



RESEARCH ARTICLE

The UTAUT Model in the Continuance Intention of E-Wallets (QRIS) by MSMEs: With the Moderating Effect of Security Risk

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Abstract

The post-COVID-19 shift toward a cashless economy in Indonesia has accelerated MSME adoption of digital wallets and QRIS; however, sustaining long-term technology retention remains challenging amid rising cyber threats. Integrating the UTAUT and ECM frameworks, this study examines how performance expectancy, effort expectancy, social influence, and facilitating conditions affect QRIS continuance intention among MSMEs, with perceived security risk as a moderator. This quantitative study collected survey data from 134 active MSME operators in Bengkulu City, Indonesia. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). Results reveal that all four UTAUT constructs significantly and positively impact QRIS continuance intention. Crucially, perceived security risk acts as a robust negative moderator, systematically weakening the positive effects of these determinants on long-term retention. Theoretically, this research extends the UTAUT model into a post-adoption business context. Practically, it underscores that sustaining digital payment ecosystems requires a collaborative approach: platform providers must enhance security, regulators must enforce consumer protection, and merchants must elevate digital literacy.

Keywords

E-Wallet; QRIS; Continuance Intention; UTAUT; Security Risk; MSMEs.

1 | INTRODUCTION

The rapid advancement of financial technology (FinTech) and digital wallet (e-wallet) services has significantly transformed transactional landscapes globally, accelerating the shift toward a cashless economy. In Indonesia, the utilization of financial technology by Micro, Small, and Medium Enterprises (MSMEs) has experienced a substantial surge, particularly in the post-COVID-19 era, compelling business operators to adapt to digital solutions for daily operations and payment processing (Kurniasari *et al.*, 2025). E-wallets such as OVO, ShopeePay, DANA, LinkAja, and GoPay have evolved from alternative innovations into integral components of MSME business activities, notably through QRIS integration, marketplace synchronization, and digital bookkeeping. Recent statistics underline this dominance, revealing that e-wallet account growth reached 47.4% over the past decade significantly outperforming debit cards (12.6%) and credit cards (1.94%). A 2025 Jakpat survey indicates that 80% of Indonesian respondents prioritize digital wallets over e-banking (45%). For MSMEs, adopting these solutions offers functional benefits such as accelerated cash receipt, simplified transaction logging, expanded customer reach, and enhanced operational efficiency (Hoque *et al.*, 2024). However, despite widespread initial adoption, sustaining long-term continuance intention toward this technology remains a critical challenge.

While initial adoption is driven by immediate utility, long-term continuance intention introduces operational complexities that standard adoption models fail to capture fully. MSMEs face substantial friction regarding internal financial reconciliation and ledger management due to the high volume of digital transactions (Alfiana & Wandira, 2024). Furthermore, literature on digital payment challenges highlights that technical vulnerabilities, security breaches, and fraudulent activities severely undermine merchant and consumer trust (Ikhwan, 2024). To address these post-adoption dynamics, this study re-examines the core constructs of the Unified Theory of Acceptance and Use of Technology (UTAUT) formulated by Venkatesh *et al.* (2003) Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC). Although the extended UTAUT2 model incorporates consumer-centric variables such as hedonic motivation, price value, and habit (Venkatesh *et al.*, 2012), this research purposefully retains the classical UTAUT framework to isolate and rigorously evaluate how these fundamental organizational and infrastructural predictors influence post-adoption continuance intention rather than initial adoption intentions within the MSME ecosystem.

A review of empirical literature reveals inconsistent and conflicting findings regarding the effects of UTAUT constructs in digital payment environments. Numerous studies validate that PE, EE, and SI positively dictate QRIS and e-wallet adoption intentions (Safitri & Sari, 2024; Laksono & Magnifera, 2024; Tavid & Kurniawati, 2024), while FC is routinely linked to actual usage behavior (Safitri & Sari, 2024) and behavioral intentions (Tavid & Kurniawati, 2024; Clarissa & Keni, 2022). Conversely, contradictory evidence shows that EE is non-significant for certain MSMEs (Sugiarto & Imronudin, 2024), and both SI and FC yield negligible impacts in specific QRIS merchant contexts (Pangestu & Pasaribu, 2022). This divergence stems from a prominent empirical gap: most existing UTAUT literature focuses heavily on pre-adoption intentions (Clarissa & Keni, 2022; Pangestu & Pasaribu, 2022; Safitri & Sari, 2024; Laksono & Magnifera, 2024), whereas dedicated MSME continuance intention research remains highly scarce and structurally fragmented (Zulaikhahh, 2020; Ansori & Nugroho, 2024). More importantly, rising fintech threats such as quishing (QR code-based phishing) undermine user safety and confidence (Singkeruang *et al.*, 2025). While security risks are known to depress technology trust (Zulaikhahh, 2020; Ansori & Nugroho, 2024; Putri *et al.*, 2021; Putritama, 2019; Isa, 2022), or act indirectly through user attitudes (Aprilia & Amalia, 2022), their role as a moderator remains largely unexplored. This creates a critical theoretical gap regarding whether high security risks actively weaken the positive effects of PE, EE, SI, and FC on technology continuance intention.

To bridge these gaps, this study examines how PE, EE, SI, and FC influence E-Wallet (QRIS) continuance intention among MSMEs, while introducing Security Risk as a pioneering contextual moderator. Mirroring the core structure of our primary reference journal (Asri *et al.*, 2025), which employs fundamental UTAUT variables, this paper introduces a specialized risk-moderation layer to capture the unique vulnerabilities of digital financial ecosystems. Methodologically, this study adopts a quantitative approach, gathering survey data via structured questionnaires from active MSME operators in Bengkulu City who are at least 17 years old and have actively utilized prominent Indonesian e-wallets for a minimum of six months. The primary objective is to evaluate the direct predictive power of the four core UTAUT components on continuance intention, alongside assessing the exact moderating strength of perceived security risks. The anticipated findings are expected to demonstrate that while operational benefits and structural support remain vital for retention, heightened security concerns act as a significant barrier that dampens the positive impacts of ease-of-use and technical facilitation.

This research offers meaningful theoretical and practical implications for the digital ecosystem. Theoretically, it extends the boundary conditions of the classical UTAUT framework by shifting its focus from initial organizational adoption to post-adoption continuance intention within business domains, while validating the moderating role of perceived risks (Saputri *et al.*, 2022). Practically, the insights gained will guide e-wallet providers, policymakers, and financial regulators in designing robust security architectures, deploying responsive customer support, and engineering targeted digital literacy initiatives to ensure sustainable digital transitions for small businesses.

2 | BACKGROUND THEORY

2.1 Expectation Confirmation Model (ECM)

The Expectation Confirmation Model (ECM) conceptualizes information systems continuance intention by shifting analytical focus from initial technology adoption to the critical post-adoption phase where long-term retention occurs (Bhattacharjee, 2001). Adapted from Oliver's (1980) consumer-centric Expectation-Disconfirmation Theory, ECM posits that an individual's decision to continuously utilize a digital system is primarily driven by post-adoption satisfaction and perceived usefulness. According to this framework, when actual system performance meets or exceeds a user's baseline expectations (confirmation), it elevates cognitive satisfaction, which directly reinforces their behavioral intention to sustain technology usage over time. In the digital financial ecosystem, ECM serves as an essential lens to explain how Micro, Small, and Medium Enterprises (MSMEs) transition from merely experimenting with a new platform to permanently integrating it into their routine commercial infrastructure based on experienced utility.

2.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) serves as a comprehensive consolidated framework developed by synthesizing eight prominent socio-psychological and innovation diffusion models to predict technology acceptance and behavioral intentions (Venkatesh *et al.*, 2003). The framework establishes that user behavior is directly dictated by four fundamental core constructs: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions. While the extended consumer-oriented UTAUT2 model incorporates additional variables such as hedonic motivation, price value, and habit (Venkatesh *et al.*, 2012), retaining the classical organizational UTAUT framework allows for a more rigorous and isolated evaluation of structural, operational, and environmental predictors within business ecosystems. In this study, these classic core constructs are re-examined to map the strategic transition of MSMEs from initial, tentative adoption to stable, continuous post-adoption continuance intention.

2.3 Performance Expectancy and E-Wallet Continuance Usage

Performance Expectancy (PE) reflects the specific degree to which an individual believes that utilizing a technological platform will assist them in gaining significant performance advantages or tangible functional benefits within their daily operations (Venkatesh *et al.*, 2003). This construct integrates underlying variables such as perceived usefulness (Davis *et al.*, 1989), extrinsic motivation (Davis *et al.*, 1992), and outcome expectations (Compeau & Higgins, 1995), which translate for MSMEs into faster cash collection, simplified financial recording, and improved sales revenue. Rooted in ECM principles, where ongoing perceived utility dictates post-adoption satisfaction (Bhattacharjee, 2001), a high level of PE ensures that merchants incorporate e-wallets into their permanent operational routines. This positive relationship is heavily supported across fintech literature, confirming that experienced functional utility is a primary driver of technology continuance intention (Saputri *et al.*, 2022; Amnas *et al.*, 2023; Sara *et al.*, 2024).

H1: Performance Expectancy has a positive effect on the continuance usage of E-Wallet (QRIS) among MSMEs.

2.4 Effort Expectancy and E-Wallet Continuance Usage

Effort Expectancy (EE) represents the perceived level of ease associated with the daily operation and management of an information system (Venkatesh *et al.*, 2003). Formulated by combining perceived ease of use from TAM (Davis, 1989), complexity from MPCU (Thompson *et al.*, 1991), and ease of use from IDT (Rogers & Shoemaker, 1971), EE operationalizes clarity of interface, simplicity of workflow, and the minimization of cognitive friction for business operators. When a QRIS platform is continuously easy to use, it reduces administrative transaction costs and employee training barriers, satisfying the user's confirmation criteria and driving long-term satisfaction. Empirical evaluations confirm that maintaining structural simplicity and low operational effort prevents merchants from abandoning digital tools as transaction volumes scale, thereby fostering a sustained continuance intention (Saputri *et al.*, 2022; Amnas *et al.*, 2023; Sara *et al.*, 2024).

H2: Effort Expectancy has a positive effect on the continuance usage of E-Wallet (QRIS) among MSMEs.

2.5 Social Influence and E-Wallet Continuance Usage

Social Influence (SI) captures the precise extent to which an individual perceives that important reference figures or environmental networks believe they should actively use a new technology (Venkatesh *et al.*, 2003). Incorporating subjective norms and social image mechanisms (Moore & Benbasat, 1991), SI operates within MSMEs through direct pressure from consumers demanding cashless options, peer recommendations, and institutional incentives from platform providers or financial regulators. Under an ECM and compliance framework (Venkatesh & Davis, 2000), these social expectations shape initial usage targets, and when validated by actual experiences, they

reinforce the business's image and market position. This dynamic is validated by empirical consensus, showing that network externalities and social ecosystems strongly lock merchants into a long-term technology continuance intention (Saputri *et al.*, 2022; Hoque *et al.*, 2024; Sara *et al.*, 2024).

H3: Social Influence has a positive effect on the continuance usage of E-Wallet (QRIS) among MSMEs.

2.6 Facilitating Conditions and E-Wallet Continuance Usage

Facilitating Conditions (FC) denote the objective degree to which an individual believes that an adequate organizational and technical infrastructure exists to actively support system utilization (Venkatesh *et al.*, 2003). This construct encompasses the availability of hardware terminal points, stable internet connectivity, and responsive customer support channels, serving as the essential foundation that reinforces technology continuance intention. In an ECM context, robust facilitating conditions ensure that system capabilities are reliably delivered during daily operations, confirming initial expectations and increasing user trust. Numerous empirical studies substantiate this baseline relationship, showing that comprehensive infrastructural and technical support prevents merchants from reverting to cash-only transactions (Clarissa & Keni, 2022; Saputri *et al.*, 2022; Sara *et al.*, 2024; Tavid & Kurniawati, 2024).

H4: Facilitating Conditions have a positive effect on the continuance usage of E-Wallet (QRIS) among MSMEs.

2.7 Security Risk as a Moderator of Performance Expectancy

Security Risk represents the perceived probability of technical vulnerabilities, fraud, data breaches, or malicious threats, such as quishing (QR-code phishing), that compromise the financial safety of a digital platform (Singkeruang *et al.*, 2025). Within the UTAUT framework, contextual threat perceptions can interfere with core behavioral paths, acting as a cognitive filter that diminishes perceived utility. When security risk is low, the functional benefits of performance expectancy, including transaction speed and financial tracking, fully drive continuous intention. However, when merchants perceive a high security risk, the threat of financial or reputational loss overrides operational advantages, weakening the direct positive impact of performance expectancy on long-term technology continuance intention (Putritama, 2019; Zulaikhah, 2020; Isa, 2022; Ansori & Nugroho, 2024).

H5: Security Risk negatively moderates the effect of Performance Expectancy on the continuance usage of E-Wallet (QRIS) among MSMEs.

2.8 Security Risk as a Moderator of Effort Expectancy

Security Risk functions as an emotional and administrative barrier that alters how effectively simple operational interfaces translate into stable, long-term merchant continuance intentions. While a low-effort system reduces immediate cognitive friction, a rising perception of transaction insecurity introduces a separate layer of psychological strain and protective anxiety. If a merchant fears that simple operational pathways make them vulnerable to fraud or data leaks, the practical benefits of a user-friendly application become less meaningful to their decision-making. Consequently, an elevated perception of security risk weakens the positive link between effort expectancy and continuance intention, whereas low risk allows operational simplicity to fully drive long-term retention (Zulaikhah, 2020; Isa, 2022; Sugiarto & Imronudin, 2024).

H6: Security Risk negatively moderates the effect of Effort Expectancy on the continuance usage of E-Wallet (QRIS) among MSMEs.

2.9 Security Risk as a Moderator of Social Influence

Security Risk operates as a powerful protective filter that conditions whether a firm complies with external social demands or shifts focus toward defensive asset protection. Although strong social pressure from customers and peer recommendations can drive an MSME to maintain digital payment options to preserve its market image (Hoque *et al.*, 2024), this social influence loses its momentum when confronted with severe transactional vulnerabilities. If a business operator believes that complying with consumer preferences exposes them to immediate financial loss or data theft, they are more likely to resist social pressure to protect their business. Thus, a high perception of security risk weakens the positive impact of social influence on continuance intention, whereas a secure environment allows social networks to fully reinforce long-term adoption (Zulaikhah, 2020; Isa, 2022; Safitri & Sari, 2024).

H7: Security Risk negatively moderates the effect of Social Influence on the continuance usage of E-Wallet (QRIS) among MSMEs.

2.10 Security Risk as a Moderator of Facilitating Conditions

Security Risk acts as a critical socio-technical constraint that determines whether infrastructural support and technical facilities successfully sustain technology continuance intention. While stable connectivity, hardware compatibility, and dedicated customer support provide the baseline infrastructure required for daily transaction

processing (Venkatesh *et al.*, 2003), their operational value drops if the underlying network is seen as unsafe. When merchants face high security risks, technical infrastructure is often viewed as a potential point of failure or vector for fraud, causing them to limit platform use despite having access to adequate support. Therefore, a high perception of security risk dampens the positive relationship between facilitating conditions and continuance intention, while a secure network environment maximizes the operational value of available infrastructure (Zulaikhah, 2020; Clarissa & Keni, 2022; Isa, 2022; Tavid & Kurniawati, 2024).

H8: Security Risk negatively moderates the effect of Facilitating Conditions on the continuance usage of E-Wallet (QRIS) among MSMEs.

3 | METHOD

This study employs a quantitative research design with an explanatory causal approach to systematically examine the predictive effects of the Unified Theory of Acceptance and Use of Technology (UTAUT) core constructs, namely Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions, on the continuance intention of digital wallets (QRIS) among micro, small, and medium enterprises (MSMEs), while evaluating the structural moderating influence of perceived security risks. The target population comprises active MSME business units operating within the urban jurisdiction of Bengkulu City, Indonesia, that integrate digital wallet services for daily payment processing. To ensure data relevance, the unit of analysis is established at the firm level, utilizing a non-probability purposive sampling technique based on two explicit, strict participant selection criteria: (1) the business must maintain active, legal operations for a minimum baseline period of one year, and (2) the unit must have actively utilized at least one major national e-wallet network, such as OVO, ShopeePay, DANA, LinkAja, or GoPay, for its commercial transactions over the preceding six months.

Data collection procedures were systematically deployed within localized commercial settings via structured questionnaires administered directly to qualified business owners or managers, maintaining strict ethical compliance protocols where participants provided informed consent and were assured of absolute anonymity and confidentiality to protect their operational rights. To empirically evaluate the conceptual framework, this study utilizes Partial Least Squares Structural Equation Modeling (PLS-SEM), executed through the advanced statistical software package SmartPLS 4, which is highly suited for non-parametric causal predictive modeling without strict requirements for normal data distribution (Hair *et al.*, 2022). The measurement instruments are subjected to a rigorous two-phase validation protocol to establish exceptional technical quality. In the first phase, the measurement model (outer model) is evaluated to confirm the internal validity and reliability of the reflective indicator items. Convergent validity is strictly assessed via indicator outer loadings, where a threshold of greater than or equal to 0.70 signifies strong item-to-construct alignment (Hair *et al.*, 2022). Discriminant validity is sequentially verified to confirm that each latent construct remains empirically distinct from all other variables in the model, utilizing cross-loadings, the Fornell-Larcker criterion (which requires the square root of the AVE to exceed any inter-construct correlation), and the highly precise Heterotrait-Monotrait (HTMT) ratio to prevent discriminant anomalies. Furthermore, internal consistency reliability is confirmed through Cronbach's alpha (α) and Composite Reliability (CR), applying a minimum confirmatory benchmark value of greater than or equal to 0.70 (Hair *et al.*, 2022).

Following outer model validation, the structural model (inner model) is evaluated to rigorously assess the hypothesized paths and the predictive capabilities of the integrated model. The explanatory power of the independent variables over the endogenous construct (continuance intention) is quantified through the coefficient of determination (R^2), which measures the total explained variance within the post-adoption behavior model. To isolate the relative importance of each specific predictor, the effect size (f^2) is calculated by comparing changes in the R^2 value when individual constructs are excluded from the model; these are interpreted using standard guidelines where 0.02, 0.15, and 0.35 represent small, medium, and large effects, respectively (Hair *et al.*, 2022). Hypotheses testing and the evaluation of the path coefficients are conducted using a non-parametric bootstrapping procedure with 5,000 to 10,000 resamples to generate stable standard errors, t-statistics, p-values, and 95% confidence intervals without relying on multivariate normality assumptions. Potential methodology limitations, such as localized geographic sampling and self-reporting bias, were actively mitigated by enforcing the multi-month usage selection filter and conducting thorough cross-loading analyses to maintain high data integrity.

Table 1. Variable Measurement

No.	Variable	Dimensions	Indicators	Scale
1	Performance Expectancy (PE) (X1)	Tusyanah & Khafid (2021)	1. PE1: I feel that E-Wallet (QRIS) is useful for my business. 2. PE2: I feel that using the system increases transaction speed between me and my customers.	Interval

				3. PE3: I feel that using E-Wallet (QRIS) increases my business productivity. 4. PE4: I feel that using E-Wallet (QRIS) improves my ability to complete important tasks.	
2	Effort Expectancy (EE) (X2)	Tusyanah & Khafid (2021)		1. EE1: The process of learning to use E-Wallet (QRIS) is easy. 2. EE2: I feel it is easy to become proficient in using E-Wallet (QRIS). 3. EE3: I feel that E-Wallet (QRIS) is easy to use. 4. EE4: I feel that the way to use E-Wallet (QRIS) is clear and understandable.	Interval
3	Social Influence (SI) (X3)	Alduais & Al-Smadi (2022)		1. SI1: My customers suggest that I accept E-Wallet (QRIS) because many of them use it. 2. SI2: Many businesses in my network/business community already use E-Wallet (QRIS), so I feel encouraged to do the same. 3. SI3: My fellow MSME actors expect me to use E-Wallet (QRIS).	Interval
4	Facilitating Conditions (FC) (X4)	Safitri & Sari (2024)		1. FC1: Internet connectivity at the business location is adequate for E-Wallet (QRIS) transactions. 2. FC2: Technical support/customer service is available from the E-Wallet (QRIS) provider. 3. FC3: E-Wallet (QRIS) is compatible with the business recording process and procedures.	Interval
5	Security Risk (Z)	Prawira et al. (2024)		1. User data security 2. Trust in the transaction security system 3. Risk of fraud and phishing 4. Level of satisfaction with the implemented security system 5. Security assurance	Interval
6	Continuance Intention / Continuance of Use (Y)	Shanmuggavel et al. (2024)		1. K1: I intend to continue using E-Wallet (QRIS) for my business in the future. 2. K2: I intend to encourage my customers to use E-Wallet (QRIS) more frequently for future transactions. 3. K3: I intend to use E-Wallet (QRIS) for my business activities. 4. K4: I expect to continue using E-Wallet (QRIS) for my business in the future.	

4 | RESULTS AND DISCUSSION

4.1 Results

4.1.1 Questionnaire Distribution Description

This study was conducted from April to May 2026 among MSME operators using E-Wallets (QRIS) in Bengkulu City, employing a quantitative approach through questionnaire distribution. The sample size for this study consisted of 134 MSMEs. This figure was obtained from all QRIS-using MSME operators encountered during the data collection period who were willing to become respondents and fulfilled all established criteria. Based on the distribution results, all questionnaires distributed to the 134 QRIS-using MSME operators were successfully collected, resulting in a 100% response rate. Furthermore, all returned questionnaires were completed in their entirety and met the research criteria, allowing them all to be processed for data analysis. Therefore, the final sample used in this study comprised 134 respondents consisting of QRIS-using MSME operators in Bengkulu City who met the research criteria.

4.1.2 Respondent Demographics

After obtaining a sample of 134 respondents who met the criteria, the next step was to obtain respondent demographics.

Table 2. Respondent Demographics

Characteristic	Category	Total	Percentage
Business Type	Culinary	78	58.21%
	Fashion	6	4.48%
	Digital	1	0.75%
	Service	29	21.64%
	Others	20	14.93%
Business Age	>1 year	101	75.37%
	5 – 10 years	29	21.64%
	10 – 15 years	2	1.49%
	16 – 20 years	2	1.49%
Duration of E-Wallet Usage	> 6 Months	10	7.46%
	6 – 12 Months	18	13.43%
	> 1 year	90	67.16%
	> 2 years	16	11.94%
Type of E-Wallet	OVO	59	44.03%
	ShopeePay	61	45.52%
	Dana	118	88.06%
	LinkAja	20	14.93%
	GoPay	8	5.97%

The majority of MSME operators in this study were culinary entrepreneurs (58.21%) with more than one year of business experience (75.37%), thus deemed capable of managing business and digital transactions. Consistent with this experience, most respondents had also used E-Wallets for more than one year (67.16%), with Dana as the most dominant platform (88.06%), followed by ShopeePay (45.52%) and OVO (44.03%). The high utilization of E-Wallets (QRIS) in the culinary sector is driven by the business characteristics that involve high daily transaction frequencies.

4.1.3 Research Data Description

This section presents the results of data analysis collected through questionnaires distributed to 134 MSME respondents in Bengkulu City.

Table 3. Descriptive Statistics

Variable	Theoretical Range	Actual Range	Standard Deviation
	Min	Max	Mean
Performance Expectancy (X1)	5	25	15
Effort Expectancy (X2)	5	25	15
Social Influence (X3)	5	25	15
Facilitating Conditions (X4)	5	25	15
Continuance Intention of E-Wallets (Y)	5	25	15
Security Risk (Z)	5	25	15

Descriptive analysis indicates that all research variables possess actual mean values far exceeding their theoretical mean (15), with homogeneous and consistent positive perceptions among respondents (small standard deviation). Respondents rated Performance Expectancy (M=21.82; SD=2.29) highly regarding transaction effectiveness, Effort Expectancy (M=21.37; SD=2.33) demonstrated ease of use, Social Influence (M=21.26; SD=2.13) indicated strong environmental influence, and Facilitating Conditions (M=21.34; SD=2.07) reflected adequate support facilities. Meanwhile, E-Wallet Continuance Intention (M=20.46; SD=3.35) showed high commitment to future usage despite slightly more dynamic answer variations. On the other hand, respondents maintained a uniform level of vigilance regarding Security Risk (M=21.08; SD=2.47).

4.1.4 Outer Model

The outer model analysis in this study was used to evaluate the quality of measurement instruments before testing the relationships between variables in the inner model. The convergent validity test aims to observe the extent to which indicators within a construct correlate highly and are capable of explaining the same construct.

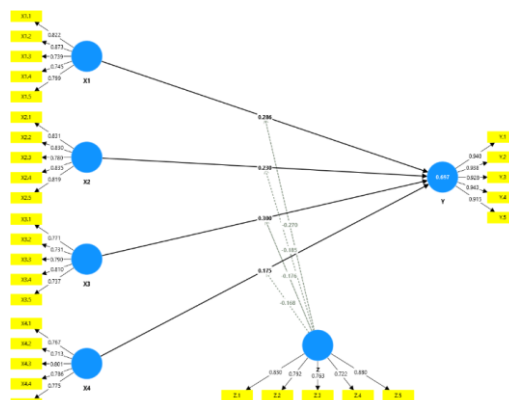


Figure 1. Outer Loading

PLS-SEM test results show that all indicators on all variables have loading factor values above the minimum threshold of 0.70, thus meeting convergent validity criteria and being suitable for further analysis without elimination. In detail, loading factor values for independent variables were Performance Expectancy (X1) ranging from 0.739 to 0.873, Effort Expectancy (X2) from 0.780 to 0.835, and Social Influence (X3) from 0.731 to 0.810. Furthermore, the Facilitating Conditions (X4) variable was in the range of 0.713 to 0.801, the Security Risk moderation variable (Z) ranged from 0.722 to 0.880, and the dependent variable E-Wallet Continuance Intention (Y) recorded the highest values, namely from 0.915 to 0.943, indicating very strong construct reflection across the measurement model. Discriminant validity is used to ensure that a construct possesses clear distinctions from other constructs in the research model.

Table 4. Discriminant Validity Test (Fornell-Larcker)

Variable	X1	X2	X3	X4	Y	Z
Performance Expectancy (X1)	0.797					
Effort Expectancy (X2)	0.220	0.819				
Social Influence (X3)	0.173	0.169	0.768			
Facilitating Conditions (X4)	0.206	0.111	0.147	0.769		
Continuance Intention of E-Wallets (Y)	0.430	0.369	0.439	0.304	0.933	
Security Risk (Z)	-0.038	0.007	0.039	-0.138	-0.187	0.799

The discriminant validity test results using the Fornell-Larcker approach indicate that the square root of the AVE value (on the main diagonal) for each construct is greater than the correlation values between other constructs, thus the model is declared valid and free from overlap. In detail, the main diagonal values were 0.797 for Performance Expectancy (X1), 0.819 for Effort Expectancy (X2), 0.768 for Social Influence (X3), 0.769 for Facilitating Conditions (X4), 0.933 for E-Wallet Continuance Intention (Y), and 0.799 for Security Risk (Z). This validity is strengthened by low to moderate inter-variable correlations, where X1 correlated weakly with other independent variables but had a positive correlation of 0.430 with Y, while variable Z even showed a negative correlation with X4 (0.138) and Y (0.187), confirming that all constructs are ready for subsequent structural analysis. The reliability test was conducted to assess the internal consistency of indicators in measuring research constructs.

Table 5. Reliability Test

Variable	Cronbach's Alpha	Composite Reliability
Performance Expectancy (X1)	0.857	0.888
Effort Expectancy (X2)	0.877	0.879
Social Influence (X3)	0.828	0.838
Facilitating Conditions (X4)	0.830	0.845
Continuance Intention of E-Wallets (Y)	0.963	0.963
Security Risk (Z)	0.864	0.971

The reliability test results show that all constructs possess excellent internal consistency, and the research instruments are declared highly reliable. This is evidenced by Cronbach's Alpha values, all of which exceeded standard thresholds, with Facilitating Conditions (X4) achieving the highest value of 0.963 and Effort Expectancy (X2) at 0.828, which remains in the highly reliable category. This reliability is reinforced by Composite Reliability values that are well above 0.80, confirming that all indicators convincingly contribute strongly and consistently to reflecting their latent

variables for the next stage of analysis.

4.1.5 Inner Model

The inner model analysis aims to test the relationships between latent variables in the structural model. At this stage, the researcher evaluates the predictive power and the magnitude of the influence exerted by the independent variables on the dependent variable, including the definitive role of the moderating variable in strengthening or weakening those behavioral paths. The R-Square value is used to show the contribution magnitude of independent variables in explaining variations in the dependent variable.

Table 6. R-Square

R-Square	Adjusted R-Square
0.697	0.675

An R-Square value of 0.697 indicates that the independent variables in the model are capable of explaining 69.7% of the variation in the E-Wallet Continuance Intention (Y) variable. After adjustment for the number of variables, the Adjusted R-Square value of 0.675 (67.5%) confirms that the model possesses strong and moderate predictive capability. This means Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, and Security Risk collectively provide a significant contribution to the dependent variable, while the remaining 32.5% of variation is influenced by factors outside the research model. The F-Square value is used to measure the influence magnitude of each independent variable on the dependent variable in the structural model.

Table 7. F-Square

Variable	Y. Continuance Intention
X1	0.234
X2	0.152
X3	0.267
X4	0.091
Z	0.022
X1 × Z	0.089
X2 × Z	0.079
X3 × Z	0.081
X4 × Z	0.159

Based on Table 7, the largest effect size on E-Wallet Continuance Intention (Y) directly originates from Social Influence (X3) ($f^2=0.267$), followed by Performance Expectancy (X1) ($f^2=0.234$) and Effort Expectancy (X2) ($f^2=0.152$), all of which fall into the medium effect category. Conversely, Facilitating Conditions (X4) ($f^2=0.091$) and the direct impact of Security Risk (Z) ($f^2=0.022$) only provided a small effect. Regarding moderation effects, the Facilitating Conditions × Security Risk interaction (X4 × Z) was the most dominant with a medium category ($f^2=0.159$), outperforming the other three moderation interactions (X1 × Z = 0.089; X2 × Z = 0.079; X3 × Z = 0.081), which only contributed small effects to the dependent variable changes. Hypothesis testing was conducted to determine whether the relationships between variables proposed in the study were statistically proven.

Table 8. Hypothesis Test

Variable	Original Sample	T-Statistic	P-Values
X1 → Y	0.286	4.896	0.000
X2 → Y	0.230	3.508	0.000
X3 → Y	0.300	5.571	0.000
X4 → Y	0.175	3.390	0.000
Z → Y	-0.086	1.059	0.145
Z × X1 → Y	-0.176	2.543	0.006
Z × X2 → Y	-0.185	2.109	0.017
Z × X3 → Y	-0.168	2.375	0.009
Z × X4 → Y	-0.270	3.248	0.001

The hypothesis test results show that Performance Expectancy (X1) ($\beta=0.286$, $t=4.896$), Effort Expectancy (X2) ($\beta=0.230$, $t=3.508$), Social Influence (X3) ($\beta=0.300$, $t=5.571$), and Facilitating Conditions (X4) ($\beta=0.175$, $t=3.390$) have a positive and significant effect on E-Wallet Continuance Intention (Y) (all $p<0.05$), with Social Influence as the strongest

predictor. Conversely, the direct impact of Security Risk (Z) on Y was not significant ($\beta=0.086$, $t=1.059$, $p=0.145$). Nevertheless, in the moderation test, all interaction effects of variable Z were proven significant and negatively directed, namely $Z \times X1$ ($\beta=0.176$, $p=0.006$), $Z \times X2$ ($\beta=0.185$, $p=0.017$), $Z \times X3$ ($\beta=0.168$, $p=0.009$), and $Z \times X4$ ($\beta=0.270$, $p=0.001$), confirming that a high perception of security risk significantly weakens the influence of all independent variables in driving E-Wallet continuance intention.

4.2 Discussion

The researcher will review the analysis results conducted to test the effects of Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions on E-Wallet (QRIS) continuance intention among MSME operators. Furthermore, this study also aims to explore the role of Security Risk as a moderating variable in strengthening or weakening the effects of Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions on E-Wallet (QRIS) continuance intention.

Performance Expectancy (PE) has been proven to have a positive effect on E-Wallet (QRIS) continuance intention among MSMEs because its functional benefits—enhancing operational efficiency, accelerating transactions, and simplifying financial recording—are considered to provide real economic value that is crucial for daily business activities. Theoretically, this finding aligns with the UTAUT framework, which positions PE as the strongest predictor of technology acceptance, as well as the Expectation Confirmation Model (ECM), which explains that strong post-adoption perceptions of usefulness reinforce satisfaction and the intention to continue using a system (continuance intention). The empirical validity of these research results is also heavily supported by various previous studies confirming that perceived usefulness remains the primary foundation for financial technology adoption, as demonstrated in the findings by Asri *et al.* (2025), Saputri *et al.* (2022), Sara *et al.* (2024), Venkatesh *et al.* (2012), and Amnas *et al.* (2023).

Effort Expectancy (EE) has a positive effect on E-Wallet (QRIS) continuance intention among MSMEs, indicating that a payment system that is practical, easy to understand, and possesses a simple interface is highly effective in minimizing operational and psychological barriers for business operators who frequently face time constraints and digital literacy limitations. From a theoretical perspective, this result closely complies with the UTAUT model (Venkatesh *et al.*, 2003), which positions ease of use as a primary determinant of behavioral intention to alleviate workloads, and is supported by the Expectation Confirmation Model (ECM) (Bhattacharjee, 2001), which explains that an easy transactional experience that meets baseline expectations will enhance consumer satisfaction. The significance of ease of use as a long-term strategic factor aligns with empirical confirmations from studies by Sara *et al.* (2024), Saputri *et al.* (2022), and Amnas *et al.* (2023), which place effort expectancy as an important predictor of financial technology continuance intention.

Social Influence (SI) has been proven to have a positive effect on E-Wallet (QRIS) continuance intention, signifying that encouragement, norms, and expectations from the surrounding environment—such as customers, fellow business operators, marketplaces, and the digital ecosystem—are capable of compelling MSMEs to retain the technology to remain relevant, competitive, and maintain a modern business image. Based on the UTAUT theory (Venkatesh *et al.*, 2003), technology usage behavior does not only stem from personal considerations but is also influenced by social pressures. From an ECM standpoint (Bhattacharjee, 2001), this social support reinforces baseline expectations that lead to satisfaction and continuance intention. The strength of social environmental influence in the digital payment ecosystem aligns with various previous empirical evidences reported by Asri *et al.* (2025), Saputri *et al.* (2022), and Hoque *et al.* (2024), which highlight the roles of image and compatibility, along with Sara *et al.* (2024).

Facilitating Conditions (FC) have a positive effect on E-Wallet (QRIS) continuance intention among MSMEs because the availability of stable internet infrastructure, technical support readiness, responsive customer service, and system compatibility serve as a fundamental foundation for daily operations to integrate smoothly. Theoretically, this result complies with the UTAUT model (Venkatesh *et al.*, 2003), which states that the readiness of technical and organizational infrastructure determines adoption success, and is reinforced by ECM (Bhattacharjee, 2001), which explains how facilitating conditions help realize positive experiences that trigger confirmation and satisfaction. The importance of this supporting ecosystem is consistently validated by numerous previous studies, such as research from Sara *et al.* (2024), Tavid and Kurniawati (2024), Clarissa and Keni (2022), Safitri and Sari (2024), Asri *et al.* (2025), Saputri *et al.* (2022), and Amnas *et al.* (2023).

Security Risk negatively moderates or weakens the effect of Performance Expectancy on E-Wallet (QRIS) continuance intention among MSMEs, which means that high concerns regarding data leaks, fraud, or cyber threats can shift the primary focus of business operators from pursuing functional benefits (efficiency) toward protective mechanisms against operational and financial losses. Within the UTAUT framework (Venkatesh *et al.*, 2003), risk acts as a contextual variable that degrades the driving power of perceived usefulness, whereas in ECM (Bhattacharjee, 2001; Venkatesh *et al.*, 2003), perceived security threats undermine the confirmation of user satisfaction, thereby reducing continuance intention. This pattern of motivational weakening aligns with the theoretical logic of Zulaikhah (2020), Putritama (2019), and Isa (2022), and is supported by the indirect path models of Ansori & Nugroho (2024) and Aprilia and Amalia (2022), reinforced by empirical evidence of real-world cyber threats from Hanif and Lallie (2021) and Singkeruang *et al.* (2025).

Security Risk negatively moderates or weakens the effect of Effort Expectancy on E-Wallet (QRIS) continuance

intention among MSMEs because high anxiety toward hacking and account misuse shifts the psychological priorities of business operators from the convenience of an easy-to-use system to the necessity of a secure-to-use system. This phenomenon aligns with the extension of the UTAUT model (Venkatesh *et al.*, 2003), where the strength of the ease of use construct can diminish due to threatening external contextual factors, and is supported by ECM (Bhattacharjee, 2001; Venkatesh *et al.*, 2003), which states that a sense of insecurity decreases satisfaction and erodes long-term usage decisions. The impact of this negative interaction is supported by the basic premises of Isa (2022) and Zulaikhah (2020) regarding the decline in adoption due to perceived risk, and is reinforced by empirical studies from Saputri *et al.* (2022), Hanif and Lallie (2021), Amnas *et al.* (2023), and Sara *et al.* (2024).

Security Risk negatively moderates or weakens the effect of Social Influence on E-Wallet (QRIS) continuance intention among MSMEs, meaning that social encouragement or pressure from customers, business peers, marketplaces, and the business environment becomes less effective when users are overshadowed by worries about data breaches, phishing, account abuse, or other digital transaction risks. Logically, this condition shifts the psychological priority of business operators from social compliance following environmental trends to protective self-defense mechanisms to avoid potential losses, an explanation supported by Ansori & Nugroho (2024) and Aprilia and Amalia (2022), and in line with the logic of Zulaikhah (2020) and Isa (2022) concerning the decline of continuance intention due to perceived risk. From a theoretical standpoint, this finding complies with the UTAUT framework (Venkatesh *et al.*, 2003), which states that the influence strength of social factors can weaken due to contextual conditions that are considered more urgent, and aligns with the Expectation Confirmation Model (ECM) because a sense of insecurity interferes with the positive confirmation process, thereby decreasing satisfaction and continuance intention (Bhattacharjee, 2001; Venkatesh *et al.*, 2003). The validity of this result is also reinforced by previous research showing that social influence in financial technology is situational and can be inhibited by risk perceptions and real threats such as quishing, as evidenced by Saputri *et al.* (2022), Hoque *et al.* (2024), Sara *et al.* (2024), Pangestu and Pasaribu (2022), Safitri and Sari (2024), and Singkeruang *et al.* (2025).

Security Risk acts as a moderating variable that weakens the effect of Facilitating Conditions on E-Wallet (QRIS) continuance intention among MSMEs, meaning that the availability of infrastructure, technical services, system compatibility, and operational assistance becomes less effective when business operators are overshadowed by anxiety that their business data and funds are exposed to detrimental threats (Venkatesh *et al.*, 2003; Thompson *et al.*, 1991). This security risk operates as a psychological filter that diverts the attention of business operators from utilizing facilities toward self-defense efforts, so that high threats reduce the practical value of available system support and weaken its relationship with continuance intention (Zulaikhah, 2020; Isa, 2022; Aprilia and Amalia, 2022). Theoretically, the UTAUT model explains that the relationship strength of facilitating conditions as a foundation for actual utilization can change according to context (Venkatesh *et al.*, 2003; Venkatesh *et al.*, 2012), while the ECM perspective asserts that a sense of security is an absolute prerequisite for supporting functions to create confirmation experiences and satisfaction that yield continuance intention (Bhattacharjee, 2001; Venkatesh *et al.*, 2003). This finding is supported by previous literature showing that perceived risk can decrease trust and the intention to continue usage (Zulaikhah, 2020; Isa, 2022; Ansori & Nugroho, 2024; Putritama, 2019; Aprilia and Amalia, 2022), while simultaneously aligning with Clarissa and Keni (2022), Pangestu and Pasaribu (2022), Safitri and Sari (2024), and Tavid and Kurniawati (2024), who prove that the influence of facilitating conditions is not always consistent and heavily depends on the situational perceptions of the user environment.

5 | CONCLUSIONS AND FUTURE WORK

This study conclusively demonstrates that the continuance intention toward digital wallets (QRIS) among micro, small, and medium enterprises (MSMEs) is strongly driven by the core constructs of the Unified Theory of Acceptance and Use of Technology (UTAUT), specifically performance expectancy, effort expectancy, social influence, and facilitating conditions. Crucially, the empirical results reveal that perceived security risk acts as a significant negative moderator, systematically dampening the positive effects of all four core determinants on long-term technology retention. Theoretically, these findings advance the information systems literature by successfully extending the predictive power of the UTAUT framework into a post-adoption context and identifying security risk as a vital environmental boundary condition within digital financial ecosystems. Practically, this evidence informs stakeholders that sustaining digital payment ecosystems requires a collaborative approach: platform providers must strengthen structural security protocols while maintaining user-friendly interfaces, merchants must proactively elevate their digital literacy, and regulatory bodies must introduce robust digital consumer protection policies. While these insights are bounded by inherent constraints, such as a localized geographic focus, a reliance on subjective self-reported survey data, and a quantitative boundary that limits deep experiential exploration, they underscore the complex trade-offs between operational utility and transactional vulnerability, framing these limitations as essential catalysts for subsequent academic inquiry.

To build upon these insights and address emerging questions surrounding digital commerce behavior, future research should pursue several concrete and feasible directions. First, expanding the geographic scope and

diversifying the target population to include individual consumers, public agencies, or larger corporate sectors would robustly test the external validity and generalizability of the current structural model. Methodologically, transitioning from a purely quantitative approach to a mixed-methods research design would allow subsequent inquiries to capture deep qualitative narratives, uncovering the nuanced psychological adjustments merchants undergo when maintaining digital tools. Furthermore, future studies should consider integrating alternative theoretical frameworks or incorporating additional latent variables, such as trust, habit, price value, user satisfaction, and digital literacy, to explain a broader variance in long-term post-adoption behavior. Finally, researchers are encouraged to refine the measurement of security risk by decomposing it into highly specific, multidimensional constructs, including transaction fraud, data privacy breaches, and emergent socio-technical threats like quick response code phishing (quishing), thereby leaving the academic and practical landscape with a highly granular blueprint for managing secure and sustainable digital transformations.

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