

Fintech Adoption Dynamics in a Free Trade Zone: Assessing TAM and Financial Prudence toward Impulsive Buying Behavior

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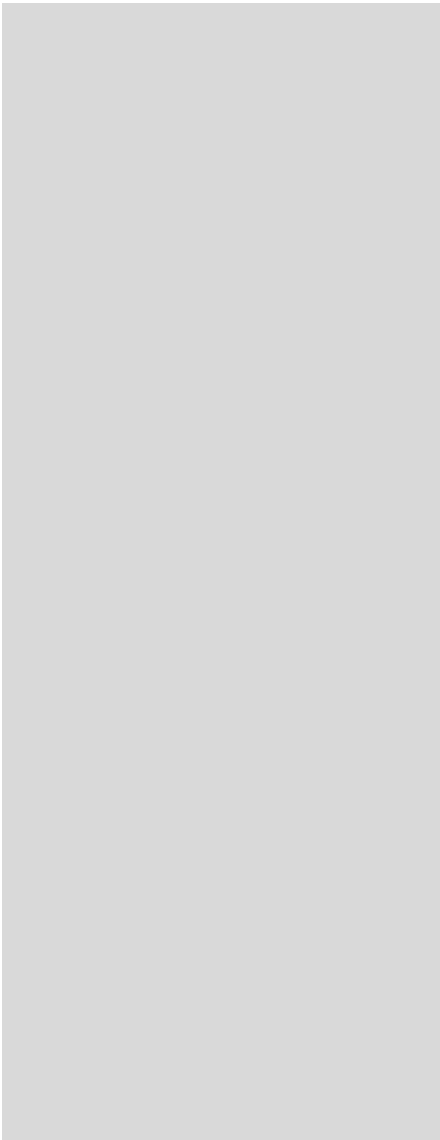
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ABSTRACT

The massive shift toward ShopeePay among Gen Z students in Batam has done more than just digitize transactions; it has created a complex environment where digital ease often clashes with impulsive spending. While fintech adoption is skyrocketing, we still lack a clear understanding of how technological acceptance (TAM) and financial literacy actually interact to drive these sudden purchases. This research investigates the relationship, testing how Perceived Ease of Use (PEOU), Perceived Usefulness (PU), and Financial Literacy (FL) influence impulsive buying, while positioning fintech usage as a potential bridge. We collected data from 350 active student users in Batam and analyzed it through a PLS-SEM framework via SmartPLS 4.0. The findings reveal several unexpected results that differ from previous behavioral assumptions. While PEOU and PU significantly drive fintech adoption, financial literacy shows no significant relationship with app usage intensity. The results suggest that higher financial literacy may also increase impulsive buying behavior, where higher financial literacy is significantly and positively associated with increased impulsive buying. This finding points toward a potent overconfidence bias, where theoretical knowledge reduces perceived risk and lowers cognitive barriers to spending. Furthermore, neither the technology itself nor the frequency of usage directly triggers impulsive urges, causing fintech usage to fail as a mediator. These results indicate that the negative behavioral impact of fintech in Batam is not driven by the platform's technical attributes, but by the psychological overconfidence of its users. This research suggests that financial education must pivot from purely theoretical knowledge to



addressing digital behavioral psychology and emotional self-regulation.

INTRODUCTION

The rapid evolution of financial technology (fintech) has fundamentally reshaped global financial systems and consumer transaction patterns. Digital payment systems, in particular, have introduced unprecedented speed, efficiency, and convenience to daily commerce. However, recent scholarship suggests that fintech adoption does more than just streamline transactions; it actively alters consumer psychology, potentially escalating impulsive buying tendencies among younger demographics (Aryadipura & Margaliu, 2025; Gaur, 2025; Matar & Aloqaily, 2025). This behavioral shift is closely related to hedonic consumption in digital environments, where the friction between desire and acquisition is nearly eliminated (Nyrhinen et al., 2024).

In the Indonesian context, digital payment adoption has reached a critical mass, bolstered by national strategic initiatives such as the Blueprint *Sistem Pembayaran Indonesia 2025* (Bank Indonesia, 2019). Reports indicate that digital transactions reached a staggering Rp5,103 trillion in 2024, with Generation Z and millennials emerging as the primary drivers of this growth (Bank Indonesia, 2025; Safitri, 2025). This phenomenon can be clearly observed in economic hubs such as Batam. As a Free Trade Zone (FTZ) characterized by intense cross-border digital activity and a rapidly modernizing urban lifestyle, Batam provides a unique socioeconomic landscape for examining Gen Z's financial behavior (Yuwono et al., 2023).

Unlike metropolitan centers such as Jakarta or Surabaya, which dominate existing Indonesian fintech research, Batam's status as a Free Trade Zone is characterized by intensified cross-border economic activity and deep structural ties to Singapore, which has consistently supplied the majority of Batam's foreign direct investment in recent years (Betric Hasibuan et al., 2025; Ha, 2026). This cross-border integration coincides with a broader regional pattern: Southeast Asia's cross-border e-commerce market was valued at approximately USD 45.39 billion in 2025 (Mordor Intelligence, 2026), and younger consumers in the region—including Gen Z and millennial shoppers in markets close to Singapore—have been shown to be disproportionately responsive to cross-border promotional and influencer-driven marketing compared to Western markets (HSG Capital, 2025). At the local level, digital payment adoption in the Riau Islands has grown substantially, with residents recording nearly 100 million QRIS transactions worth approximately Rp11.5 trillion in 2025 (Heryanto, 2026). Building on these documented structural conditions, this study argues that Batam's combination of high cross-border commercial exposure and rapidly growing digital payment adoption plausibly creates a distinct behavioral environment for Gen Z consumers, one in which the psychological mechanisms linking fintech usage to impulsive buying may operate more intensely than in non-FTZ metropolitan settings. This proposition has not been directly tested in prior literature and is treated here as a contextual rationale rather than an established finding; it positions Batam as a theoretically and empirically distinct setting for examining whether patterns observed in previous Indonesian fintech studies hold under conditions of heightened cross-border economic exposure.

Notably, (Aryadipura & Margaliu, 2025) argue that e-wallet ecosystems in Indonesia have become primary catalysts for impulsive buying, making Batam an essential case study for investigating this technological impact.

To analyze this digital shift, the Technology Acceptance Model (TAM) provides a robust framework by focusing on perceived ease of use (PEOU) and perceived usefulness (PU) (Underdown & Tamara, 2025; Wei et al., 2025). TAM has been widely applied in digital contexts such as mobile banking and e-commerce, consistently showing that both PEOU and PU positively affect adoption (Budiyanto et al., 2025; Sama et al., 2023; Wijaya et al., 2025). PEOU refers to the degree to which an individual believes that using Shopee-Pay is free of effort, including navigation speed and interface clarity (Wijaya et al., 2025; Zhao et al., 2024). Based on this theoretical foundation, this study proposes that the simplicity of the interface

directly drives usage (H1: PEOU has a positive and significant effect on Fintech Usage). Meanwhile, PU reflects the belief that fintech enhances transaction efficiency and provides tangible benefits such as cashback (Purwianti et al., 2024; Saputri et al., 2025; Wei et al., 2025). It is anticipated that when users perceive these measurable advantages, their usage intensity increases (H2: PU has a positive and significant effect on Fintech Usage) (Matar & Aloqaily, 2025; Wijaya et al., 2025).

Beyond technological perceptions, the role of financial literacy remains a subject of intense academic debate. Financial literacy including understanding financial products and assessing risks is traditionally expected to promote rational decision-making (Anggraeni et al., 2024; Oktaviani et al., 2023; Widiastuti & Sumastuti, 2025; Yuwono et al., 2023). However, its role in fintech adoption is complex, as behavioral factors often outweigh financial knowledge (Cuandra et al., 2024; Kodongo, 2024). There is a significant gap between financial inclusion and literacy in Indonesia (Otoritas Jasa Keuangan & Badan Pusat Statistik, 2024.), suggesting that literacy may no longer act as a primary shield (Laili et al., 2025). Therefore, this study explores how financial literacy influences fintech engagement (H3: Financial Literacy has a significant effect on Fintech Usage).

The most critical concern is how this usage subsequently triggers impulsive buying unplanned purchasing driven by emotional urges and immediate gratification (Hellyani et al., 2024; Nyrhinen et al., 2024). Fintech usage intensity functions as a behavioral mechanism where the "cashless effect" reduces payment friction and spending awareness (Kurucz et al., 2025; Kuswanto et al., 2024; Tariq et al., 2024). As fintech becomes an integrated consumption experience, it actively shapes purchasing behavior (Sharma et al., 2024), leading to H4 (Fintech Usage has a positive and significant effect on Impulsive Buying) (Muhammad, Miftah et al., 2024; Tariq et al., 2024; Widiastuti & Sumastuti, 2025). Furthermore, PEOU and PU may directly bypass cognitive barriers; the frictionless nature of e-wallets increases susceptibility to triggers (Hellyani et al., 2024; Vinkóczy et al., 2026), while perceived benefits like discounts rationalize unplanned spending as "advantageous" (Bakar et al., 2025; Underdown & Tamara, 2025). This establishes the direct paths for H5 (PEOU to IB) and H6 (PU to IB). Interestingly, while literacy should curtail such spending (Anggraeni et al., 2024; Karina, Putri et al., 2024), this research investigates a potential "overconfidence bias" where literacy paradoxically triggers impulsive spending in digital environments (Afrita & Ita, 2025; Tahir, 2025). Thus, we seek to test this context-dependent relationship (H7: Financial Literacy has a significant effect on Impulsive Buying).

Finally, this study positions fintech usage as a vital mediator. Higher PEOU, PU, and literacy are projected to increase usage frequency, which raises exposure to promotional stimuli and hedonic triggers (Bakar et al., 2025; Lady et al., 2025; Matar & Aloqaily, 2025). By analyzing these indirect effects, this study aims to evaluate whether usage intensity is the mechanism converting perceptions into impulsive actions (H8, H9, and H10: Fintech Usage significantly mediates the effects of PEOU, PU, and Financial Literacy on Impulsive Buying) (Muhammad, Miftah et al., 2024; Widiastuti & Sumastuti, 2025). Despite the proliferation of

fintech literature, a significant gap persists as studies often overlook behavioral consequences (Cuandra et al., 2024; Multi et al., 2024). By employing a rigorous PLS-SEM approach (J. Hair & Alamer, 2022); Mardianto et al., 2024; Sudaryono et al., 2024), this study intends to fill this gap by providing empirical evidence from a unique Free Trade Zone context.

Despite this growing body of literature, existing studies have largely examined TAM constructs and financial literacy as isolated predictors either of fintech adoption or of impulsive buying—rather than as an integrated system. Studies applying TAM typically stop at the adoption stage without tracing its downstream behavioral consequences (Budiyanto et al., 2025; Wijaya et al., 2025), while studies on financial literacy and consumption tend to treat literacy as a direct, standalone predictor of spending behavior without accounting for the technological pathway through which that spending occurs (Anggraeni et al., 2024; Widiastuti & Sumastuti, 2025). Consequently, few studies have simultaneously modeled fintech usage as a mediating mechanism linking cognitive technology perceptions (PEOU, PU) and financial literacy to impulsive buying within a single integrative framework. This gap is particularly consequential given that H8–H10 in the present study hinge precisely on this mediating role: without empirically testing usage intensity as the mechanism converting perception and knowledge into behavior, the causal chain between fintech design, financial literacy, and impulsive consumption remains only partially understood. Moreover, this integrative approach—combining TAM constructs, financial literacy, and the overconfidence paradox within a single mediated model—remains particularly underexplored in emerging-market and free-trade-zone contexts, where cross-border digital exposure may intensify these relationships beyond what has been observed in conventional metropolitan settings. Despite the proliferation of fintech literature, a significant gap persists as studies often overlook these behavioral consequences (Cuandra et al., 2024; Multi et al., 2024). By employing a rigorous PLS-SEM approach (J. Hair & Alamer, 2022; Sudaryono et al., 2024), this study intends to fill this gap by providing empirical evidence from a unique Free Trade Zone context.

METHODOLOGY

Type of Research

This study adopts a quantitative, hypothesis-testing (explanatory) research design to examine the causal relationships between Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Financial Literacy (FL), Fintech Usage, and Impulsive Buying behavior. Rooted in the positivist paradigm, this research emphasizes objective measurement and rigorous hypothesis testing through systematic statistical analysis.

Data were analyzed using Structural Equation Modeling (SEM) with a Partial Least Squares (PLS-SEM) approach via SmartPLS 4.0 software. This method was selected for its robustness in modeling complex structural relationships, its ability to handle non-normal data distributions, and its superior performance in predictive-oriented frameworks (J. F. Hair et al., 2021). Furthermore, the application of PLS-SEM in this study adheres to the rigorous analytical

and reporting standards commonly practiced in contemporary Indonesian business and accounting research (Mardianto et al., 2024).

Location and Time of Research

The research was conducted in Batam, focusing on university students who actively use ShopeePay as their primary digital payment method. Batam was selected due to its strategic economic position as a free trade zone and its high level of fintech adoption among Generation Z consumers. The unique digital lifestyle in this region provides a representative context for examining the "cashless effect" on impulsive consumption.

Furthermore, the regional digital landscape in Batam significantly influences how the local population manages personal finances and responds to the rapid development of financial technology (Yuwono et al., 2023). Data collection was carried out over a five months period, from December 2025 to April 2026, to capture a comprehensive snapshot of digital payment behavior in this specialized economic zone.

Population and Sample

The population comprised university students in Batam who actively use ShopeePay. A non-probability purposive sampling technique was employed, with respondents required to be active university students who had conducted at least three ShopeePay transactions in the previous month. This criterion ensured that respondents had sufficient experience with ShopeePay's interface and features to meaningfully evaluate perceived ease of use and usefulness, consistent with prior fintech usage studies (Aryadipura & Margaliu, 2025).

Sample size adequacy was assessed using the guidelines recommended by Hair et al. (2021), which suggested a minimum sample of 250 respondents for the PLS-SEM analysis. The required sample size was further verified using GPower, assuming a medium effect size ($f^2 = 0.15$), a significance level of 0.05, and statistical power of 0.80, resulting in a minimum required sample of 85 respondents. The inverse square root method proposed by (Kock & Hadaya, 2018) was also considered as an additional criterion. The final sample of 350 valid respondents exceeded both the J. F. Hair et al (2022) recommendation and the GPower minimum, indicating adequate sample size and statistical power for testing the proposed structural model.

Data Collection Techniques

Primary data were collected through an online structured questionnaire distributed via WhatsApp, Instagram, Line, and Telegram. Questionnaire items were adapted from validated scales in previous studies (Table 1) and translated into Indonesian using back-translation to ensure semantic equivalence. All items were measured using a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The questionnaire was administered via Google Forms for four weeks. Two screening questions verified respondents' active student status and ShopeePay transaction frequency in the past month. Ineligible respondents were automatically excluded, while single-response restrictions minimized duplicate submissions. Prior to the main survey, a pilot test with 30 respondents was conducted. Cronbach's Alpha values ranged from

0.82 to 0.91, exceeding the 0.70 threshold and indicating good internal consistency for structural equation modelling (Mardianto et al., 2024; Sudaryono et al., 2024).

Tabel 1. Definiton and Operationalization

Variables	Operational Definiton	Indicators	Sources
Perceived Ease of Use (X1)	The degree to which an individual believes that using ShopeePay is free of physical and mental effort.	Easy to learn. Controllable. Clear and understandable. Flexible to use. Easy to become skillful.	(J. Hair & Alamer, 2022; Wijaya et al., 2025)
Perceived Usefulness (X2)	The degree to which a student believes that using ShopeePay enhances their transaction efficiency and performance.	Accomplish tasks more quickly. Improve transaction performance. Increase effectiveness. Make transactions easier. Useful in daily activities.	(Underdown & Tamara, 2025; Wei et al., 2025)
Financial Literacy (X3)	The combination of awareness, knowledge, and skills of students in managing digital financial resources wisely.	Basic digital financial knowledge. Savings and spending management. Understanding the time value of money. Awareness of fintech risks. Budget planning capabilities.	(Tahir, 2025; Widiastuti & Sumastuti, 2025)
Fintech Usage (Z)	The level of intensity, frequency, and volume of using ShopeePay as a primary payment method in daily consumption.	Monthly transaction frequency. Duration of application usage. Nominal transaction volume. Diversity of payment features used. Dependency on digital wallets.	(Aryadipura & Margaliu, 2025; Sharma et al., 2024)
Impulsive Buying (Y)	Unplanned purchasing behavior driven by immediate emotional urges without deliberate consideration of consequences.	Spontaneity in purchasing. Sudden urge to buy. Disregard for financial consequences. Reaction to real-time promotions. Immediate hedonic gratification.	(Nyrhinen et al., 2024; Vinkóczy et al., 2026)

The data analysis was conducted using a two-stage approach with SmartPLS 4.0. In the first stage, the measurement model (outer model) was evaluated to assess the validity and reliability of the constructs. Convergent validity was examined through outer loading values greater than 0.708 and Average Variance Extracted (AVE) values exceeding 0.50. Discriminant validity was assessed using the Fornell–Larcker criterion and Heterotrait–Monotrait Ratio (HTMT) values below 0.90, while internal consistency reliability was evaluated through Composite Reliability and Cronbach’s Alpha values above 0.70 (J. Hair & Alamer, 2022).

In the second stage, the structural model (inner model) was evaluated to test the proposed hypotheses using a bootstrapping procedure with 5,000 resamples. The assessment included path coefficients (beta), coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2). To examine more complex relationships, mediation effects were analyzed using the specific indirect effect approach, which provides a more robust estimation compared to the traditional Variance Accounted For (VAF) method. Furthermore, to minimize potential bias and ensure data integrity, this study assessed the Variance Inflation Factor (VIF). In accordance with contemporary analytical standards, VIF values below 3.3 indicate the absence of significant common method bias (Mardianto et al., 2024). This rigorous analytical procedure enhances the reliability, validity, and transparency of the empirical findings within the Indonesian business context.

RESULTS AND DISCUSSION

a. Overview of the research location

Batam City, as a strategic Free Trade Zone (FTZ) in Indonesia, presents a unique socioeconomic landscape characterized by high digital technology penetration. The rapid development of fintech infrastructure in Batam has made digital payment systems like ShopeePay an integral part of daily transactions, particularly among university students. This high-intensity digital environment provides a relevant context for examining how technological convenience and financial knowledge interact to influence consumer behavior in the digital era.

b. Respondent Characteristics

The study included 350 respondents, whose characteristics are used to describe the socioeconomic profile of ShopeePay users and serve as a basis for analyzing the factors influencing fintech usage and impulsive buying behavior. The detailed breakdown of respondent characteristics is presented in Tabel 2.

Tabel 2. Respondent Characteristics

Variable	Dominant Category	Percentage
Gender	Female	69,4%
Age	21-24 years old	60,3%
Study Program	Management	81,1%
Monthly Expenditure	IDR 500,000 – 1,000,000	40,9%
User Experience	Active ShopeePay Users	100%

Sources: Primary data from a questionnaire, processed, 2026

These characteristics indicate that the digital payment ecosystem in this study is primarily driven by female "digital-native" university students with moderate to high financial activity. The high concentration of respondents from management backgrounds and the significant intensity of ShopeePay usage suggest a demographic that is highly exposed to fintech promotional stimuli, thereby providing a robust foundation for examining the relationship between technology acceptance, financial literacy, and consumption patterns.

c. Measurement Model Valuation

The measurement model assessment ensures that all constructs are reliable and valid before testing the structural relationships.

- 1. Convergent Validity and Reliability:** As shown in Tabel 3, all indicator loadings exceed the 0.708 threshold, confirming strong item reliability. Internal consistency is established as Cronbach's Alpha (CA) for all variables is above 0.70.

Tabel 3. Reliability And Convergent Validity Results

Variable	Loading	CA
Perceived ease of use	0.823–0.870	0.901
Perceived usefulness	0.819–0.881	0.900
Financial literacy	0.851–0.898	0.925
Fintech usage	0.832–0.871	0.909
Impulsive buying	0.753–0.799	0.837

Sources: Primary data from a questionnaire, processed, 2026

- 2. Discriminant Validity:** To verify that each construct is empirically unique, the Heterotrait-Monotrait (HTMT) ratio was employed. Tabel 4 shows that all HTMT values are below the 0.90 criterion, indicating that there is no multicollinearity between the variables and that each construct measures a distinct concept.

Tabel 4. Discriminant validity results (HTMT)

Variables	FL	FU	IB	PEOU
FL				
FU	0.568			
IB	0.158	0.064		
PEOU	0.709	0.799	0.058	
PU	0.779	0.781	0.081	0.874

Sources: Primary data from a questionnaire, processed, 2026

d. Structural Model Evaluation (Inner Model)

The structural model was evaluated to measure the model's predictive power and the substantive impact of each independent variable. To achieve this, the coefficient of determination and the effect size were calculated. The summary of these predictive metrics is presented in Tabel 5.

Tabel 5. Predictive Power And Effect Size Results

Path/Variable	R ²	f ²	Result
Fintech usage	0.575	-	Moderate
Impulsive buying	0.047	-	Weak
PEOU -> FU	-	0.170	Medium effect
PU -> FU	-	0.103	Small effect
FL -> IB	-	0.048	Small effect

Sources: Primary data from a questionnaire, processed, 2026

The results in Tabel 5 indicate that the model has a moderate predictive power for Fintech Usage, explaining 57.5% of its variance. In contrast, the R^2 for Impulsive Buying is notably low at 4.7%, suggesting that factors beyond the current model largely drive spontaneous purchasing behavior. Furthermore, the f^2 analysis identifies Perceived Ease of Use as the most influential factor in driving usage intensity compared to other variables.

To determine the significance of the hypothesized relationships, a bootstrapping procedure with 5,000 resamples was performed. This analysis provides the path coefficients (β), T-statistics, and P-values, which serve as the basis for accepting or rejecting the research hypotheses, as detailed in Tabel 5.

Tabel 6. Hypothesis Testing Results

Path	Coefficient (β)	T-statistics	P-values	Decision
PEOU -> FU	0.446	6.517	0.000	Supported
PU -> FU	0.377	5.684	0.000	Supported
FL -> FU	0.027	0.422	0.673	Rejected
FL -> IB	0.313	2.727	0.006	Supported
FU -> IB	0.022	0.182	0.856	Rejected

Sources: Primary data from a questionnaire, processed, 2026

e. Discussion

The findings reveal that Generation Z in Batam adopts fintech primarily due to perceived ease of use and perceived usefulness, while financial literacy does not significantly influence fintech usage intensity. This suggests that technological convenience and lifestyle factors are

stronger drivers of fintech adoption than deliberate financial considerations, consistent with Sharma et al. (2024) and Safitri (2025), who emphasize the importance of ease, service accessibility, and digital-native characteristics in fintech adoption.

A key finding is that financial literacy positively influences impulsive buying, indicating a possible “literacy paradox” associated with overconfidence, contrary to Widiastuti & Sumastuti (2025) but supporting Tahir (2025). Meanwhile, fintech usage does not significantly influence impulsive buying, supporting Nyrrhinen et al. (2024), who argue that impulsive behavior is driven more by psychological and external stimuli. Future research should consider psychological factors using the SOR framework, as suggested by Vinkóczy et al. (2026), while fintech providers should promote responsible spending through budget alerts and financial self-regulation.

CONCLUSIONS AND SUGGESTION

This study concludes that perceived ease of use and perceived usefulness significantly influence fintech usage among Generation Z students in Batam, while financial literacy does not significantly affect fintech usage but positively influences impulsive buying. Fintech usage itself has no significant effect on impulsive buying, suggesting that emotional factors, promotions, and shopping situations play a greater role. Future research should consider psychological and behavioral variables such as self-control, hedonic motivation, FOMO, and promotional exposure, while fintech providers and policymakers should promote responsible spending through budgeting features and strengthened digital financial education.

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