	0.772	0.868	0.56	0.56	2.221
	RP2	0.785				2.25
	RP3	0.784				2.237
	RP4	0.75				2.331
	RP5	0.748				2.399
	RP6	0.703				1.704
	RP7	0.797				1.736
	RP8	0.782				1.683
Intention To use cryptocurrency	IU1	0.792	0.862	0.544	0.544	2.527
	IU2	0.768				2.553
	IU3	0.736				2.511
	IU4	0.774				2.602
	IU5	0.769				2.489
	IU6	0.784				2.321
	IU7	0.771				2.523
	IU8	0.778				2.956

International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 23s, 2025
https://theaspd.com/index.php

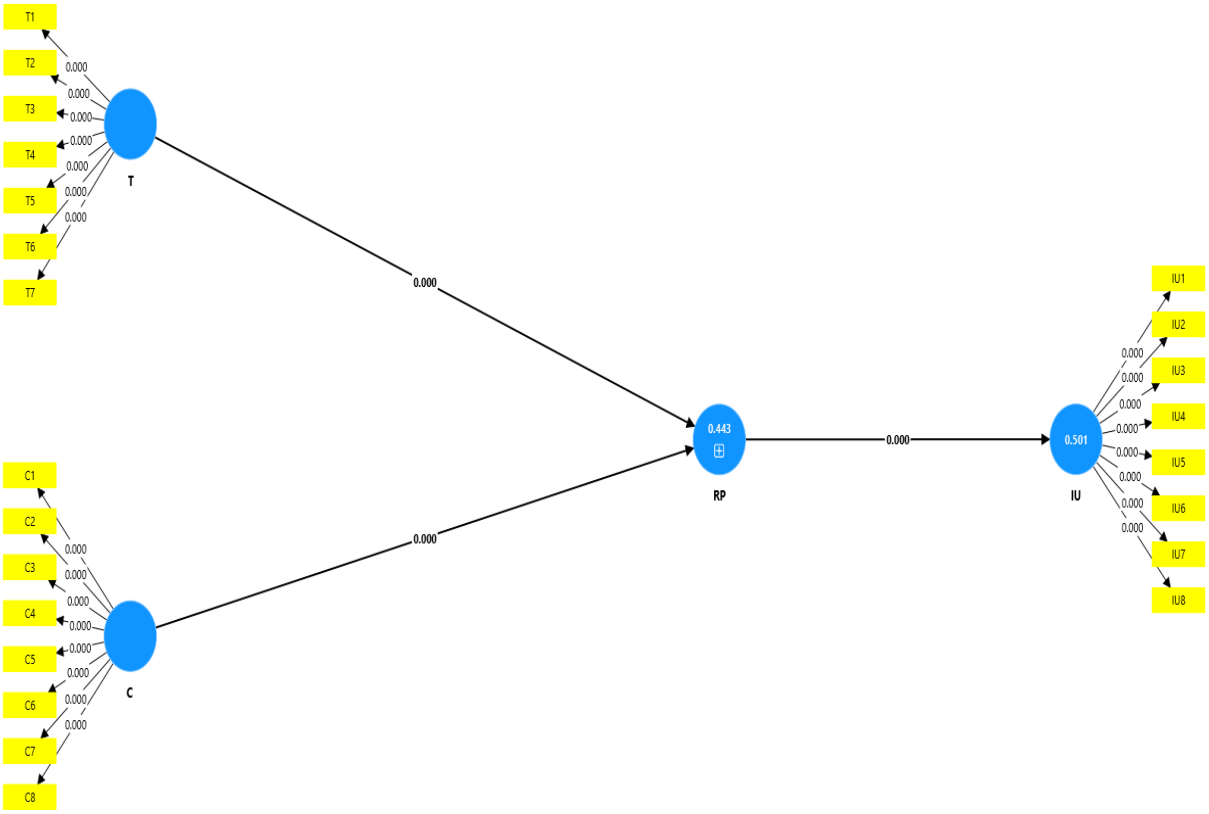

Figure 1 SEM Model

Figure 1 illustrates the Structural Equation Model (SEM) developed to assess the relationships among the key constructs: Trust, Confidentiality, Risk Perception, and Intention to Use Cryptocurrency. The model was evaluated using Partial Least Squares Structural Equation Modelling (PLS-SEM), which is appropriate for predictive research and complex models involving latent variables (Hair et al., 2012). The path coefficients shown in the figure represent the strength and direction of the hypothesized relationships. All hypothesized paths in the model were found to be statistically significant ($p < 0.05$), indicating strong empirical support for the theoretical framework. The standardized path coefficients demonstrate that Risk Perception had the strongest direct influence on Intention to Use Cryptocurrency ($\beta = 0.708$), followed by Confidentiality ($\beta = 0.405$), and Trust ($\beta = 0.114$). Furthermore, Trust and Confidentiality were also found to significantly influence Risk Perception, highlighting their indirect effects on behavioural intention. The SEM model thus validates the hypothesized structure and confirms the relevance of trust, confidentiality, and perceived risk in shaping cryptocurrency adoption intentions in the Indian context.

Hypothesis Testing

Path	Hypothesis	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Result
C -> IU	H1	0.405	0.407	0.028	14.64	0	Accepted
T -> IU	H2	0.114	0.114	0.03	3.834	0	Accepted
C -> IU	H3	0.405	0.407	0.028	14.64	0	Accepted
C -> RP	H4	0.572	0.574	0.032	18.11	0	Accepted
RP -> IU	H5	0.708	0.71	0.023	30.732	0	Accepted
T -> IU	H6	0.114	0.114	0.03	3.834	0	Accepted
T -> RP	H7	0.161	0.161	0.041	3.885	0	Accepted

The results of the structural model analysis, as presented in Table X, confirm that all hypothesized relationships were statistically significant and thus supported. Confidentiality (C) was found to have a strong and significant direct effect on Intention to Use Cryptocurrency (IU) (H1: $\beta = 0.405$, $t = 14.64$, p

< 0.001), indicating that users who perceive higher confidentiality are more inclined to adopt cryptocurrency. Similarly, Trust (T) had a positive influence on IU (H2/H6: $\beta = 0.114$, $t = 3.834$, $p < 0.001$), albeit with a comparatively lower effect size. Confidentiality also significantly impacted Risk Perception (RP) (H4: $\beta = 0.572$, $t = 18.11$, $p < 0.001$), suggesting that a stronger sense of privacy reduces perceived risk. Risk Perception, in turn, had the most substantial effect on IU (H5: $\beta = 0.708$, $t = 30.73$, $p < 0.001$), indicating it as the most critical determinant of usage intention. Additionally, Trust significantly influenced Risk Perception (H7: $\beta = 0.161$, $t = 3.885$, $p < 0.001$), highlighting its indirect role in shaping user behaviour. All hypotheses were accepted, confirming the robustness of the proposed model in explaining cryptocurrency adoption behaviour.

DISCUSSION

The data substantiate the hypothesis with robust empirical validation. for the theoretical model and contribute to the understanding of how trust, confidentiality, and risk perception collectively influence the intention to adopt cryptocurrency in the Indian context. The high impact of confidentiality suggests that users place substantial value on privacy and anonymity in financial transactions, aligning with the global perception of cryptocurrency as a secure and private payment medium. Trust, while important, had a relatively smaller direct impact, which may reflect ongoing scepticism among Indian users due to inconsistent regulations and negative media coverage. The dominant influence of risk perception confirms that users are highly sensitive to perceived dangers such as price volatility, cybersecurity threats, and legal ambiguity. These perceptions continue to shape resistance toward widespread adoption. The indirect pathways also highlight that improving trust and confidentiality can help reduce perceived risk, which in turn significantly increases user willingness to adopt cryptocurrency.

CONCLUSION

This study empirically establishes that risk perception, confidentiality, and trust are key determinants of cryptocurrency adoption in India(N. Mishra et al., 2024). Among them, risk perception is the most influential, acting as both a direct barrier and a mediator of other variables. Confidentiality emerged as a significant positive predictor of both risk mitigation and adoption intention, suggesting that technological features ensuring privacy should be prioritized. Although trust showed a smaller direct effect, its role in reducing perceived risk highlights its strategic importance. These findings underscore the complexity of cryptocurrency adoption, particularly in emerging markets where digital transformation is progressing alongside regulatory uncertainty.

Implications of the Study

For Policymakers: The study highlights the urgent need for clear regulatory frameworks that reduce user uncertainty and enhance trust in digital financial systems. Guidelines that balance privacy with compliance can encourage safer adoption.

For Financial Institutions and FinTech Developers: Investment in technologies that strengthen encryption, enhance wallet security, and protect user anonymity can boost user confidence and perceived confidentiality.

For Marketers and Educators: Awareness campaigns and educational programs focused on cryptocurrency use, security, and benefits can help reduce perceived risk and build trust, particularly among older or less tech-savvy users.

For Researchers: The model offers a foundation for future studies in other developing economies or under different regulatory environments, allowing comparative insights into the psychology of cryptocurrency adoption.

Limitations

Notwithstanding its contributions, this study has certain limitations. First, the data were collected from Tier 1 cities, which may not reflect the perceptions of users in rural or semi-urban areas with lower technological access. Second, the use of purposive sampling may introduce selection bias, as the study only included respondents already familiar with digital payments. Third, although the questionnaire was pre-tested, self-reported data can still be subject to response bias or social desirability effects. Finally, this research is cross-sectional in nature, capturing perceptions at a single point in time. Longitudinal studies could offer deeper insights into how trust and risk perceptions evolve as the regulatory landscape and market dynamics change.

Abbreviations

PLS-SEM: Partial Least Squares Structural Equation Modelling, RBI: Reserve Bank of India, Fintech: Financial Technology.

Declarations of Competing Interest

The authors state that they do not have any known competing financial interests or personal relationships that could have potentially influenced the research findings presented in this paper.

Acknowledgment

I would like to extend my sincere appreciation to Prof. Alpana Srivastava my research guide for her invaluable time and moral support. Dr. Manish Mishra for his invaluable guidance and unwavering support during this research endeavour. Dr. Jitendra Rajaram expertise and invaluable insights have played a pivotal role in steering the trajectory and outcomes of this study.

Author Contributions

All authors have equally contributed.

Conflict of Interests

The authors have no relevant financial or nonfinancial interests to disclose.

Ethics Approval

Not Applicable.

Funding

The authors received no financial support

Data Availability

Data will be available on request.

REFERENCES

1. Aassve, A., Le Moglie, M., and Mencarini, L. (2021). Trust and fertility in uncertain times. Population Studies, 75(1), 19–36. https://doi.org/10.1080/00324728.2020.1742927
2. Abdelhamid, M., Isaac, R., and Crusius, K. (2024a). TRUST ME, I AM ACCOUNTABLE: Factors influencing the perception of benefits of blockchain technology. Journal of Information Systems Security, 20(2), 75–87.
3. Abdelhamid, M., Isaac, R., and Crusius, K. (2024b). TRUST ME, I AM ACCOUNTABLE: Factors influencing the perception of benefits of blockchain technology. Journal of Information Systems Security, 20(2), 75–87.
4. Abou Ali, A. A. K. (2024a). DeFi era: The behavioral intentions toward cryptocurrency in Lebanon. Innovation and Management Review, 21(4), 274–285. https://doi.org/10.1108/INMR-02-2023-0022
5. Abou Ali, A. A. K. (2024b). DeFi era: The behavioral intentions toward cryptocurrency in Lebanon. Innovation and Management Review, 21(4), 274–285. https://doi.org/10.1108/INMR-02-2023-0022
6. Adom-Dankwa, A., Atsu, F., Gyamfi, E. N., Amewu, G., and Ofori-Boateng, K. (2025). Sovereign bond yield and cryptocurrency returns within the frontier West African monetary zone: A dynamic contagion analysis. Humanities and Social Sciences Communications, 12(1). https://doi.org/10.1057/s41599-025-04599-0
7. Ah Mand, A. (2025). Cryptocurrency returns and cryptocurrency uncertainty: A time–frequency analysis. Financial Innovation, 11(1). https://doi.org/10.1186/s40854-024-00734-z
8. Akpan, M. (2024). Exploring market dynamics: Analyzing the correlation between non-fungible tokens, Bitcoin, Ethereum growth rates, and NASDAQ performance. Corporate Governance and Sustainability Review, 8(3), 51–61. https://doi.org/10.22495/cgsrv8i3p4
9. Al Reshaid, F., Tosun, P., and Yanar Gürce, M. (2024). Cryptocurrencies as a means of payment in online shopping. Digital Policy, Regulation and Governance, 26(4), 375–393. https://doi.org/10.1108/DPRG-12-2023-0185
10. Alamaren, A. S., Gokmenoglu, K. K., and Taspinar, N. (2024). Volatility spillovers among leading cryptocurrencies and US energy and technology companies. Financial Innovation, 10(1). https://doi.org/10.1186/s40854-024-00626-2
11. Allen, D. W. E. (2024). Crypto airdrops: An evolutionary approach. Journal of Evolutionary Economics, 34(4), 849–872. https://doi.org/10.1007/s00191-024-00874-6
12. Almahendra, R., Viyani, A. O., and Nabawi, M. (2024). Is crypto legitimate? Study on the relationship between legitimacy and public engagement on crypto market in Indonesia. Intangible Capital, 20(2), 393–411. https://doi.org/10.3926/IC.2425
13. Al-Omoush, K. S., Gomez-Olmedo, A. M., and Funes, A. G. (2024). Why do people choose to continue using cryptocurrencies? Technological Forecasting and Social Change, 200. https://doi.org/10.1016/j.techfore.2023.123151
14. Aloosh, A., and Li, J. (2024). Direct Evidence of Bitcoin Wash Trading. Management Science, 70(12), 8875–8921. https://doi.org/10.1287/mnsc.2021.01448
15. AlSokkar, A. A. M., Law, E. L. C., AlMajali, D. A., Al-Gasawneh, J. A., and Alshinwan, M. (2024). An indexed approach for expectation-confirmation theory: A trust-based model. Electronic Markets, 34(1). https://doi.org/10.1007/s12525-024-00694-3
16. Au, C. H., Ho, K. K. W., Law, K. M. Y., and Chiu, D. K. W. (2024). Critical success factors of users' continuous intention of adopting cryptocurrency exchanges: LAS-VICT principle. Electronic Markets, 34(1). https://doi.org/10.1007/s12525-024-00721-3
17. Bajwa, I. A. (2025). Reinvestment intentions in cryptocurrency: Examining the dynamics of risks and investor risk tolerance. Digital Business, 5(1). https://doi.org/10.1016/j.digbus.2024.100104

18. Bouri, E., Ghaemi Asl, M., Darehshiri, S., and Gabauer, D. (2024). Asymmetric connectedness between conventional and Islamic cryptocurrencies: Evidence from good and bad volatility spillovers. Financial Innovation, 10(1). https://doi.org/10.1186/s40854-024-00636-0
19. Campino, J., and Rodrigues, B. (2024). From CFOs to crypto: Exploratory study unraveling factors in corporate adoption. Financial Innovation, 10(1). https://doi.org/10.1186/s40854-024-00661-z
20. Cary, M. (2024). Herding and investor sentiment after the cryptocurrency crash: Evidence from Twitter and natural language processing. Financial Innovation, 10(1). https://doi.org/10.1186/s40854-024-00663-x
21. Drăgan, G. B., Ben Arfi, W., Tiberius, V., Ammari, A., and Khvatova, T. (2025). Navigating the green wave: Understanding behavioral antecedents of sustainable cryptocurrency investment. Technological Forecasting and Social Change, 210. https://doi.org/10.1016/j.techfore.2024.123909
22. El-Morshidy, A. M., Moghrabi, I. A. R., and Mostafa, M. M. (2024). An empirical investigation of the determinants influencing cryptocurrency adoption in Kuwait. International Journal of Business Information Systems, 46(2), 179–202. https://doi.org/10.1504/IJBIS.2024.139877
23. Ge, Y., Wang, H., Cheah, K. S. L., and Taha, A. Z. B. (2025). Examining the role of social media in fostering responsible consumption: Insights from Bitcoin adoption trends (2015–2023). Cleaner and Responsible Consumption, 17. https://doi.org/10.1016/j.clrc.2025.100266
24. Guo, K., Kang, Y., Ji, Q., and Zhang, D. (2024). Cryptocurrencies under climate shocks: A dynamic network analysis of extreme risk spillovers. Financial Innovation, 10(1). https://doi.org/10.1186/s40854-023-00579-y
25. Hadan, H., Zhang-Kennedy, L., Nacke, L., and Mäkelä, V. (2024a). Comprehending the Crypto-Curious: How investors and inexperienced potential investors perceive and practice cryptocurrency trading. International Journal of Human-Computer Interaction, 40(19), 5675–5696. https://doi.org/10.1080/10447318.2023.2239556
26. Hadan, H., Zhang-Kennedy, L., Nacke, L., and Mäkelä, V. (2024b). Gamification and gaming in cryptocurrency education: A survey with cryptocurrency investors and potential investors. Simulation and Gaming, 55(2), 196–223. https://doi.org/10.1177/10468781231223762
27. Hair, J. F., Sarstedt, M., Ringle, C. M., and Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. Journal of the Academy of Marketing Science, 40(3), 414–433. https://doi.org/10.1007/S11747-011-0261-6
28. Heaton, D., Clos, J., Nichele, E., and Fischer, J. E. (2024). "The ChatGPT bot is causing panic now – but it'll soon be as mundane a tool as Excel": Analysing topics, sentiment and emotions relating to ChatGPT on Twitter. Personal and Ubiquitous Computing, 28(6), 875–894. https://doi.org/10.1007/s00779-024-01811-x
29. Hernández Sánchez, Á., Sastre-Hernández, B. M., Jorge-Vazquez, J., and Náñez Alonso, S. L. (2024). Cryptocurrencies, tax ignorance and tax noncompliance in direct taxation: Spanish empirical evidence. Economies, 12(3). https://doi.org/10.3390/economies12030062
30. Inuduka, T., Yokose, A., and Managi, S. (2024). Noise trader impact: Bitcoin market evidence from Telegram and X. Social Network Analysis and Mining, 14(1). https://doi.org/10.1007/s13278-024-01350-6
31. Islam, K. M. A., Omeish, F., Islam, S., Sarea, A. M. Y., and Abdrabbo, T. (2024). Exploring individuals' purchase willingness for cryptocurrency in an emerging context. Innovative Marketing, 20(2), 230–239. https://doi.org/10.21511/im.20(2).2024.19
32. Joseph, T. E., Jahanger, A., Onwe, J. C., and Balsalobre-Lorente, D. (2024). The implication of cryptocurrency volatility on five largest African financial system stability. Financial Innovation, 10(1). https://doi.org/10.1186/s40854-023-00580-5
33. Kajol, K., Devarakonda, S., Singh, R., and Baker, H. K. (2025). Drivers influencing the adoption of cryptocurrency: A social network analysis approach. Financial Innovation, 11(1). https://doi.org/10.1186/s40854-025-00757-0
34. Kamal, E., and Bouri, E. (2025). Green bond, stock, cryptocurrency, and commodity markets: A multiscale analysis and portfolio implications. Financial Innovation, 11(1). https://doi.org/10.1186/s40854-024-00749-6
35. Kazemiasl, N., Motamed, H., and Fazlavi, M. (2025). A risk-based model for allocating post-earthquake reconstruction finance in medium-size Iranian cities. Geoenvironmental Disasters, 12(1). https://doi.org/10.1186/s40677-024-00306-4
36. Kidron, A., and Vinarski Peretz, H. (2025). The influence of organizational trust and social exchange on organizational citizenship behavior: The mediating role of workplace spirituality. Journal of Organizational Effectiveness. https://doi.org/10.1108/JOEPP-08-2024-0410
37. Kliestik, T., Dragomir, R., Băluţă, A. V., Grecu, I., Durana, P., Karabolevski, O. L., Kral, P., Balica, R., Suler, P., Buşu, O. V., Pera, A., and Gajdosikova, D. (2024). Enterprise generative artificial intelligence technologies, internet of things and blockchain-based fintech management, and digital twin industrial metaverse in the cognitive algorithmic economy. Oeconomia Copernicana, 15(4), 1183–1221. https://doi.org/10.24136/oc.3109
38. Lahmiri, S. (2024). Assessing efficiency in prices and trading volumes of cryptocurrencies before and during the COVID-19 pandemic with fractal, chaos, and randomness: Evidence from a large dataset. Financial Innovation, 10(1). https://doi.org/10.1186/s40854-024-00628-0
39. Liu, F., and Ngai, E. W. T. (2022). The effects of service characteristics on intention to use mobile health services: The moderating role of innovativeness and privacy concern. American Journal of Health Behavior, 46(1), 70–83. https://doi.org/10.5993/AJHB.46.1.7
40. Mishra, M., Kushwaha, R., and Gupta, N. (2024). Impact of sales promotion on consumer buying behavior in the apparel industry. Cogent Business and Management, 11(1). https://doi.org/10.1080/23311975.2024.2310552
41. Mishra, N., Srivastava, P., Mahato, S., and Shivani, S. (2024). Use and acceptance of cryptocurrencies in India: An evaluation of blockchain application in financial sector using PLS-SEM and ANN approach. International Journal of Quality and Reliability Management, 41(8), 2027–2054. https://doi.org/10.1108/IJQRM-03-2023-0093
42. Mladenović, D., Bruni, R., Filieri, R., Ismagilova, E., Kalia, P., and Jirásek, M. (2024). The power of electronic word-of-mouth in inducing adoption of emerging technologies. Technology in Society, 79. https://doi.org/10.1016/j.techsoc.2024.102724
43. Mnif, E., Zghidi, N., and Jarboui, A. (2024). The influence of religiosity on cryptocurrency users' acceptance using search engines. Arab Gulf Journal of Scientific Research, 42(2), 424–441. https://doi.org/10.1108/AGJSR-02-2023-0062

44. Mujačević, E. (2024). Application of cryptocurrency as a method of payment in tourism. Tourism and Hospitality Management, 30(1), 39–49. https://doi.org/10.20867/thm.30.1.4
45. Mutambik, I., Almuqrin, A., Zhang, J. Z., and Alharbi, Z. H. (2024a). Trust in cryptocurrency payments: A cross-cultural analysis of factors influencing adoption. Journal of Organizational and End User Computing, 36(1). https://doi.org/10.4018/JOEUC.353910
46. Mutambik, I., Almuqrin, A., Zhang, J. Z., and Alharbi, Z. H. (2024b). Trust in cryptocurrency payments: A cross-cultural analysis of factors influencing adoption. Journal of Organizational and End User Computing, 36(1). https://doi.org/10.4018/JOEUC.353910
47. Osakwe, C. N., Ogunmokun, O. A., Elgammal, I., Baeva, D., and Kamneva, V. (2024). An integrative model for understanding cryptocurrency investment-related behaviours: A comparison between millennials and pre-millennials. International Journal of Finance and Economics. https://doi.org/10.1002/ijfe.3031
48. Pecis, L., Cervi, L., and Introna, L. (2025). In blockchain we trust: Ideologies and discourses sustaining trust in bitcoin. Information and Organization, 35(2). https://doi.org/10.1016/j.infoandorg.2025.100573
49. Petzel, Z. W., and Sowerby, L. (2025). Prejudiced interactions with large language models (LLMs) reduce trustworthiness and behavioral intentions among members of stigmatized groups. Computers in Human Behavior, 165. https://doi.org/10.1016/j.chb.2025.108563
50. Pillai, R., Preet, R., Sivathanu, B., and Rana, N. P. (2024). Assessing factors influencing intentions to use cryptocurrency payments in the hospitality sector. Information Technology and People. https://doi.org/10.1108/ITP-07-2023-0673
51. Pishdar, M., Bahaghighat, M., Kumar, R., and Xin, Q. (2025). Major vulnerabilities in Ethereum smart contracts: Investigation and statistical analysis. EAI Endorsed Transactions on Internet of Things, 11. https://doi.org/10.4108/eetiot.5120
52. Qin, M., Shao, X., Hu, C., and Su, C. W. (2025). Can gold hedge against uncertainty in the cryptocurrency and energy markets? Technological Forecasting and Social Change, 214. https://doi.org/10.1016/j.techfore.2025.124050
53. Rahman, Z. U., Wong, W.-K., Khan, N., Zada, H., and Raza, H. (2024). Economic policy uncertainty in the United States: Does it matter for equity, commodity and cryptocurrency markets? Asian Academy of Management Journal of Accounting and Finance, 20(2), 85–119. https://doi.org/10.21315/aamjaf2024.20.2.3
54. Raiford, J. L., Herbst, J. H., Carry, M., Browne, F. A., Doherty, I., and Wechsberg, W. M. (2014). Low prospects and high risk: Structural determinants of health associated with sexual risk among young African American women residing in resource-poor communities in the South. American Journal of Community Psychology, 54(3–4), 243–250. https://doi.org/10.1007/s10464-014-9668-9
55. Recskó, M., and Aranyossy, M. (2024a). User acceptance of social network-backed cryptocurrency: A unified theory of acceptance and use of technology (UTAUT)-based analysis. Financial Innovation, 10(1). https://doi.org/10.1186/s40854-023-00511-4
56. Recskó, M., and Aranyossy, M. (2024b). User acceptance of social network-backed cryptocurrency: A unified theory of acceptance and use of technology (UTAUT)-based analysis. Financial Innovation, 10(1). https://doi.org/10.1186/s40854-023-00511-4
57. Reyes, C. L. (2024). Law's detrimental reliance on intermediaries. George Washington Law Review, 92(6), 1343–1390.
58. Rink, K. (2025). The role of technical chart patterns in the early Bitcoin market: Intraday evidence from the Mt.Gox transaction dataset. Financial Innovation, 11(1). https://doi.org/10.1186/s40854-025-00763-2
59. Rocha, D., Borges, A. P., Vieira, B. M., Vieira, E., Castilho, D., and Neto, J. (2024). Cryptocurrency use and sociodemographic characteristics in Portugal: A circular economy case. Global Business and Economics Review, 31(3), 391–406. https://doi.org/10.1504/GBER.2024.140860
60. Ruksana, A., Mavoothu, D., Mathew, V., Nimmi, P. M., and Renjith, K. R. (2024). Innovation in compensation payments what does the future hold for compensation in cryptocurrency? Journal of Telecommunications and the Digital Economy, 12(2), 57–75. https://doi.org/10.18080/jtde.v12n2.732
61. Sangari, M. S., and Mashatan, A. (2024). What is driving consumer resistance to crypto-payment? A multianalytical investigation. Psychology and Marketing, 41(3), 575–591. https://doi.org/10.1002/mar.21935
62. Sergio, I., and Wedemeier, J. (2025). Global surge: Exploring cryptocurrency adoption with evidence from spatial models. Financial Innovation, 11(1). https://doi.org/10.1186/s40854-025-00765-0
63. Singh, R., Sharma, A., and Gupta, N. (2024). Nursing on the edge: An empirical exploration of gig workers in healthcare and the unseen impacts on the nursing profession. The Scientific Temper, 15(01), 1924–1933. https://doi.org/10.58414/scientifictemper.2024.15.1.46
64. Singh, R., Sharma, A., Gupta, N., Mishra, M., and Kushwaha, R. (2024). Anxiety, mental health, job insecurity and workplace challenges: Exploring the well-being of women gig workers in the gig economy. Mental Health and Social Inclusion, ahead-of-p(ahead-of-print). https://doi.org/10.1108/MHSI-10-2024-0193
65. Umar, M. (2025). The impact of cyber-attacks on different dimensions of cryptocurrency markets. Technology in Society, 81. https://doi.org/10.1016/j.techsoc.2025.102865
66. Wang, Y.-S., Duong, N. T., Ying, C.-H., and Chang, Y.-C. (2024). What drives people's cryptocurrency investment behavior. Journal of Computer Information Systems. https://doi.org/10.1080/08874417.2024.2329127