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Cryptocurrency Adoption Under Institutional Dualism: Extending Technology Acceptance Model Among Indonesian Generation Z

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Abstract

This study examines how perceived usefulness, ease of use, and perceived risk mediate the relationship between technology awareness and behavioral intention to adopt cryptocurrency among Indonesian Generation Z, with government support as a moderator under institutional dualism. A quantitative cross-sectional design was executed using Partial Least Squares Structural Equation Modeling (PLS-SEM) on a sample of 335 respondents ($n = 335$). Results reveal that perceived usefulness (indirect effect = 0.291, $p < 0.001$) and ease of use (indirect effect = 0.158, $p < 0.001$) significantly mediate adoption intention, whereas perceived risk does not (indirect effect = 0.011, $p = 0.322$). Crucially, perceived risk directly predicts intention positively ($\beta = 0.128$, $p < 0.001$), indicating Generation Z perceives risk as a signal of high return potential rather than a barrier. Government support moderates only the awareness, ease of use, and intention pathway (Index of Moderated Mediation = 0.014, $p = 0.041$). This study establishes institutional ambiguity as a critical boundary condition for technology acceptance models, where regulatory dissonance suppresses or inverts classical risk mediation. Policy effectiveness hinges on harmonizing regulatory frameworks between financial and monetary authorities.

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INTRODUCTION

Cryptocurrency adoption in developing economies follows heterogeneous trajectories shaped by regulatory architectures and generational digital habits (Ha et al., 2025; Zreik & Iqbal, 2025). In Indonesia, this heterogeneity is particularly pronounced due to a unique institutional dualism. The Financial Services Authority regulates crypto assets as digital financial assets under Law Number 4 of 2023 and POJK 27/2024, allowing domestic platforms to achieve substantial user bases. Conversely, Bank Indonesia strictly prohibits cryptocurrency for payment purposes. This regulatory dissonance injects persistent legal ambiguity into consumer adoption decisions.

Generation Z represents the critical demographic for examining cryptocurrency adoption under such regulatory fragmentation due to their unique cognitive processing of digital financial innovations. High digital fluency and pervasive connectivity distinguish this cohort from older generations (Mannheim, 1952; Turner, 2015). Unlike older cohorts who rely on traditional financial heuristics, Generation Z processes adoption through a cognitive filter that prioritizes frictionless digital onboarding while remaining highly sensitive to state ambiguity (Ramadhan & Putra, 2025; Saputra & Darma, 2022). Their investment experience remains limited, making their behavioral intention highly susceptible to the parallel cognitive evaluations triggered by technology awareness. Therefore, this cohort provides the ideal lens to observe how institutional contradictions disrupt standard cognitive adoption pathways.

The transition from technology awareness to behavioral intention is not a direct mechanical process but a complex cognitive evaluation mediated by perceived utility, operational friction, and risk assessment. Technology awareness serves as the foundational antecedent that exposes individuals to blockchain mechanics and market dynamics (Albayati et al., 2020). For Generation Z, this awareness directly influences behavioral intention by first shaping their perceived usefulness and ease of use. When young users understand the functional benefits of cryptocurrency, they evaluate its instrumental value and the effort required to navigate local platforms. This cognitive pathway is uniquely complicated by the Indonesian regulatory landscape. The awareness of contradictory signals from the Financial Services Authority and Bank Indonesia introduces a layer of institutional ambiguity that disrupts the standard risk evaluation mechanism. Consequently, the influence of technology awareness on behavioral intention is channeled through these parallel cognitive mediators, where regulatory dualism fundamentally alters how risk is perceived and processed.

Sagheer et al. (2022) provided a foundational attempt to map this cognitive path in a developing country setting. Working in Pakistan, they demonstrated that technology awareness influences behavioral intention indirectly through three parallel mediators while government support moderates each indirect effect. Their model is theoretically attractive because it treats awareness, cognition, and institutional signaling as a single integrated system. The financial ecosystem in Pakistan remains heavily informal with lower fintech penetration and a different regulatory stance on digital assets. In contrast, Indonesia hosts a relatively mature digital financial infrastructure alongside an evolving but contradictory regulatory framework. This jurisdictional split constitutes a theoretically distinct environment that may fundamentally alter the mediation mechanisms observed in the reference study (Bhardwaj et al., 2021; Nuryyev et al., 2020).

Building upon these theoretical gaps, this study adopts a replication-extension design using Sagheer et al. (2022) as the reference framework. Grounded in the epistemological replication framework articulated by Tsang and Kwan (1999), this study executes a *generalization replication* by holding the core conceptual and structural boundaries constant while introducing controlled contextual deviations. This programmatic approach allows for a systematic evaluation of the baseline model's external validity and boundary conditions under a framework of regulatory ambiguity. The systematic deviations include the Indonesian institutional context, a Generation Z sample replacing the general adult population, and context-adapted indicators capturing local platform awareness. These deliberate deviations ensure any divergence in findings reflects true macro-institutional differences rather than methodological artifacts (Arias-Oliva et al., 2019; Jariyapan et al., 2022). Recent Indonesian studies demonstrate that social influence and intuitive interfaces heavily impact youth fintech adoption (Ikhlash & Purba, 2025; Khofifah & Kardiyem, 2023), yet the broader cognitive architecture of cryptocurrency adoption under state regulation remains underexplored.

Two interrelated research questions guide this inquiry. The first question asks to what extent perceived usefulness, ease of use, and risk mediate the leap from awareness to adoption intention. The second question examines whether perceived government support alters these cognitive pathways under institutional dualism. By anchoring the extended model in the Indonesian regulatory climate, this research pushes the contextual limits of the Technology Acceptance Model to test whether classical cognitive mediations survive under regulatory dualism.

Ultimately, the findings aim to untangle how policy clarity and smart platform design can convert generational digital curiosity into tangible adoption behavior, offering critical insights for both platform designers and policymakers navigating institutional ambiguity.

The Technology Acceptance Model posits perceived usefulness and perceived ease of use as primary adoption determinants (Davis, 1989). However, cryptocurrency contexts involve high volatility and regulatory uncertainty, necessitating the inclusion of perceived risk as a parallel mediator (Folkinshteyn & Lennon, 2016; Shahzad et al., 2018). This extension is grounded in three theories. Generational Cohort Theory asserts that Generation Z processes digital finance through a lens of digital nativity, prioritizing frictionless interfaces (Turner, 2015). Institutional Theory explains how contradictory regulatory signals from the Financial Services Authority and Bank Indonesia create ambiguous legitimacy cues that disrupt standard cognitive processing (DiMaggio & Powell, 1983; Ha et al., 2025). Protection Motivation Theory links these institutional conditions to risk processing, arguing that institutional ambiguity decouples threat and coping appraisals, fundamentally altering risk perception (Lim, 2003; Rogers, 1975). Together, these lenses explain why classical mechanisms may fracture under contradictory governance.

Technology awareness implies substantively grasping blockchain mechanics and legal standings (Albayati et al., 2020). From this foundation, users evaluate perceived usefulness, the belief that cryptocurrency delivers financial advantages, and perceived ease of use, the expectation of effortless navigation (Saadé & Bahli, 2005). Perceived risk captures threats of volatility and regulatory crackdowns (Nuryyev et al., 2020). Government support influences whether users perceive state regulation as clear and protective (Zafar et al., 2021), ultimately dictating behavioral intention, which is the readiness to adopt the technology.

Previous research highlights the context-dependent nature of crypto adoption. Indonesian studies indicate that while intuitive interfaces drive early interest (Ramadhan & Putra, 2025; Saputra & Darma, 2022), the effect of perceived risk remains highly contested, often vanishing in local electronic wallet contexts (Khofifah & Kardiyem, 2023; Violinda & Khorunnisya, 2022). Internationally, while Technology Acceptance Model constructs predict acceptance (Albayati et al., 2020), risk mediation varies across cultures (Shahzad et al., 2018). Sagheer et al. (2022) established that technology awareness influences behavioral intention through perceived usefulness, ease of use, and risk, moderated by government support. However, their Pakistani context features an informal financial ecosystem, contrasting sharply with the Indonesian environment.

Regulation actively manipulates risk perception. Legal ambiguity directly increases compliance costs and reduces adoption intention globally (Ha et al., 2025; Zreik & Iqbal, 2025). Government support moderates technology acceptance by strengthening indirect effects when regulation is perceived as coherent (Zafar et al., 2021). The Indonesian regulatory landscape underwent a structural transformation in 2025. Under Law Number 4 of 2023, oversight shifted to the Financial Services Authority, reclassifying crypto as digital financial assets. However, the Bank Indonesia prohibition on crypto as a payment instrument remains in force. This creates a novel regulatory bifurcation between the primary financial regulator and the central bank, a condition that may selectively attenuate the moderating role of government support depending on regulatory coherence.

Awareness of crypto benefits enhances beliefs about instrumental value, fostering adoption. Despite institutional ambiguity, this core cognitive pathway is robust.

H1: Perceived usefulness mediates the positive relationship between technology awareness and behavioral intention to adopt cryptocurrency.

Generation Z abandons platforms with high cognitive load. Awareness of streamlined local platforms elevates ease of use, increasing intention. This fundamental evaluation dimension is relatively insensitive to institutional variation.

H2: Perceived ease of use mediates the positive relationship between technology awareness and behavioral intention to adopt cryptocurrency.

In Indonesia, perceived risk is amplified by regulatory dissonance. While awareness may shape intention through risk, contradictory institutional signals may decouple awareness from risk perception, suppressing the classical negative risk pathway (Khofifah & Kardiyem, 2023).

H3: Perceived risk mediates the relationship between technology awareness and behavioral intention, although the direction and significance are contextually altered by institutional ambiguity.

Government support operates as a contextual amplifier, strengthening the translation of awareness into cognitive evaluations when regulation is perceived as clear. However, under institutional contradictions, government support may selectively moderate only pathways aligned with its regulatory domain.

H4a: Government support moderates the indirect effect of technology awareness on behavioral intention through perceived usefulness, such that the indirect effect is stronger when government support is high.

H4b: Government support moderates the indirect effect through perceived ease of use, with the indirect effect stronger under high government support.
H4c: Government support moderates the indirect effect through perceived risk, with the indirect effect weaker under high government support.

Building on these hypotheses, the proposed research model positions technology awareness as the independent variable, perceived usefulness, perceived ease of use, and perceived risk as parallel mediators, government support as a moderator, and behavioral intention as the dependent variable. The relationships among these variables are shown in figure 1.

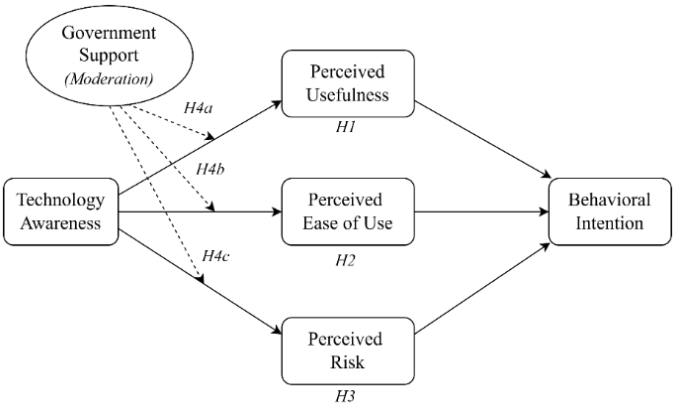


Figure 1. Proposed Research Model
Source: Adapted from Sagheer et al. (2022)

METHOD

This study employs a quantitative, cross-sectional design to test the moderated mediation framework among Indonesian Generation Z. A cross-sectional approach captures psychological evaluations at a single point in time, aligning with the foundational assumptions of TAM and facilitating replication of the model by Sagheer et al. (2022) within the distinct Indonesian regulatory context (Arias-Oliva et al., 2019; Jariyapan et al., 2022).

The target population for this research comprised Indonesian Generation Z across the entire nation, defined by the Statistics Indonesia agency as individuals born between 1997 and 2012. The study restricts the sample to ages 16 to 29. The lower bound ensures legal capacity for independent financial decisions or parentally guided wallet ownership for those under 18. The upper bound aligns with the oldest Generation Z cohort in 2026.

No enumerated sampling frame exists for crypto aware Generation Z in Indonesia. The Statistics Indonesia agency records the total Generation Z population at 69.38 million but the crypto aware subset is unquantified. Therefore, this study employs purposive sampling with four inclusion criteria, including being aged 16 to 29, having daily internet access, having exposure to cryptocurrency information within the preceding six months, and providing electronic informed consent.

Sample size determination followed contemporary guidelines for Partial Least Squares Structural Equation Modeling. While traditional rules suggest sample size be determined by the maximum number of arrowheads pointing at a particular construct modern statistical power analysis provides a more robust justification (Hair et al., 2021). A sample of 335 provides sufficient statistical power exceeding 0.80 to detect small effect sizes at a 5 percent significance level. This sample size ensures robust parameter estimation stable bootstrap confidence intervals, and exceeds the minimum threshold required for complex moderated mediation models (Falk & Miller, 1992; Hair et al., 2021). The obtained sample substantially exceeds the reference study sample to enable reasonable methodological comparability (Sagheer et al., 2022).

Data collection was conducted between February and May 2026 through a hybrid multichannel approach designed to capture a nationally representative subset of digitally active youth. The online component involved survey distribution via social media platforms, targeted digital finance forums, and specific social media algorithms designed to reach young investors across various Indonesian provinces. The offline component utilized code-based collection at university campuses, cafes, and social spaces in Semarang, Central Java. This offline strategy was crucial for capturing respondents operating outside traditional digital cryptocurrency echo chambers while the online distribution ensured broader national reach. Snowball sampling techniques were applied to amplify both online and offline distribution avenues. Electronic informed consent was mandatory. This hybrid approach

ensured representation across different Generation Z segments nationwide. Acknowledging cross-sectional survey limitations we note purposive sampling limits generalizability. The inability to calculate precise response rate precludes formal nonresponse bias testing which is addressed in the discussion.

The measurement instrument adapts validated scales from the reference study with conceptual roots in established literature (Albayati et al., 2020; Davis, 1989; Saadé & Bahli, 2005; Shahzad et al., 2018; Treiblmaier & Sillaber, 2021). It comprises 33 items measured on a five-point Likert scale from 1 meaning Strongly Disagree to 5 meaning Strongly Agree. Three items were contextually adapted to capture knowledge of Indonesian platforms awareness of Indonesian crypto regulations and clarity of OJK regulations. Following back translation by a certified linguist to secure semantic parity construct validity was anchored on rigorous benchmarks. Outer loadings, Average Variance Extracted, HTMT ratios, and composite reliability all comfortably cleared established psychometric thresholds (Hair et al., 2021). **Table 1** presents the operationalization of variables.

Table 1. Operationalization of Research Variables

No	Variable	Indicator		Reference
1	Technology Awareness	[TA1]	Understanding of blockchain	Albayati et al. (2020)
		[TA2]	How cryptocurrency works	
		[TA3]	Knowledge of different types of cryptocurrency	
		[TA4]	Consumption of cryptocurrency news	
		[TA5]	Knowledge of local Indonesian platforms	
		[TA6]	Decentralization of cryptocurrency	
		[TA7]	Awareness of advantages and disadvantages	
		[TA8]	Ability to educate others	
		[TA9]	Development of cryptocurrency in Indonesia	
2	Perceived Usefulness	[PU1]	Transaction speed	Davis (1989); Sagheer et al. (2022)
		[PU2]	Digital financial management	
		[PU3]	Ease of international transactions	
		[PU4]	Investment profit potential	
		[PU5]	Transaction efficiency	
		[PU6]	Overall utility	
3	Perceived Ease of Use	[PEOU1]	Ease of learning	Saadé & Bahli (2005)
		[PEOU2]	User-friendly application interface	
		[PEOU3]	Speed of adoption	
		[PEOU4]	Ease of account registration	
		[PEOU5]	Understanding without a technical background	
		[PEOU6]	Overall ease of use	
4	Perceived Risk	[PR1]	Cybersecurity risks	Shahzad et al. (2018)
		[PR2]	Regulatory uncertainty risks	
		[PR3]	Price volatility risks	
5	Government Support	[GS1]	Clarity of OJK regulations	Albayati et al. (2020)
		[GS2]	Public education by the government	
		[GS3]	Consumer protection	
		[GS4]	Maturity of local infrastructure	

No	Variable	Indicator		Reference
6	Behavioral Intention	[BI1]	Intent to use in the short term	Treiblmaier & Sillaber, (2021)
		[BI2]	Recommendations to others	
		[BI3]	Intent to explore features	
		[BI4]	Priority as a primary instrument	
		[BI5]	Intent to use in the long term	

Descriptive statistics were generated in SPSS to profile respondent characteristics. The structural model was estimated using PLS SEM in SmartPLS 4 (Ringle et al., 2024). This method handles complex exploratory webs of parallel mediators and a moderator maximizing explained variance without forcing multivariate normality (Hair et al., 2021). It is well suited for predictive modeling in relatively new research domains where theoretical development is ongoing. The moderation analysis utilized the product indicator approach which is the default and most widely accepted method for estimating interaction effects in variance based structural equation modeling (Hair et al., 2021). Common method bias was evaluated using the full collinearity inner model test to ensure the self-reported cross-sectional data was not inflated by methodological artifacts (Kock, 2015).

The analysis followed a rigorous two-stage approach. The first stage assessed the measurement model for reliability and validity. Indicator reliability was evaluated through outer loadings with a threshold of 0.70. Internal consistency reliability was assessed using Cronbach alpha and composite reliability, while convergent validity was evaluated through Average Variance Extracted with a threshold of 0.50. Discriminant validity was assessed using the Heterotrait Monotrait ratio of correlations. The threshold was set at 0.85 for conceptually distinct constructs and 0.90 for conceptually similar constructs (Hair et al., 2021). When initial discriminant validity checks revealed violations, an iterative indicator removal protocol was applied until the bootstrap confidence intervals fell below the acceptable threshold (Henseler et al., 2015).

The second stage evaluated the structural model for path coefficients, effect sizes, and predictive relevance. Mediation analysis followed established guidelines for establishing mediation types, with indirect effects calculated for each pathway and significance tested through bootstrapping with 5000 subsamples (Zhao et al., 2010). The index of moderated mediation was calculated for each conditional indirect effect to test the moderation hypotheses. Model fit was assessed using the Standardized Root Mean Square Residual (Hu & Bentler, 1999), and predictive relevance was evaluated using the blindfolding procedure with an omission distance of 7 to calculate Q square values (Hair et al., 2021). Local effect sizes were evaluated using f square metrics, where values of 0.02, 0.15, and 0.35 represent small, medium, and large effects, respectively.

RESULT AND DISCUSSION

The demographic profile of 335 respondents shows a sample skewed predominantly male at 57.0 percent and single at 80.9 percent, with most falling within the 21 to 24 years age bracket at 42.4 percent. Educational background was heavily distributed across senior high school graduates at 46.3 percent and bachelor degree holders at 37.6 percent, while students constituted the largest occupational group at 41.5 percent. Crypto experience distribution is striking with 41.8 percent reporting awareness without direct engagement and 24.8 percent being active users. This composition captures the targeted cognitive cohort as respondents are digitally fluent yet operationally on the cusp of investment commitment. **Table 2** presents the demographic profile.

Table 2. Demographics Profile

Demographics Category		Freq.	Percent.
Gender	Male	191	57%
	Female	144	43%
Marital Status	Single	271	81%
	Married	64	19%
Age	16–20 Years	77	23%
	21–24 Years	142	42%
	25–29 Years	116	35%
Education	Senior High School	155	46%

Demographics Category		Freq.	Percent.
	Diploma (D3)	38	11%
	Bachelor (S1)	126	38%
	Master (S2)	16	5%
Occupation	Student	139	41%
	Private Employee	132	39%
	Entrepreneur	58	17%
	Others	6	2%
Experience On Cryptocurrency	Yes, Actively Using	83	25%
	Yes, Tried	112	33%
	No, Just Aware	140	42%

Source. Primary data processed (2026).

Given the cross-sectional and self-reported nature of the data, potential common method bias was evaluated using the full collinearity inner model test (Kock, 2015). The inner model values ranged from 1.059 to 2.929, all below the conservative threshold of 3.3, confirming that common method bias is not a pervasive issue and structural estimates are not inflated by methodological artifacts.

Table 3 outlines the initial discriminant validity check, where severe HTMT ratio violations emerged immediately. The pair of perceived ease of use and perceived usefulness recorded a bootstrap upper bound of 1.026 demanding remedial action. The iterative removal protocol in **Table 4** sequentially eliminated five problematic indicators by prioritizing items exhibiting the lowest minimum loading differentials. This procedure is theoretically justified as it removes indicators contributing most to construct overlap without compromising core conceptual meaning (Henseler et al., 2015). The process continued until the upper bound of the HTMT bootstrap confidence interval dropped below the 1.00 threshold. The final iteration yielded a maximum bootstrap value of 0.993, resolving theoretical overlap between technology awareness and perceived usefulness. Although close to the threshold, this strictly satisfies the statistical criterion for discriminant validity, indicating the constructs remain empirically distinct despite high correlation in the Indonesian cryptocurrency context.

Table 3. Initial Model HTMT Confidence Intervals (33 item)

Construct Pair	Estimate	97.5% CI Upper Bound	Criterion	Status
PU ↔ PEOU	0.998	1.026	< 1.00	Violated
TA ↔ PU	0.968	0.995	< 1.00	High (Below threshold)
PEOU ↔ GS	0.939	0.992	< 1.00	High (Below threshold)
TA ↔ PEOU	0.930	0.964	< 1.00	High (Below threshold)

Note. Values shown in red mark bootstrap confidence interval upper bounds exceeding the 1.00 threshold. Source. Primary data processed (2026).

Table 4. Iterative Indicator Removal

Iteration	Indicator Removed	Min. Loading Differential	Highest HTMT Pair	Highest HTMT Value	Highest HTMT Bootstrap	Status
	Not applicable		PEOU & PU	0.998	1.026	Unacceptable
1	PU 1	0.065	PEOU & PU	0.998	1.029	Unacceptable
2	PU 6	0.062	PEOU & PU	0.991	1.027	Unacceptable
3	PEOU 2	0.069	PEOU & PU	0.985	1.023	Unacceptable
4	PEOU 4	0.065	TA & PU	0.964	1.000	Unacceptable
5	TA 6	0.050	TA & PU	0.953	0.993	Acceptable

Note. The yellow row shows the baseline model before indicator removal. Red values mark HTMT bootstrap upper bounds above the 1.00 threshold. Removal proceeds by lowest minimum loading differential until the bootstrap upper bound falls below 1.00. Source. Primary data processed (2026).

Table 5 consolidates descriptive statistics alongside indicator reliability and multicollinearity metrics. Retained items reliably exceeded the 0.70 loading benchmark, with the strongest single indicator being PR1 at

0.914. All variance inflation factor scores sit well below the 5.0 threshold, ranging from 1.459 to 3.530, confirming the absence of multicollinearity (Hair et al., 2021). Mean values reveal interesting psychological patterns: awareness items hovered around 3.80 indicating strong cognitive familiarity, while perceived risk items dipped to 3.21 to 3.41 suggesting moderate threat perception. Behavioral intention items rested between 3.28 and 3.41, a noticeable dip relative to awareness hinting at the classic intention to behavior gap typical of high uncertainty markets.

Table 5. Item Level Statistics and Indicator Reliability

Construct and Item	Mean	SD	Outer Loading	VIF
Technology Awareness				
TA1	3.81	1.112	0.832	2.606
TA2	3.76	1.100	0.818	2.616
TA3	3.90	1.107	0.832	2.867
TA4	3.79	1.054	0.799	2.254
TA5	3.90	1.029	0.769	2.061
TA7	3.87	1.064	0.809	2.818
TA8	3.67	1.122	0.803	2.598
TA9	3.81	1.119	0.837	2.955
Perceived Usefulness				
PU2	3.63	1.044	0.802	1.807
PU3	3.73	1.084	0.820	1.804
PU4	3.71	0.978	0.774	1.731
PU5	3.76	1.047	0.779	1.916
Perceived Ease of Use				
PEOU1	3.57	1.075	0.815	2.420
PEOU3	3.58	1.066	0.821	2.514
PEOU5	3.57	1.092	0.772	1.866
PEOU6	3.66	1.058	0.845	1.802
Perceived Risk				
PR1	3.28	1.235	0.914	2.626
PR2	3.21	1.171	0.859	2.104
PR3	3.41	1.247	0.903	2.401
Government Support				
GS1	3.75	1.029	0.843	1.919
GS2	3.67	1.017	0.801	1.730
GS3	3.70	1.030	0.747	1.459
GS4	3.82	0.949	0.800	1.649
Behavioral Intention				
BI1	3.39	1.282	0.887	3.174
BI2	3.28	1.240	0.848	2.606
BI3	3.41	1.227	0.842	2.456
BI4	3.33	1.269	0.862	2.811
BI5	3.41	1.305	0.905	3.530

Source. Primary data processed (2026).

Table 6 confirms acceptable construct reliability and validity. Cronbach alpha values range from 0.810 for Government Support to a robust 0.928 for Technology Awareness. None exceed the 0.95 upper redundancy limit. Composite reliability scores consistently surpass 0.70 while Average Variance Extracted values comfortably clear the 0.50 minimum benchmark (Hair et al., 2021).

Table 6. Construct Reliability and Validity

Construct	Cronbach's α	CR (rho_a)	CR (rho_c)	AVE
BI	0.919	0.921	0.939	0.755
GS	0.810	0.812	0.875	0.637
PEOU	0.866	0.867	0.909	0.714
PR	0.872	0.883	0.921	0.796
PU	0.831	0.832	0.888	0.664
TA	0.928	0.929	0.941	0.667

Source. Primary data processed (2026).

Table 7 presents HTMT bootstrapped confidence intervals as the contemporary gold standard for discriminant validity (Hair et al., 2021). All upper bound values fall strictly below the 1.00 threshold. Although point estimates between conceptually adjacent constructs remain elevated the decisive criterion is the confidence interval boundary which clears the structural model of conceptual overlap threatening discriminant validity.

Table 7. HTMT Bootstrapped Confidence Intervals Final

Construct Pair	Original Sample (O)	Sample Mean (M)	2.5%	97.5%
GS ↔ BI	0.758	0.758	0.683	0.826
PEOU ↔ BI	0.785	0.785	0.729	0.837
PEOU ↔ GS	0.925	0.926	0.868	0.978
PR ↔ BI	0.335	0.336	0.216	0.458
PR ↔ GS	0.276	0.280	0.148	0.419
PR ↔ PEOU	0.241	0.246	0.119	0.395
PU ↔ BI	0.849	0.850	0.801	0.897
PU ↔ GS	0.922	0.924	0.858	0.985
PU ↔ PEOU	0.952	0.953	0.907	0.995
PU ↔ PR	0.271	0.272	0.127	0.421
TA ↔ BI	0.672	0.673	0.599	0.738
TA ↔ GS	0.748	0.747	0.653	0.833
TA ↔ PEOU	0.893	0.893	0.842	0.936
TA ↔ PR	0.204	0.208	0.085	0.352
TA ↔ PU	0.953	0.953	0.910	0.993

Source. Primary data processed (2026).

The structural model was specified as a full mediation model by design. Consistent with the extended theoretical framework technology awareness is conceptualized as a distal antecedent that influences behavioral intention exclusively through proximal cognitive evaluations. Consequently, no direct path from technology awareness to behavioral intention was estimated in the structural model. This theoretical specification aligns with the premise that mere awareness does not directly trigger adoption intention without prior cognitive processing (Davis, 1989; Sagheer et al., 2022). Because the model is fully mediated the total effect of technology awareness on behavioral intention is equivalent to the sum of its specific indirect effects.

Model fit was evaluated primarily using the Standardized Root Mean Square Residual. **Table 8** shows the value of the estimated model at 0.055 well below the conservative 0.08 threshold indicating highly robust fit (Hu & Bentler, 1999). The Normed Fit Index yielded a marginal value of 0.819 but modern guidelines caution this index is highly sensitive to model complexity and recommend the Standardized Root Mean Square Residual as the most reliable exact fit criterion (Hair et al., 2021). Fit indices further corroborate model adequacy.

Table 8. Model Fit Summary

	Saturated model	Estimated model
SRMR	0.053	0.055
d_ULS	1.124	1.218
d_G	0.652	0.673
Chi-square	1283.457	1325.991
NFI	0.825	0.819

Source: Primary data processed (2026).

Table 9 evaluates explanatory and predictive power. The model explains 59.7 percent of the variance in behavioral intention. Perceived usefulness and perceived ease of use achieve stronger explanations at 78.1 percent and 75.9 percent respectively. Q square values ranging from 0.300 to 0.562 indicate strong out of sample predictive precision. However perceived risk constitutes a notable outlier. Its R square of 0.061 and negligible Q square range suggest that technology awareness alone holds limited predictive power over risk perception among Indonesian Generation Z. This pattern supports the proposition that risk perception in ambiguous regulatory environments may decouple from rational informational cues.

Table 9. Endogenous Construct Evaluation

Endogenous Construct	R^2	Adjusted R^2	Q^2predict Range	PLS-SEM RMSE Range
Behavioral Intention	0.597	0.594	0.300 - 0.456	0.961 - 1.029
Perceived ease of use	0.759	0.757	0.502 - 0.557	0.705 - 0.771
perceived usefulness	0.781	0.779	0.445 - 0.562	0.713 - 0.743
Perceived risk	0.061	0.053	0.006 - 0.041	1.170 - 1.230

Source. Primary data processed (2026).

Table 10 presents local effect sizes. Technology awareness exerts a large effect on Perceived Usefulness and Perceived Ease of Use yet its effect on Perceived Risk is negligible. Government support displays large direct effects on ease of use and usefulness but a small effect on risk. Within Behavioral Intention prediction Perceived Usefulness emerges as the dominant medium effect predictor while Perceived Risk lags. These asymmetric effect sizes consistently signal that the risk pathway operates under a fundamentally different psychological logic in the Indonesian context. To verify the appropriateness of the full mediation specification, an alternative model incorporating a direct path from technology awareness to behavioral intention was estimated and compared against the hypothesized model. The direct effect proved statistically nonsignificant ($\beta = -0.133$, $t = 1.763$, $p = 0.078$), and including this path raised the explained variance in behavioral intention by less than one percentage point ($R^2 = 0.602$ versus 0.597 in the original specification). Following Zhao et al. (2010), this pattern supports indirect-only mediation for the usefulness and ease of use pathways, confirming that technology awareness shapes adoption intention exclusively through these cognitive evaluations rather than through any residual direct influence.

Table 10. Effect Size f-Square

Predictor	Criterion	f^2	Interpretation
TA	PU	0.863	Large
TA	PEOU	0.625	Large
TA	PR	0.004	Negligible
GS	PU	0.350	Large
GS	PR	0.028	Small
GS	PEOU	0.477	Large
PU	BI	0.193	Medium
PEOU	BI	0.072	Small-Medium
PR	BI	0.039	Small

Source. Primary data processed (2026).

The comprehensive visual representation of the final estimated structural model is provided in Figure 2. This diagram illustrates the standardized path coefficients and the statistical significance of all direct relationships alongside the specific moderation effects of government support. The visual mapping confirms that the structural specification adequately captures the complex cognitive mechanisms driving cryptocurrency adoption intentions among Indonesian Generation Z.

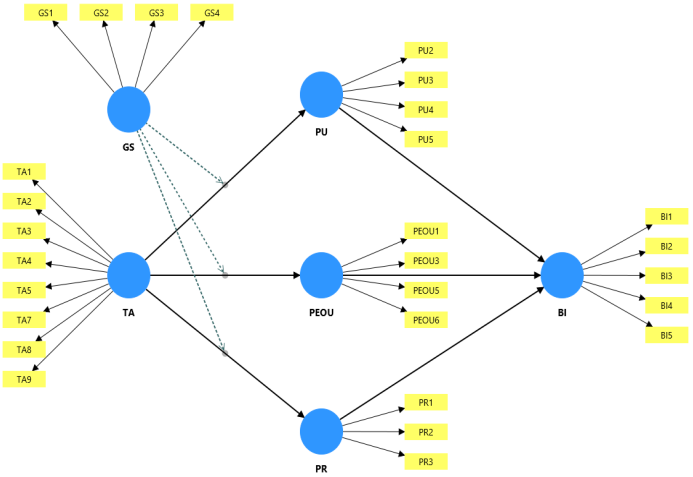


Figure 2. Final PLS-SEM Structural Model
Source: Primary data processed (2026).

Bootstrapped path coefficients across 5000 subsamples deliver inferential judgments. Table 11 details direct indirect and moderated mediation outcomes based on a 0.05 significance level. Structural results indicate that technology awareness significantly predicts perceived usefulness and perceived ease of use but not perceived risk. Perceived usefulness, perceived ease of use, and perceived risk each positively predict behavioral intention. Notably, the positive risk-intention relationship contradicts classical assumptions that risk functions as an adoption barrier. Government Support moderates only the awareness to ease of use pathway not the usefulness or risk pathways.

Table 11. Structural Model Results and Hypothesis Testing

Hypothesis / Path	Relationship Type	β	SD	t-value	ρ-value	Result
Direct Effects						
	TA → PU	0.610	0.046	13.282	0.000	Significant
	TA → PR	0.086	0.081	1.065	0.287	Not Significant
	TA → PEOU	0.544	0.048	11.412	0.000	Significant
	PU → BI	0.478	0.062	7.739	0.000	Significant
	PR → BI	0.128	0.032	4.016	0.000	Significant
	PEOU → BI	0.290	0.062	4.656	0.000	Significant
	TA → BI	-0.133	0.075	1.763	0.078	Not Significant
Mediation Effects						
H1	TA → PU → BI	0.291	0.043	6.748	0.000	Supported
H2	TA → PEOU → BI	0.158	0.036	4.383	0.000	Supported
H3	TA → PR → BI	0.011	0.011	0.990	0.322	Not Supported
Moderated Mediation Effects						
H4a	GS × TA → PU → BI	0.009	0.015	0.622	0.534	Not Supported
H4b	GS × TA → PEOU → BI	0.014	0.007	2.047	0.041	Supported
H4c	GS × TA → PR → BI	0.006	0.007	0.841	0.400	Not Supported

Note. Red values denote p-values exceeding 0.05, indicating nonsignificant effects or unsupported hypotheses.
Source. Primary data processed (2026).

The mediation analysis reveals that perceived usefulness significantly transmits the effect of technology awareness on behavioral intention, supporting H1. These indirect only patterns are corroborated by the supplementary full mediation test, which found no significant direct effect of technology awareness on behavioral intention. Similarly, perceived ease of use significantly mediates the awareness intention relationship, supporting H2. However, perceived risk does not mediate this relationship, rejecting H3. This failure to replicate the risk mediated pathway constitutes a theoretically significant divergence from the reference study, possibly attributable to fragmented oversight suppressing risk cognition under regulatory ambiguity.

The moderated mediation analysis indicates that government support does not moderate the indirect effect through perceived usefulness, rejecting H4a. The conditional indirect effects are significant at both low and high government support, but the difference is not statistically significant. Government support significantly moderates the indirect effect through perceived ease of use, supporting H4b. The conditional indirect effect is stronger at high government support, suggesting that regulatory clarity amplifies the translation of awareness into ease of use beliefs. Finally, government support does not moderate the indirect effect through perceived risk, rejecting H4c. Neither conditional indirect effect reaches significance, suggesting that regulatory contradictions decouple risk perception from regulatory signals.

Simple slope analysis examined the moderating effect of government support on the relationship between technology awareness and the three cognitive mediators. The analysis revealed an asymmetric moderation pattern. For the perceived usefulness and perceived risk pathways, the slopes across low, mean, and high levels of government support were nearly parallel, indicating no substantial change in relationship strength. Conversely, the slope for the perceived ease of use pathway diverged significantly at higher awareness levels. The line representing high government support exhibited a steeper gradient compared to the low government support line, confirming that regulatory clarity amplifies the translation of awareness into ease of use beliefs.

The mediation framework partially replicates Sagheer et al. (2022). Perceived usefulness and ease of use robustly transmit the relationship between technology awareness and behavioral intention, with effect sizes exceeding baseline expectations. This amplification reflects Indonesia's mature fintech infrastructure, where young users build awareness through actual platform contact rather than passive exposure (Bhardwaj et al., 2021; Putri et al., 2024). Ease of use carries particular weight, as Generation Z demands frictionless onboarding before instrumental utility claims register (Ramadhan & Putra, 2025; Saputra & Darma, 2022).

Beyond confirming the central propositions of the Technology Acceptance Model, the present findings suggest that technology awareness operates primarily as a catalyst for cognitive evaluation rather than as a direct determinant of behavioral intention. The insignificant direct effect of technology awareness indicates that simply possessing information about cryptocurrency is insufficient to motivate adoption unless individuals perceive tangible benefits and manageable interaction processes. This finding reinforces Davis (1989) original proposition that users transform knowledge into behavioral intention through evaluations of usefulness and ease of use rather than through awareness alone. More importantly, the Indonesian context demonstrates that technology awareness is embedded within a broader institutional environment, implying that cognitive beliefs are continuously shaped by external regulatory cues. Consequently, technology adoption should be understood as the outcome of an interaction between individual cognition and institutional legitimacy rather than merely an individual decision-making process. This interpretation aligns with recent evidence suggesting that technology acceptance in financial innovations increasingly depends on the interaction between technological characteristics and institutional arrangements that reduce uncertainty and enhance public confidence (Albayati et al., 2020; Ha et al., 2025).

While the usefulness and ease of use pathways reinforce the explanatory power of the Technology Acceptance Model, the perceived risk pathway reveals a fundamentally different pattern. Rather than supporting conventional technology adoption theory, the Indonesian evidence suggests that risk perceptions are shaped less by individual knowledge and more by the broader institutional environment in which cryptocurrency is regulated. This divergence highlights the importance of examining risk as a context-dependent construct whose influence may vary across institutional settings.

The failure to replicate the risk-mediated pathway constitutes the study's most theoretically significant finding. Rather than deterring adoption, perceived risk positively predicts behavioral intention among Indonesian Generation Z, suggesting that contradictory regulatory signals from the Financial Services Authority and Bank Indonesia decouple risk evaluation from rational threat appraisal. Consistent with Protection Motivation Theory, when institutional anchors wobble, threat and coping appraisals diverge, reframing risk as a marker of high return potential rather than a barrier (Lim, 2003; Mattke et al., 2021; Rogers, 1975). This divergence contrasts with Sagheer et al. (2022), who observed a negative risk-intention relationship in Pakistan, and Shahzad et al. (2018), who found no effect in China. Under fragmented oversight, individuals cannot reliably assess outcome probability

or severity, so risk perception disassociates from specific threats and instead signals asset legitimacy (Arias-Oliva et al., 2019; Namahoot & Rattanawiboonsom, 2022). The negligible R^2 further confirms that risk perception is driven largely by factors external to individual cognition, most notably institutional inconsistency surrounding cryptocurrency regulation.

Government support asymmetrically moderates only the awareness to ease of use pathway, indicating that regulatory interventions reduce procedural uncertainty by making platforms easier to navigate rather than directly influencing perceptions of economic value or investment risk. This pattern provides empirical support for Institutional Theory: institutional legitimacy emerges not from regulatory presence alone but from the consistency and credibility of institutional arrangements (DiMaggio & Powell, 1983; Scott, 2014). In the Indonesian cryptocurrency market, fragmented regulatory authority between the Financial Services Authority and Bank Indonesia dilutes the signaling effect of government support, preventing users from developing coherent evaluations of usefulness and risk. Consequently, the effectiveness of government intervention depends on institutional coherence rather than intensity alone, suggesting that future TAM extensions should incorporate regulatory consistency as a contextual boundary condition.

These findings position institutional ambiguity as a boundary condition for the Technology Acceptance Model, under which risk mediation can be suppressed entirely rather than functioning as a stable extension (Albayati et al., 2020; Shahzad et al., 2018). The positive risk-intention relationship extends this further, suggesting risk processing is culturally and generationally contingent, introducing a risk-as-opportunity pattern in which volatility signals asset potential rather than danger for digitally native cohorts in emerging markets. Government support's asymmetric moderation similarly refines Institutional Theory, as state intervention reduces cognitive friction only when regulatory architecture is internally consistent, meaning policymakers must resolve institutional contradictions before state support can meaningfully facilitate adoption.

CONCLUSION AND RECOMMENDATION

This replication-extension study evaluated a moderated mediation framework among Indonesian Generation Z to understand cryptocurrency adoption under institutionally ambiguous conditions. The empirical evidence confirms core Technology Acceptance Model tenets within a mature domestic fintech context, demonstrating that perceived usefulness and ease of use robustly mediate the transition from technology awareness to behavioral intention. A theoretically significant divergence emerges in the risk pathway, where perceived risk fails to mediate this relationship and instead positively predicts adoption intention. This counterintuitive outcome indicates that under contradictory regulatory signals from the Financial Services Authority and Bank Indonesia, Generation Z reframes risk not as an adoption barrier but as a marker of high return potential, effectively decoupling risk evaluation from rational informational cues. Furthermore, the analysis reveals that government support asymmetrically moderates only the ease of use pathway. This selective moderation underscores that mere regulatory presence is insufficient, as regulatory signals must be fully coherent to activate authentic institutional legitimacy effects.

These findings establish institutional dualism as a critical boundary condition for the Technology Acceptance Model in cryptocurrency contexts. By demonstrating that risk mediation can be completely suppressed and inverted under regulatory ambiguity, this study challenges the universal assumption of risk as a deterrent in digital finance. Furthermore, the asymmetric moderation of government support refines institutional theory by proving that deep regulatory coherence, rather than mere state intervention, is required to facilitate technology adoption in institutionally complex environments.

Platform designers should prioritize intuitive onboarding over complex usefulness claims, emphasizing concrete benefits like portfolio diversification over abstract novelty. Given the positive risk perception observed, platforms should provide transparent volatility indicators that frame fluctuations as learning opportunities rather than pure threats.

Policymakers require a unified regulatory framework. Consolidating oversight between the Financial Services Authority and Bank Indonesia, potentially through a joint task force harmonizing the digital asset and payment frameworks, is necessary for credible risk reduction. Until consolidation occurs, government support remains an incomplete signal, and financial literacy initiatives should address institutional navigation alongside technical understanding to help Generation Z interpret contradictory regulatory signals and make informed decisions.

The exclusive focus on Generation Z, while theoretically justified, constrains the generalizability of these findings to other age cohorts. Older demographic groups may process regulatory ambiguity and risk information through different cognitive heuristics, given their divergent financial socialization and institutional trust baselines (Turner, 2015). The observed patterns may likewise be specific to Indonesia's fragmented regulatory structure and may not extend to jurisdictions where financial authorities operate under unified oversight. This constraint limits the external validity of the risk-as-opportunity mechanism identified in this study.

A more substantive limitation concerns the low explanatory power observed for perceived risk ($R^2 = 0.061$), indicating that technology awareness and government support jointly account for only a marginal share of variance in risk perception. This result is consistent with Protection Motivation Theory, which posits that threat appraisal requires activation through salient and coherent cues (Rogers, 1975). The absence of such coherence in Indonesia's regulatory environment may explain why informational exposure alone fails to shape risk evaluation. Factors external to the present model, such as peer influence, social media discourse, or price volatility, likely play a more decisive role in forming risk perceptions among this cohort. This gap directly informs the methodological priorities outlined in the following section.

The cross-sectional design further limits causal inference, as data collection coincided with an active period of regulatory transition. The decoupling of risk perception documented here may therefore reflect a transient condition rather than a stable psychological pattern. Additionally, reliance on behavioral intention as the outcome variable introduces a degree of overestimation risk, given the well-documented gap between stated intention and actual market behavior in financial decision-making contexts (Sagheer et al., 2022). Taken together, these findings should be interpreted as evidence of cognitive positioning toward cryptocurrency adoption rather than confirmed adoption behavior.

These limitations point toward specific directions for theoretical refinement. Rather than incremental replication, subsequent research should prioritize model extensions that directly address the explanatory gaps identified above, particularly regarding the mechanisms underlying risk perception.

Legal literacy represents a promising construct for future investigation, motivated by the non-significant moderation effect of government support on the risk pathway (H4c). This result may not indicate that regulation is inconsequential, but rather that potential adopters lack the capacity to interpret its meaning. Individuals with higher legal literacy may interpret ongoing regulatory transitions as routine policy evolution, whereas those with lower literacy may interpret contradictory signals as implicit endorsement of speculative behavior. Incorporating this construct would help determine whether the positive risk-intention relationship reflects genuine opportunism or a deficit in regulatory comprehension.

Platform trust similarly warrants examination as a potential mediating mechanism. The negligible explanatory power of the present model over perceived risk suggests that users may rely on the credibility of specific exchanges rather than macro-level institutional signals when evaluating risk. When institutional cues are inconsistent, users may default to more immediate and observable trust anchors, such as data security practices, transaction reliability, and platform reputation. Testing this construct would clarify whether platform-level trust substitutes for, or interacts with, institutional-level legitimacy in shaping adoption decisions.

A further methodological priority involves transitioning the outcome variable from declared intention to verified adoption behavior. Although intention remains a defensible proxy within the original TAM framework, the volatility of financial preferences in uncertain markets necessitates more robust measures. Objective indicators, such as verified wallet registration, transaction records, or longitudinal platform engagement data, would provide stronger validation of whether the cognitive shifts identified in this study translate into sustained adoption.

Finally, cross-jurisdictional comparative studies would help isolate the specific effects of institutional dualism from broader emerging-market conditions. Comparing Indonesia with countries operating under unified regulatory frameworks, such as Singapore, would clarify whether the risk-as-opportunity phenomenon documented here is unique to Indonesia's regulatory structure or characteristic of fragmented regulatory environments more broadly.

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