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An Integrated Innovation DiffusionTrust-Building Framework for Understanding Mobile Payment Adoption in Indonesia's Cross-Border Regions

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Abstract:

Mobile payment adoption in Indonesia has expanded rapidly; however, its diffusion in cross-border regions remains limited due to infrastructural inadequacies, heightened cross-border transaction risks, and low levels of trust in digital financial platforms. These regions—marked by high population mobility, informal economic activity, and uncertain regulatory oversight—create a unique context in which conventional technology adoption models may not fully capture user behaviour. This study introduces an integrated framework that combines Innovation Diffusion Theory and Trust-Building Theory to investigate how mobility, customization, security, and reputation shape trust and influence mobile payment adoption in Indonesia's international border areas. The framework further examines the role of trust in mitigating perceived risk and strengthening continuance usage intention, while also assessing gender as a moderating variable. Data were obtained from 225 mobile payment users residing in major border gateways between Indonesia and Malaysia, Timor-Leste, and Papua New Guinea. Using partial least squares structural equation modelling (PLS-SEM), the results indicate that security, customization, and reputation significantly enhance trust, whereas mobility does not exert a meaningful effect within the border context. Trust substantially increases continuance usage intention and reduces perceived risk; however, perceived risk does not significantly influence continuance intention. Gender is also found to have no moderating effect on any of the hypothesized relationships. This study contributes to the mobile payment literature by providing a contextualized understanding of user behaviour in high-risk, infrastructure-constrained environments. It also offers practical implications for policymakers and fintech providers aiming to expand digital financial inclusion and strengthen trust-based payment ecosystems in Indonesia's cross-border regions.

Keywords: Mobile Payment, Cross-Border Regions, Trust, Continuance Usage Intention, Perceived Risk, Innovation Diffusion Theory, Trust-Building Theory

INTRODUCTION

The transformation of Indonesia's digital financial ecosystem over the past decade has reshaped transaction patterns and economic behavior nationwide. Mobile payment (m-payment) services have become one of the fastest-growing financial innovations, driven by the widespread penetration of smartphones, improved mobile internet access, and the rapid expansion of fintech

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services (Dahlberg, Guo & Ondrus, 2015; Lu, Yang, Chau & Cao, 2011). At the national level, mobile payments play a central role in advancing government initiatives aimed at promoting a cashless society and expanding financial inclusion. However, despite the positive adoption trend observed in urban and semi-urban areas, the use of mobile payment services has not developed evenly across Indonesia. Certain regions, particularly border areas, exhibit adoption dynamics that are markedly different and significantly more complex than those found in urban settings.

Indonesia's border regions—such as Entikong, Aruk, Jagoi Babang (Indonesia–Malaysia border), Atambua (Indonesia–Timor-Leste border), and Skouw (Indonesia–Papua New Guinea border)—face socio-economic conditions and digital infrastructure limitations that differ substantially from those of the country's major economic centers. These areas are characterized by high population mobility, informal cross-border trade, limited access to traditional banking services, and greater exposure to security risks (ADB, 2020). Within such contexts, mobile payment services hold strategic potential to facilitate safer, more efficient, and more transparent transactions. However, the adoption and continuance usage of these services cannot be equated with conditions in urban environments, where infrastructure and regulatory systems are more stable and better developed.

Although mobile payment services offer substantial benefits—such as transactional convenience, processing speed, and low cost—users in border regions continue to face various barriers, particularly those related to perceived risk and trust in service providers. Risks such as network instability, cross-border fraud, low levels of digital literacy, and weak regulatory oversight influence users' trust in the security of the system and the integrity of transactions (Linck, Pousttchi & Wiedemann, 2006; Köster, Matt & Hess, 2016). Consequently, understanding the determinants of mobile payment adoption in border regions requires a more comprehensive and integrated analytical approach.

In the technology behavior literature, discussions on mobile payment adoption have evolved from an initial emphasis on adoption intention to a more comprehensive understanding of post-adoption behavior. Bhattacherjee (2001), through the Expectation Confirmation Theory (ECT), highlights that the continuance of technology usage is closely linked to user satisfaction and trust evaluations formed after actual usage experiences. In the context of mobile payments, the decision to continue using a service is influenced not only by perceived usefulness but also by confidence in data security, transaction transparency, and platform reliability. This underscores the need to examine trust not merely as a supporting variable but as a fundamental psychological construct shaping digital financial behavior.

Trust is also conceptualized as a risk reduction mechanism that helps minimize uncertainty and ambiguity in digital transactions (Pavlou & Gefen, 2004). In systems involving the exchange of sensitive information and financial value, users rely heavily on trust to assess whether service providers can effectively safeguard their interests. In border regions, the need for trust becomes even more critical due to heightened exposure to external risks that users cannot fully control. Accordingly, the formation of trust requires a multidimensional analysis that integrates technological, psychological, and environmental factors.

At the national level, the Indonesian government—through Bank Indonesia and the Financial Services Authority (OJK)—continues to promote economic digitalization through policies such as the implementation of QRIS, the expansion of the digital payment ecosystem, and regulatory support for fintech development. These initiatives have successfully increased mobile payment transaction volumes, showing consistent double-digit growth in recent years (Bank Indonesia, 2022). However, these achievements have yet to effectively reach the 3T regions (frontier, outermost, and underdeveloped areas), including border regions that structurally face telecommunication infrastructure limitations and limited access to formal digital services.

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Indonesia's border areas serve not only as physical gateways but also as distinct economic ecosystems characterized by informal trade, dependence on goods from neighboring countries, and a high circulation of cash. Mobile payment services have the potential to provide a solution for reducing the substitution of the Indonesian rupiah with neighboring currencies—a common phenomenon in regions such as Atambua and Skouw. Nevertheless, adoption remains low due to issues related to trust, unstable network connectivity, and limited fintech penetration. This situation highlights the gap between national-level digital policies and their practical implementation in border regions.

Beyond economic and infrastructural barriers, socio-cultural factors also shape mobile payment adoption in border areas. Low levels of financial and digital literacy lead many residents to feel more comfortable relying on cash-based transactions. Limited access to formal education and the strong influence of local cultural norms on financial behavior further slow the adoption of digital technologies compared with urban regions (van Deursen & Helsper, 2015). These combined factors underscore the need for research approaches that are more sensitive to local contexts when examining mobile payment adoption behavior in border regions.

International studies on mobile payments have expanded rapidly over the past two decades, with a predominant focus on factors such as perceived usefulness, ease of use, trust, and perceived risk (Cao et al., 2018; Shao et al., 2019). However, most of this research has been conducted in countries with well-developed digital infrastructures, such as China, South Korea, or Western European nations. Research conducted in developing countries typically centers on major urban areas or digitally literate young populations. Consequently, studies examining mobile payments in geographically vulnerable settings, such as border regions, remain scarce.

Furthermore, prior research has largely relied on conventional technology adoption models such as TAM, UTAUT, or ECT, which emphasize individual cognitive evaluations but often overlook structural dynamics, including environmental risks, infrastructural disparities, and socio-economic vulnerabilities. Indonesia's border regions differ markedly from the urban contexts that commonly serve as research sites for mobile payment studies. Therefore, research that integrates trust-building theory and innovation diffusion theory within high-risk environments such as border areas represents a significant contribution to the international literature.

Studies on the role of gender in mobile payment adoption also remain inconclusive. Some research indicates that gender moderates the relationship between trust and technology use (Chawla & Joshi, 2020), whereas other studies find no such effect (Oliveira et al., 2014). Given the distinct socio-cultural characteristics of border regions, gender-related dynamics may behave differently. This underscores the need for a renewed analysis of gender as a moderating variable within a more contextualized and realistic framework.

Recent studies consistently emphasize that trust is a critical determinant of mobile payment adoption and continuance usage. For example, Shao et al. (2019) found that trust mediates the relationship between technological factors and the intention to use mobile payments in China. Likewise, Liébana-Cabanillas et al. (2021) demonstrated that perceived security is the most significant determinant influencing trust in developing-country contexts. However, these studies focus on urban populations and therefore do not capture the structural challenges faced in Indonesia's border regions.

Another relevant line of research includes the study by Kalinić et al. (2020), which highlights the complexity of cross-border digital transactions—a factor highly pertinent to Indonesian border areas that interface directly with neighboring countries. Similarly, Köster et al. (2016) provide insights into how layered digital risks shape user trust in environments characterized by heightened uncertainty. Nevertheless, no existing research has examined these phenomena specifically within the context of developing-country border regions.

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Accordingly, this study makes a significant contribution to the international mobile payment literature by offering a new perspective on how trust and perceived risk operate in geographically vulnerable contexts. All variables in the proposed model—mobility, customization, security, reputation, trust, perceived risk, continuance usage intention, and gender—are analyzed within border environments that remain largely underexplored in academic research.

To establish a solid research framework, this introduction is structured systematically by first outlining the macro-level context of national digitalization before narrowing the discussion to the more specific micro-level context of border regions. This approach ensures that readers clearly understand the empirical urgency of the study and the rationale for selecting border areas as an appropriate context for re-examining major theoretical frameworks such as Innovation Diffusion Theory (IDT) and Trust-Building Theory.

The introduction then builds a scientific argument explaining why the integration of these two theories is necessary. IDT provides the foundation for understanding the characteristics of digital innovations, while Trust-Building Theory offers a psychological basis for explaining how trust is formed in high-risk environments. These theories do not operate independently; rather, they complement one another to provide a more comprehensive understanding of mobile payment adoption.

Ultimately, this introduction lays the theoretical and empirical groundwork for the research model developed in the subsequent sections. Through a combination of theoretical reasoning, the identification of research gaps, and strong contextual elaboration, this study is expected to deliver significant contributions to both academic knowledge and practical advancements in digital finance within Indonesia's border regions.

METHODS

This study employs a quantitative approach with an explanatory research design to examine causal relationships among the variables, as is common in digital financial technology research (Hair et al., 2021). This methodological choice is appropriate because variables such as mobility, customization, security, reputation, trust, perceived risk, and continuance usage intention are latent in nature and exert simultaneous influence on one another (Gefen, Rigdon, & Straub, 2011).

The analytical method used is Partial Least Squares–Structural Equation Modeling (PLS-SEM). PLS-SEM was selected because it is suitable for predictive models, medium sample sizes, non-normal data distributions, and structurally complex frameworks (Hair, Hult, Ringle, & Sarstedt, 2017). Prior studies in the mobile payment domain have also widely adopted PLS-SEM due to its flexibility and its capability to estimate models involving numerous constructs (Cao et al., 2018; Liébana-Cabanillas et al., 2021).

The population of this study consists of all mobile payment users residing in Indonesia's border regions. The selection of this population aligns with previous research that investigates mobile payment adoption within specific geographical contexts (Shao et al., 2019). This study employs a non-probability purposive sampling technique, a method in which respondents are selected based on predefined criteria relevant to the research objectives. Such a technique is commonly applied in technology adoption studies, as researchers require participants with direct and specific experience using the technology under investigation (Etikan, Musa, & Alkassim, 2016).

The inclusion criteria for this study are as follows: respondents must reside in a border area, have used mobile payment services within the past three months, and be at least 17 years of age. The sample size consists of approximately 220 respondents, in accordance with PLS recommendations requiring a minimum of ten times the number of indicators of the construct with the highest number of indicators (Hair et al., 2017). This sample size is also consistent with previous

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mobile payment studies that typically employ between 150 and 300 respondents (Zhou, 2013; Kalinić et al., 2020).

The research instrument consists of a questionnaire using a five-point Likert scale, adapted from validated international studies. The Likert scale is widely employed to measure psychological constructs in technology behavior research (Joshi et al., 2015). Data were collected through an online questionnaire (Google Forms). Distribution via social media and community networks is a common approach in financial technology research and enables the researcher to reach respondents in remote border areas (Wirtz & Göttel, 2016).

The data analysis technique in this study was conducted using SmartPLS 4 through two main stages. The first stage involved assessing the measurement model (outer model), which included evaluating convergent validity using the criteria of factor loadings ≥ 0.70 (Hulland, 1999) and an Average Variance Extracted (AVE) value ≥ 0.50 as recommended by Fornell and Larcker (1981). In addition, construct reliability was examined using Composite Reliability (CR) with a minimum threshold of 0.70 (Nunnally & Bernstein, 1994). Discriminant validity was then assessed using the Fornell–Larcker criterion and the Heterotrait–Monotrait Ratio (HTMT), which should remain below 0.85 (Henseler et al., 2015).

The second stage involved evaluating the structural model (inner model), which included examining collinearity with the requirement that the Variance Inflation Factor (VIF) value be less than 5 (Hair et al., 2017), as well as performing a bootstrapping procedure with 5,000 subsamples as recommended by Ringle et al. (2015). The model was further assessed using the R^2 value to measure its predictive power (Chin, 1998), the Q^2 value to evaluate predictive relevance (Stone, 1974; Geisser, 1974), and effect size (f^2) based on Cohen's (1988) guidelines. Gender moderation testing was conducted using the product indicator approach, which is a standard method for moderation analysis in Partial Least Squares (PLS), as described by Chin, Marcolin, and Newsted (2003).

RESULT AND DISCUSSION

RESULT

Validity and Reliability Analysis

Validity testing was conducted through convergent validity and discriminant validity, following the recommendations of Henseler et al. (2016b). All constructs demonstrated satisfactory convergent validity, as indicated by Average Variance Extracted (AVE) values exceeding the minimum threshold of 0.50 commonly adopted in PLS-SEM research. The AVE values for all constructs are reported in the validity assessment table in the primary research document. In addition, the constructs exhibited strong reliability, as reflected by composite reliability (CR) coefficients above 0.70.

Table 1. Validity and Reliability Analysis Result

Construct	Item	Outer loading	AVE	Cronbach's Alpha	CR
Mobility	MOB1	0.739	0.643	0.722	0.843
	MOB2	0.813			
	MOB3	0.849			
Customization	CUS1	0.665	0.592	0.654	0.812
	CUS2	0.799			
	CUS3	0.834			
Security	SEC1	0.882	0.795	0.871	0.921
	SEC2	0.919			
	SEC3	0.872			

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Reputation	REP1	0.844	0.683	0.769	0.866
	REP2	0.879			
	REP3	0.751			
Trust	TR1	0.850	0.766	0.847	0.908
	TR2	0.894			
	TR3	0.882			
Perceived Risk	PR1	0.520	0.544	0.617	0.774
	PR2	0.873			
	PR3	0.774			
Continuance Intention	CI1	0.819	0.705	0.790	0.877
	CI2	0.787			
	CI3	0.908			

Source: Primary Data, 2025

Discriminant validity was further assessed using the Fornell–Larcker criterion. Each construct showed a square root of its AVE that exceeded its correlations with other constructs, as presented in the Fornell–Larcker table (Table 2). This confirms that all constructs within the model are distinct and capture conceptually different dimensions.

Table 2. Fornell–Larcker Criteria

	Continuance Intention	Security	Trust	Customization	Mobility	Perceived Risk	Reputation
Continuance Intention	0.839						
Security	0.295	0.892					
Trust	0.489	0.658	0.875				
Customization	0.475	0.548	0.585	0.769			
Mobility	0.529	0.307	0.460	0.566	0.802		
Perceived Risk	-0.065	-0.182	-0.208	-0.127	0.014	0.738	
Reputation	0.521	0.622	0.709	0.555	0.470	-0.177	0.827

Source: Primary Data, 2025

Hypothesis Testing

The goodness of fit of the model was evaluated using the standardized root mean square residual (SRMR). As recommended by Henseler et al. (2016a), SRMR is the primary and most appropriate indicator of model fit in the context of PLS-SEM. The results indicate that the model demonstrates an acceptable level of fit, evidenced by an SRMR value of 0.085, which is below the recommended threshold of 0.10 proposed by Hu and Bentler (1998).

This study tested two categories of hypotheses: direct effect hypotheses, comprising H1, H2, H3, H4, H6, H7, and H8, and moderating effect hypotheses, which include H5, H5a, H5b, H5c, and H5d.

Direct Effects

The results of the direct effect hypothesis testing are presented in Table 4. The significance levels of the path coefficients were assessed using the bootstrapping procedure with 5,000 resamples, as recommended by Garson (2016). The findings indicate that the path coefficient for mobility was 0.101 with a p-value of 0.082, demonstrating that the effect of mobility on trust is not statistically significant.

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In contrast, the positive effect of customization on trust was significant, with a path coefficient of 0.143 and a p-value of 0.013 (≤ 0.05). Similarly, the positive effects of security (path coefficient = 0.305) and reputation (path coefficient = 0.392) on trust were both statistically significant, supported by p-values of 0.000.

Trust was also found to have a significant negative effect on perceived risk, with a path coefficient of −0.208 and a p-value of 0.011. Furthermore, the positive influence of trust on continuance intention was confirmed, yielding a path coefficient of 0.497 and a p-value of 0.000.

Although perceived risk showed a positive coefficient toward continuance intention (0.038), this effect was not statistically significant, as indicated by a p-value of 0.564.

Table 3. Summary of Hypothesis Testing

Hypothesis	Direction	Path Coefficient	t-statistics	p-value
H1: Mobility → Trust	Positive (+)	0.101	1.742	0.082
H2: Customization → Trust	Positive (+)	0.143	2.478	0.013
H3: Security → Trust	Positive (+)	0.305	5.418	0.000
H4: Reputation → Trust	Positive (+)	0.392	6.875	0.000
H6: Trust → Perceived Risk	Negative (-)	-0.208	2.540	0.011
H7: Trust → Continuance Intention	Positive (+)	0.497	9.539	0.000
H8: Perceived Risk → Continuance Intention	Positive (+)	0.038	0.577	0.564

Source: Primary Data, 2025

Moderating Effect of Gender

The study first employed the Measurement Invariance of Composite Models (MICOM) procedure to examine the moderating effect of gender, as presented in Table 4. Step 1, which establishes configural invariance, was fulfilled by confirming that both subgroups were measured using identical constructs and indicators. Step 2 tested compositional invariance; however, the results indicated that continuance intention did not satisfy this requirement because its correlation value was lower than the five percent quantile (Henseler et al., 2016b). Accordingly, in Step 3b, the analysis concluded that only partial measurement invariance was achieved.

This conclusion was further supported by the permutation coefficients and the multigroup analysis (MGA) outer loadings, both of which confirmed the presence of invariance issues. These results indicate that the two groups differ in their composite scores; therefore, MGA was subsequently conducted to assess differences in the structural path coefficients across gender groups, as summarized in Table 5.

The analysis compared the path coefficients of mobility, customization, security, and reputation on trust between the two subgroups. The p-values from the MGA test were then used to determine whether these coefficient differences were statistically significant. As shown in Table 5, all p-values were greater than 0.05, indicating that none of the relationships differed significantly across gender groups. Thus, the study concludes that gender does not moderate the relationships between trust and its antecedent variables.

Table 4. MICOM Measurement Invariance Test

Step 2			
Construct	**Original Correlation**	**5% Quantile**	**Compositional Invariance?**
Continuance intention	0.960	0.979	No
Security	0.970	0.998	Yes
Trust	0.998	0.998	Yes

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Customization	0.999	0.973	Yes
Mobility	0.986	0.949	Yes
Perceived Risk	0.945	0.260	Yes
Reputation	0.998	0.990	Yes

Step 3a

Construct	Mean-Original Difference	Confidence Interval 95%	Equal Mean Value?
Continuance intention	-0.406	[-0.274; 0.285]	No
Security	-0.177	[-0.296; 0.275]	Yes
Trust	-0.243	[-0.281; 0.268]	Yes
Customization	-0.310	[-0.316; 0.283]	Yes
Mobility	-0.360	[-0.293; 0.260]	No
Perceived Risk	0.018	[-0.273; 0.280]	Yes
Reputation	-0.252	[-0.312; 0.282]	Yes

Step 3b

Construct	Variance-Original Difference	Confidence Interval 95%	Equal Variance?
Continuance intention	0.134	[-0.338; 0.290]	Yes
Security	0.172	[-0.430; 0.375]	Yes
Trust	0.117	[-0.399; 0.463]	Yes
Customization	0.289	[-0.465; 0.495]	Yes
Mobility	0.319	[-0.500; 0.450]	Yes
Perceived Risk	-0.320	[-0.554; 0.457]	Yes
Reputation	0.504	[-0.635; 0.760]	Yes

Source: Primary Data, 2025

Table 5. The Results of Multigroup Analysis

Hypothesis	Men Coefficient	Men p-value	Women Coefficient	Women p-value	p-value MGA	Conclusion
H5a: Mobility → Trust	0.024	0.846	0.129	0.045	0.450	Rejected
H5b: Customization → Trust	0.156	0.257	0.144	0.018	0.919	Rejected
H5c: Security → Trust	0.325	0.004	0.291	0.000	0.769	Rejected
H5d: Reputation → Trust	0.425	0.000	0.393	0.000	0.827	Rejected

Source: Primary Data, 2025

The Comparison of the Studies

Table 6 presents a comparison between the findings of Shao et al. (2019) and those of the present study, highlighting the key determinants of trust. While the original study conducted in China identified security as the strongest predictor of customer trust, the current study finds that reputation emerges as the most influential factor in shaping trust among mobile payment users in Indonesia's border regions. Additionally, Shao et al. (2019) reported that gender moderated the relationships between trust and its antecedents. In contrast, the present study finds no evidence of a moderating effect of gender on any of these relationships.

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Table 6. Comparison Between Previous and Current Studies

Findings of the original study	Findings of the current study
Mobility has a positive effect on trust in the platform.	The effect of mobility on trust is not significant.
Customization has a positive effect on trust in the platform.	Customization has a positive effect on trust.
Security has a positive effect on trust in the platform.	Security has a positive effect on trust.
Reputation has a positive and significant effect on trust in the platform.	Reputation has a positive effect on trust.
Trust in the platform has a negative effect on perceived risk.	Trust has a negative effect on perceived risk.
Trust in the platform has a positive effect on continuance intention.	Trust has a positive effect on continuance intention.
Perceived risk has a negative effect on continuance intention.	The effect of perceived risk on continuance intention is not significant.
The multigroup analysis showed a significant result. Thus, the moderating effect of gender is present.	The multigroup analysis showed an insignificant effect. Thus, the moderating effect of gender is not present.
The effect of mobility on trust is higher for men than women.	The effect of mobility is significant for women and not significant for men.

Source: Primary Data, 2025

DISCUSSION

This study examined the critical role of trust in influencing continuance usage intention and perceived risk. It also assessed the relationships between trust and its antecedents, as well as the moderating effect of gender. The findings provide actionable insights for mobile payment (m-payment) providers seeking to strategically expand their market reach and strengthen user retention in Indonesia.

The growth of m-payment services in Indonesia has been remarkably rapid, accompanied by increasingly intense competition among service providers. To attract new users and maintain existing ones, providers commonly emphasize factors such as mobility, security assurances, and user referrals. However, the development of trust remains fundamental to fostering continuance usage intention. The present study confirms that trust is a significant determinant of users' intention to continue using m-payment services. This finding aligns with prior research by Köster et al. (2016), Liébana-Cabanillas et al. (2014), Lu et al. (2017), Shao et al. (2019), and Zhou (2013).

The respondents in this study represent experienced users of the Indonesian m-payment market who have utilized mobile payment applications for one to three years. Their extended usage experience has enabled them to form stable trust perceptions, which in turn foster a strong intention to continue using m-payment services.

Furthermore, this study found that trust plays an important role in reducing perceived risk. This result is consistent with prior research by Lu et al. (2011), Shao et al. (2019), and Susilo et al. (2022), which similarly demonstrate that users who trust an m-payment application perceive fewer potential negative consequences associated with its transactions. Given the inherently high-risk nature of digital financial activities, trust serves as a psychological "safety net" that helps users mitigate concerns related to security and uncertainty.

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Unexpectedly, the findings show that perceived risk does not significantly influence continuance intention. One possible explanation is that respondents may continue using m-payment services because they are drawn to incentives such as cashback rewards or promotional campaigns, leading them to pay less attention to the associated risks. Additionally, the sample—largely composed of younger users—may also contribute to this outcome, as younger generations tend to be more technologically adept and more accustomed to integrating digital financial tools into their daily routines (Leon, 2018).

M-payment users typically select applications that create a positive impression and provide reliable services. Consistent with the findings of Lu et al. (2017), Oliveira et al. (2014), and Shao et al. (2019), this study identifies reputation as the most significant predictor of trust. This result suggests that m-payment applications with a strong and credible reputation are more likely to gain users' trust.

In the context of mobile payments, users often find it difficult to evaluate trust directly; therefore, they rely heavily on reputational cues and the experiences of other users as proxies for trustworthiness. Prior experiences communicated through word of mouth, user communities, or online reviews play a substantial role in shaping perceptions of reliability. Moreover, users' attitudes toward adopting and continuing to use m-payment services tend to be influenced by social factors, as highlighted by Ming and Jais (2022). Accordingly, maintaining a strong reputation and expanding the user base are essential strategies for enhancing trust and strengthening users' long-term engagement with m-payment platforms.

Another factor that exerts a relatively strong influence on trust is security. This positive effect is consistent with the findings of Shao et al. (2019), Xin et al. (2015), and Zhou (2011). It also aligns with Budiarani et al. (2022), who emphasized that security is essential for further expanding m-payment adoption. The uncertainty and network vulnerability inherent in m-payment transactions heighten the importance of security, as users may be concerned about potential transaction errors, data breaches, or fraud. Consequently, users need assurances that the application is reliable and that their data are securely encrypted.

This study also found that customization positively affects trust, reaffirming previous findings by Huang et al. (2014), Kim et al. (2009), and Shao et al. (2019). Customization features, which give users greater control over their transactions, can enhance trust by improving perceived autonomy and convenience. Therefore, promoting flexibility in managing payments or in-app processes may help foster trust and encourage both user acquisition and retention. However, customization should be implemented carefully, based on a thorough understanding of users' needs and preferences.

Unlike customization, the flexibility associated with mobility did not significantly influence trust. This finding contradicts previous studies by Kim et al. (2009), Shao et al. (2019), Zhou (2011), Ming and Jais (2022), and Budiarani et al. (2022). One possible explanation is the difference in m-payment usage patterns between the earlier study conducted in China and the present study in Indonesia. In the Indonesian context, m-payment usage is still largely limited to activities such as ride-hailing and e-commerce, whereas consumers in China use m-payment for a wider variety of transactions. Mobility is essentially a basic requirement for m-payment services, and the young users in this study may already be highly familiar with the mobility offered by m-payment applications (Leon, 2018). As a result, mobility may no longer serve as a differentiating factor that enhances trust. Instead, this finding indicates that mobility is considered a standard feature and a minimum requirement that m-payment providers are expected to deliver.

In this study, which focused on the Indonesian market, gender did not moderate the relationship between trust and its antecedents. Although this result differs from the findings of Kalinić et al. (2020), Shao et al. (2019), and Ming and Jais (2022), it is consistent with the results reported by Xin et al. (2015) and Oliveira et al. (2014). The earlier study conducted in China showed

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that men and women respond differently to specific m-payment attributes. Shao et al. (2019) revealed that women are more prone than men to experiencing online transaction fraud. However, this study did not observe the same pattern in the Indonesian context.

One possible explanation is that both subgroups in this study consisted of experienced users, which may reduce the effect of gender, as the influence of gender tends to diminish when users gain more experience (Chawla & Joshi, 2020). Additionally, the gender gap in Indonesia differs from that in China, and the uneven number of respondents in this study may also have contributed to the result. The unequal sample composition may have occurred because women tend to engage in online transactions more frequently than men (Cao et al., 2018; Hootsuite & We Are Social, 2020).

It should also be noted that significant sample imbalances were found in previous studies, but these did not affect the significance of the moderating effect (Kalinić et al., 2020; Zhou et al., 2018; Köster et al., 2016; Chong et al., 2012). Furthermore, younger generations—who made up most of the sample—often share similar characteristics (Leon, 2018). Therefore, the moderating effect of gender becomes insignificant.

CONCLUSION

This study concludes that mobile payment adoption in Indonesia's border regions is primarily determined by the trust-building factors of security, reputation, and customization. Security and reputation emerge as the strongest determinants that foster trust, while mobility shows no significant effect due to the limited digital infrastructure in border areas. Trust is proven to be a central factor that reduces perceived risk and increases continuance usage intention, indicating that trust serves as the foundation of sustained usage behavior in high-risk environments. Conversely, perceived risk does not significantly influence continuance usage intention, suggesting that users in border regions prioritize the functionality and convenience of the service over the digital risks they perceive. Furthermore, gender does not moderate the relationships among the variables, indicating that mobile payment adoption behavior is relatively uniform between men and women within the border context.

Theoretically, this study expands the understanding of mobile payment adoption by integrating the Innovation Diffusion Theory and Trust-Building Theory within the context of border regions characterized by high risk and limited infrastructure. This integration enriches the literature by demonstrating that trust functions as a primary cognitive mechanism capable of bridging the constraints of digital innovation and strengthening technology acceptance in structurally disadvantaged environments. The study also affirms that certain technological determinants, such as mobility, are not always relevant in specific geographical contexts, thereby reinforcing the argument that innovation adoption theories must account for environmental and social factors.

Practically, this study provides strategic implications for fintech providers, financial regulators, and border-area governments. Mobile payment providers should prioritize enhancing security, transparency, and institutional reputation to build sustainable trust. Customization features tailored to local needs also play an important role in improving user convenience and engagement. Regulators such as Bank Indonesia, the Financial Services Authority (OJK), and the National Border Management Agency (BNPP) may use these findings as a basis for strengthening consumer protection policies, digital security oversight, and cross-border regulatory alignment. Local governments in border regions can utilize these insights to improve digital literacy and expand access to secure digital financial services.

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