

Financial Literacy, Perceived Security, and Cashless Behavior among Generation Z: The Mediating Role of Trust

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Abstract

This study examines the direct and indirect relationships of financial literacy and perceived security with self-reported cashless behavior through trust among accounting students at Politeknik Negeri Lampung. Using a cross-sectional survey and purposive sampling, 141 students with prior cashless payment experience completed a four-point Likert-scale questionnaire. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 3, supplemented by bootstrap confidence intervals, sample size sensitivity assessment, and alternative indicator specifications. The findings indicate that financial literacy ($\beta = 0.139$, $p = 0.074$) and perceived security ($\beta = -0.011$, $p = 0.901$) were not directly associated with cashless behavior at a statistically significant level. Both variables were positively associated with trust ($\beta = 0.269$ and 0.713 , respectively), while trust was positively associated with cashless behavior ($\beta = 0.728$, all $p < 0.001$). Significant indirect relationships were identified through trust for financial literacy ($\beta = 0.195$, 95% CI [0.110, 0.287]) and perceived security ($\beta = 0.519$, 95% CI [0.354, 0.693]). The model explained 66.0% of the variance in cashless behavior and 76.9% in trust. These findings support indirect-only statistical mediation through trust, although the cross-sectional design prevents causal inference. Limitations include the single-institution sample, self-reported behavior, and conceptual overlap between security and trust. The study contributes context-specific evidence that trust is an important intermediary in understanding cashless payment practices and highlights implications for financial education and digital payment reliability.

Keywords: Financial Literacy, Generation Z, Perceived Security, Self-Reported Cashless Behavior, Trust

1. INTRODUCTION

The development of financial technology has expanded opportunities for transactions without physical cash through electronic money, digital wallets, and related payment services ([Yuniarti, Septiani, Rusmianto, Wijaya, & Kurniawan, 2025](#); [Candy, Robin, Sativa, Septiana, Can, & Alice, 2022](#)). In Indonesia, this development is consistent with the National Non-Cash Movement (*Gerakan Nasional Non-Tunai/GNNT*) introduced by the Bank Indonesia in 2014. From January to July 2025, the value of electronic money shopping transactions reached IDR 524.89 trillion, increasing by 65.49% compared to the same period a year earlier ([Kusnandar, 2025](#)). These figures concern transaction value, not the percentage or number of electronic money users. Figure 1 compares electronic money shopping transaction values for January–July 2024 and January–July 2025.

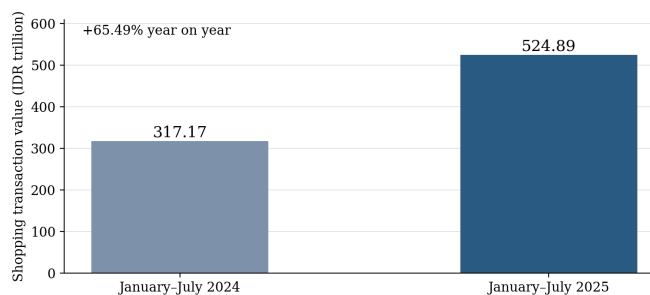


Figure 1. Electronic-money shopping transaction value for January–July

The expansion of digital payments in transportation, toll roads, banking, fintech services, and Micro, Small, and Medium Enterprises (MSMEs) provides a setting in which individuals can develop cashless payment habits ([Lukito & Khairunnisa, 2022](#)). Cashless behavior concerns the use of non-cash instruments in economic transactions, but the availability of an instrument does not by itself

explain how an individual evaluates or uses it. Financial literacy is relevant because it concerns financial management, the use of financial products, and the assessment of risks ([Syahrozi, Nahampun, Fakhri, & Widia, 2025](#)). The 2025 Financial Services Authority (*Otoritas Jasa Keuangan*/OJK) survey reported a financial literacy index of 90.63% and a financial inclusion index of 99.10% for respondents whose highest education was higher education, compared with a literacy index of 54.50% for the elementary-education group ([OJK, 2024](#)). Figure 2 shows this educational comparison. These national indices describe education groups and cannot be treated as measured literacy scores for the students in this study.

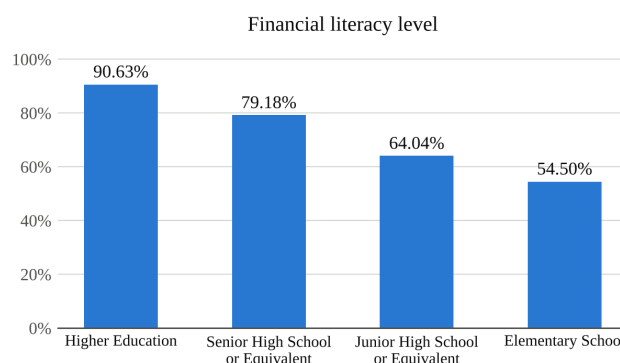


Figure 2. Financial literacy level

Students are a relevant population because financial independence, digital financial knowledge, and payment experience may develop simultaneously during higher education ([Diah, Lestariningsih, Su, Ekonomi, Riyadi, & Surakarta, 2026](#); [Saur, Sinaga, & Panjaitan, 2026](#)). Financial education can provide a basis for evaluating costs, benefits, and risks, whereas repeated payment experiences can shape judgments about the service itself. [Chanafaro and Sari \(2024\)](#) examined financial literacy in relation to both intention and use of digital payments, showing the importance of distinguishing an evaluation or intention from payment use. However, students with an accounting background should not be automatically assumed to have uniformly high literacy or identical transaction habits. Differences in exposure to financial learning and payment services may still exist within this group and need empirical assessment.

Perceived security is also relevant to digital payment use because users evaluate whether their transactions and personal information are protected ([Setiawan, & Tambun, 2025](#); [Ananda, & Mardiana, 2025](#)). Server-based and chip-based electronic-money systems provide different technical arrangements for storing and processing value by [Nazar, Arifah, Fitri, Putri, and Ramadiant \(2023\)](#), while evolving payment threats require continued attention to protection ([Amelia & Rianto, 2024](#)). The Indonesia Anti-Scam Center (IASC) recorded 135,397 fraud reports by May 2025, reported losses of IDR 2.6 trillion, 219,168 accounts reported as suspected of involvement, and 49,316 blocked accounts ([OJK, 2024](#)). These aggregate figures establish the relevance of fraud concerns but do not measure the experiences of the present respondents. Financial understanding and perceived protection may be related to trust in payment services, whereas concerns about fraud may accompany lower willingness to use them ([Gultom, & Safitry, 2021](#); [Kurniasari, 2021](#); [Ningrum, & Soepatini, 2026](#); [Faridah, & Kuswati, 2024](#)).

Previous empirical findings can be compared across three related groups. First, studies on financial literacy and cashless transactions have reported positive relationships, whereas [Giriani \(2021\)](#) and [Seputri and Yafiz \(2022\)](#) did not identify a significant literacy relationship in their respective e-money and QRIS settings. Second, security has been related to financial technology use or interest in digital transactions, and [Rahadi, Putri, Soekarno, Damayanti, Murtaqi, and Saputra \(2021\)](#) reported an insignificant security relationship in their Generation Z cashless framework. Third, trust has been associated with non-cash transaction use, while [Dayan \(2020\)](#) reported an insignificant relationship with digital payment use. These results concern different samples, instruments, and dependent constructs: intention, adoption, continued use, and reported payment behavior are related

outcomes but not interchangeable. Thus, the inconsistency cannot be resolved by simply counting the significant results.

Research on trust mediation offers a basis for this question. [Kurniasari \(2021\)](#) considered trust between security-related evaluations and digital payment adoption; [Faridah and Kuswati \(2024\)](#) examined e-wallet adoption; [Jamiah, Purwanto, and Asmike \(2022\)](#) examined interest in using GoPay; and [Ningrum and Soepatini \(2026\)](#) examined digital payment intention with regard to literacy, social norms, and behavioral control. [Mayasari, Marisya, Jamilah, and Ghazali \(2025\)](#) further emphasized the importance of security in students' e-wallet trust. Consequently, adding trust alone is not a novel approach. What remains to be examined here is the joint role of financial literacy and perceived security in relation to a broader self-reported payment-practice construct among accounting students who already have non-cash payment experience. Testing the residual direct and indirect paths can show whether the observed relationship is concentrated in trust. The novelty is bounded to this model comparison, outcome operationalization, and institutional setting; the design does not supply independently observed transaction behaviors.

The research problem is whether financial literacy and perceived security have independent direct relationships with reported cashless behavior, or whether their relationships are primarily indirect through trust in a sample of existing payment users. Accounting students at Politeknik Negeri Lampung provide a setting in which financial learning and experience with non-cash instruments can be examined together. [Bria, Manewalu, Fahik, and Lian \(2025\)](#) studied literacy among accounting and non-accounting students, providing a reason to consider educational background, while [Daffa, Nabilla, and Ulya \(2024\)](#) discussed cashless use among university students. The present sample is grounded more specifically in two accounting programs, four entry cohorts, and the eligibility requirement of prior non-cash payment use. This provides evidence of relevant payment exposure, but neither course achievement nor the duration of service use was measured. The objectives are to test the five direct relationships and two indirect relationships through trust. The theoretical contribution is a context-specific comparison of belief-related predictors and trust in reported digital financial behavior. The practical relevance concerns financial education, transaction protection, and service reliability for students and providers.

2. LITERATURE REVIEW AND HYPOTHESES

The proposed model draws on the belief–evaluation–behavior logic of the Theory of Planned Behavior (TPB), while using trust and technology acceptance studies to specify the payment-service context. The TPB distinguishes attitude, subjective norm, perceived behavioral control, intention, and behavior ([Ajzen, 1991](#)). Financial literacy may inform beliefs about payment consequences; perceived security may inform beliefs about obstacles and protection; and trust represents an evaluation of the provider on whom the user must rely. Neither literacy nor security is identical to a core TPB construct. The present model does not measure all TPB components; therefore, it is a TPB-informed model of associations rather than a complete test or extension of the TPB. Technology acceptance research also shows why service evaluation is relevant when users consider digital financial instruments ([Amalia et al., 2026](#)). Trust complements this reasoning by addressing reliance under uncertainty ([Mayer et al., 1995](#)). These perspectives make it plausible that literacy and security are associated with payment use through trust, even when their independent direct coefficients are weak. They justify the hypothesized paths; they do not determine in advance which paths must be significant.

2.1 The Effect of Financial Literacy on Cashless Behavior

Financial literacy is the ability to make decisions and the skill to manage finances to achieve financial well-being, based on knowledge, skills, and confidence ([OJK, 2022](#)). Financial literacy includes the skill of assessing information and making appropriate decisions regarding the use and management of finances as well as an understanding of management, planning, and investment, with levels ranging from well-literate to not literate ([Suryanto & Rasmini, 2018](#)). Cashless behavior is a cashless transaction behavior that reflects the habit of using digital payment instruments, such as QRIS, digital wallets (e-wallets), and mobile banking ([Raja Gukguk & Panjaitan, 2026](#)).

Financial literacy can help individuals assess information, manage expenditure, and consider the consequences of a payment choice ([Widhiari et al., 2025](#)). A lack of financial understanding may expose users to budgeting errors or inappropriate product choices ([Arianti, 2022](#)). In a TPB-informed interpretation, financial knowledge can inform behavioral beliefs about the benefits and costs of non-cash payments, rather than being equivalent to attitude itself ([Ningrum & Soepatini, 2026](#)). Knowledge-related relationships also occur in other digital accounting contexts: [Melando et al. \(2022\)](#), whose co-authors include Eksa Ridwansyah of Politeknik Negeri Lampung, examined e-filing, tax sanctions, and tax knowledge in relation to individual taxpayer compliance. This evidence concerns tax compliance and provides contextual support for studying informed financial decisions; it does not directly establish a cashless payment relationship. Studies by [Wasyiah et al. \(2024\)](#), [Sari et al. \(2022\)](#), [Wati and Hwihanus \(2025\)](#), and [Muttasari and Lukiastuti \(2020\)](#) support a positive literacy relationship in their respective settings. [Zanra and Sufnirayanti \(2024\)](#) examined literacy in relation to MSMEs' interest in QRIS. [However, Giriani \(2021\)](#) and [Seputri and Yafiz \(2022\)](#) show that this direct relationship is not consistent across all payment contexts. These competing results justify testing the direct path alongside the proposed trust pathway.

H₁: Financial literacy positively affects cashless behavior among accounting students

2.2 The Effect of Perceived Security on Cashless Behavior

Perceived security is the belief that a system or application can protect personal data and transactions from the threat of data leakage or account misuse by [Sastraman and Sitorus \(2025\)](#), so that personal or financial information cannot be accessed by unauthorized parties ([Flavián & Guinalú, 2006](#)). Digital payment users face threats such as malware, phishing, and identity theft ([Lakshmi & Rani, 2024](#)). Therefore, the system must be able to control and protect user transactions, protect privacy, and guarantee the security of transactions from illegal acts, and fulfill the components of confidentiality, integrity, and availability ([Fauzi, Wibowo, Fikri, Syukri, Dewi, Adhi, Azzahra, Lestari, & Aurellia, 2023](#)).

When users perceive that their transactions and information are protected, they may be more willing to provide information and continue using a service ([Wahyuni & Dahmiri, 2021](#)). Security can therefore be considered a contextual belief about obstacles to payment use ([Safinka & Kristianto, 2026](#)). TPB describes perceived behavioral control as perceived ease or difficulty in performing a behavior, given resources and barriers ([Ajzen, 1991](#)). Perceived security may inform this assessment but does not measure the full control construct, which can also include access, ability, and opportunities. [Ningrum and Soepatini \(2026\)](#) provide a related application of control-related beliefs in digital payment intention. [Kamil \(2020\)](#) and [Azmi, Bahri, Adnan, and Hamdiah \(2025\)](#) reported positive security relationships in digital financial settings. [Supriatna and Widiatoro \(2026\)](#) examined security within a technology-adoption framework among Jakarta millennials. In contrast, [Rahadi, Putri, Soekarno, Damayanti, Murtaqi, and Saputra \(2021\)](#) did not identify a significant security relationship in their cashless model. The possibility that protection is evaluated through trust, rather than expressed as an independent direct relationship with payment practices, is therefore retained in the present model.

H₂: Perceived security has a positive effect on the cashless behavior of accounting students

2.3 The Effect of Financial Literacy on Trust

Trust is the willingness to rely on another party despite vulnerability, based on expectations about that party's conduct ([Mayer et al., 1995](#)). In payment services, financial literacy may provide a basis for evaluating provider information, costs, transaction records, and the consequences of sharing financial information. Trust can develop through judgments about consistent experience and performance ([Syah, 2021](#)). [Hatari and Wediawati \(2024\)](#) examined literacy and trust in digital-wallet interest, while [Kantika et al. \(2022\)](#) considered trust in digital bank adoption. These settings support examining literacy and trust together but do not imply that literacy always increases confidence: better-informed users may also recognize risks or reject unsuitable services. The TPB suggests that beliefs about consequences contribute to evaluations of a behavior ([Ajzen, 1991](#)). The proposed

mechanism is therefore an informed assessment of service reliability, rather than financial knowledge automatically producing use. [Ningrum and Soepatini \(2026\)](#) reported a positive literacy–trust relationship in a digital-payment intention model. The present study tests whether students who report stronger financial literacy also report greater trust in non-cash payment services.

H₃: Financial literacy positively affects trust

2.4 The Effect of Perceived Security on Trust

Perceived security and trust are conceptually related but have different objects of evaluation. Perceived security concerns the protection of transactions and information, whereas trust concerns expectations about a provider's ability, benevolence, and integrity ([Kantika et al., 2022](#); [Widodo & Fajri, 2024](#)). Protection can provide information about whether the provider is dependable, so a positive security–trust relationship is expected. [Rafii et al. \(2025\)](#) examined security and user trust in mobile banking, and [Mayasari et al. \(2025\)](#) reported security as an important correlate of students' e-wallet trust. [Safinka and Kristianto \(2026\)](#) also considered security in digital transactions. However, the distinction is not complete merely because separate names are assigned to the variables. A trust item that refers explicitly to user security may overlap with the security scale. This study consequently evaluates the association together with HTMT confidence intervals and a sensitivity specification excluding the security-related trust item, rather than interpreting a strong coefficient as unqualified evidence that the constructs are independent.

H₄: Perceived security positively affects trust

2.5 The Effect of Trust on Cashless Behavior

Trust concerns whether a payment service can be relied upon to meet the user's expectations ([Aldiansyah et al., 2024](#)). It may be associated with a willingness to use the service despite uncertainty because users must depend on providers to process transactions and manage information appropriately ([Permana, 2020](#); [Seputri & Yafiz, 2022](#)). [Amalia et al. \(2026\)](#) reviewed the use of technology acceptance perspectives in digital payment sustainability, supporting attention to psychological evaluations beyond technical availability. [Kurniasari \(2021\)](#) and [Fadhil et al. \(2020\)](#) considered provider trust in digital payment adoption. In the present model, the expected relationship concerns a broad self-reported payment-use construct that also includes satisfaction and recommendation; it is not a prediction of transaction counts from bank records. [Putri et al. \(2023\)](#) examined trust in QRIS transaction decisions, while [Wasyiah et al. \(2024\)](#) examined trust in fintech use. These findings support a positive hypothesis, but [Dayan \(2020\)](#) provides a competing finding. The model therefore tests the relationship while recognizing that successful past use may also contribute to trust and that cross-sectional responses cannot determine the temporal direction.

H₅: Trust has a positive effect on cashless behavior

2.6 The Effect of Financial Literacy on Cashless Behavior with Trust as a Mediating Variable

A financially literate individual may evaluate the benefits and risks of non-cash payments positively without necessarily using them more often. Payment behavior can depend on whether those evaluations are accompanied by confidence in the provider's conduct ([Ningrum & Soepatini, 2026](#)). Trust is thus proposed as an intervening psychological evaluation rather than a substitute label for financial knowledge. [Permanasari et al. \(2025\)](#) considered trust in QRIS intention, while [Alawi et al. \(2020\)](#) examined literacy and financial inclusion in fintech use. [Selfianti et al. \(2025\)](#) studied trust as a mediator in students' shopping interest, an outcome that differs from payment frequency and habit. [Maghfiroh and Arwani \(2025\)](#) related literacy and digital technology to trust in Islamic banking. Together, these studies show that financial understanding, trust, and digital financial participation may be linked, but their different outcome definitions limit direct comparison. [Ningrum and Soepatini \(2026\)](#) studied payment intention, and [Kantika et al. \(2022\)](#) studied digital bank adoption. The present hypothesis extends this comparison to reported cashless practices among existing users. A significant indirect relationship can coexist with an insignificant direct relationship because the direct path

estimates the remaining association after trust is included, whereas the indirect path is the product of the literacy–trust and trust–behavior coefficients.

H_6 : Trust mediates the effect of financial literacy on cashless behavior

2.7 The Effect of Perceived Security on Cashless Behavior with Trust as a Mediating Variable

Security concerns the operation of an information system to protect transactions and data against relevant threats (Alfaris, 2023). Perceived security is the user's assessment of that protection and should not be treated as an objective technical audit of the service. Security evaluations may provide a basis for confidence in the provider (Safinka & Kristianto, 2026; Casanova & Nugroho, 2024). Violinda and Khorunnisya (2022) discussed perceptions and behavior in e-wallet interest, while Permanasari et al. (2025) examined technology factors, trust, and QRIS intention. The proposed indirect pathway is that perceived protection is associated with a broader judgment of provider dependability, which is then associated with reported cashless behavior. This pathway is theoretically plausible, but the sequence is not observed over time in the present survey. It must therefore be evaluated as statistical mediation under the specified model, with attention to alternative explanations and measurement overlap.

Faridah and Kuswati (2024) examined the trust in the security e-wallet adoption relationship. Jamiah et al. (2022) and Handayani and Anggrainie (2024) examined security and trust in interest in using particular e-wallet services. Their results provide support for testing a security trust pathway, while also demonstrating that trust mediation has already been studied. The present hypothesis concerns non-cash practices reported across payment instruments by accounting students who have used those instruments. It does not claim that an adoption or intention result necessarily applies to observed transactions. Both the direct and indirect security relationships are retained so that the role of trust can be assessed without assuming in advance that mediation must be present. Figure 3 presents the research framework.

H_7 : Trust mediates the effect of perceived security on cashless behavior

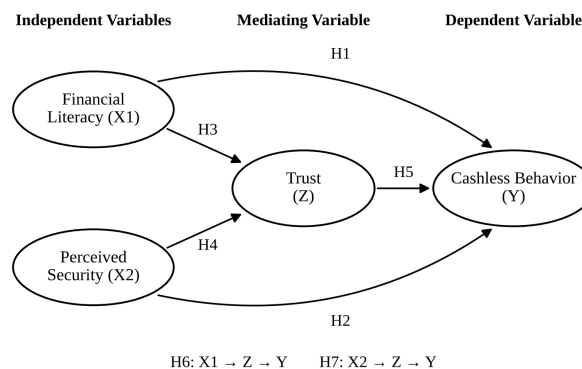


Figure 3. Research framework

Figure 3 illustrates the research framework examining the relationships between financial literacy, perceived security, trust, and cashless behavior. Financial literacy (X_1) and perceived security (X_2) serve as independent variables, trust (Z) acts as the mediating variable, and cashless behavior (Y) represents the dependent variable. The framework proposes that financial literacy (H_1) and perceived security (H_2) directly influence cashless behavior, while financial literacy (H_3) and perceived security (H_4) also influence trust. Trust is hypothesized to directly influence cashless behavior (H_5) and mediate the relationships between financial literacy and cashless behavior (H_6) and between perceived security and cashless behavior (H_7). This framework enables the examination of both direct and indirect relationships to assess the mediating role of trust in cashless payment practices.

3. RESEARCH METHODOLOGY

This study used a quantitative cross-sectional survey. The institutional population comprised 1,010 active students in the Tax Accounting and Digital Business Accounting programs at Politeknik Negeri Lampung from the 2022–2025 entry cohorts, according to the Academic Office. Non-probability purposive sampling was used to reach respondents relevant to the research question (Sugiyono, 2019). Eligibility required active enrollment in an accounting program, experience using non-cash payment instruments such as QRIS, mobile banking, or card-based payments, and willingness to respond. The eligibility requirement focuses the analysis on existing users who can evaluate payment services, rather than students who have never used them. It also restricts inference to this selected group. The sample was not drawn randomly from the full population, and the number of invitations or ineligible submissions was not recorded in the reported recruitment results; therefore, a survey response rate could not be calculated from the 141 usable responses.

The initial sample-size plan used the Slovin calculation with a nominal 10% error parameter to obtain approximately 91 as an initial recruitment target. This calculation is reported to preserve the sampling record, but it is not a valid estimate of survey precision for a purposive sample and does not determine PLS-SEM mediation power. A supplementary analytical sensitivity assessment follows the inverse-square-root logic of Kock and Hadaya (2018), replacing the one-sided normal critical value with 1.96 to match the original two-sided 5% tests. Under the standard-error approximation of one divided by the square root of the sample size, the sum of the 1.96 critical value and the 0.842 value for 80% power gives a minimum detectable standardized path of approximately 0.236 with $n = 141$. A path of 0.25 would require approximately 126 responses under this approximation, whereas a path of 0.139 would require approximately 407. Thus, 141 is adequate for moderately sized paths under the stated assumptions but cannot establish adequate power for every small direct relationship. This is a sensitivity calculation, not an a priori power analysis or proof of 80% power for both indirect products. The uncertainty of mediation is assessed directly through the supplementary bootstrap intervals.

Data were collected through a closed-ended Google Forms questionnaire administered in Indonesian. The original instrument contained 61 items: 20 financial literacy items, nine perceived security items, 15 trust items, and 17 cashless behavior items. The dimensions were adapted from OJK (2024), Bimaruci et al. (2020), Noviyanti and Erawati (2021), and Salma and Permatasari (2025), respectively, to refer to non-cash payment services used by students. Each item used a four-point agreement scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, and 4 = Strongly Agree. This response format requires a directional judgment but does not by itself improve validity; excluding a midpoint may also force an uncertain respondent to select an agreement category (Chyung et al., 2017; DeCastellarnau, 2018). The available instrument documentation supports adaptation of dimensions and Indonesian wording but does not document a separate pilot study, expert-rating procedure, or forward–back translation. Formal translation equivalence and pre-survey validation should consequently not be assumed. The statistical assessment reported here concerns the responses obtained from the main sample. Table 1 presents the final operationalization after eight literacy items were eliminated; the final questionnaire contained 53 items.

Table 1. Operationalization of variables

Variables	Variable Definition	Indicators (questionnaire items)	Scale
Financial Literacy (X_1)	The skill of assessing information and making appropriate decisions regarding the use and management of finances (Arianti, 2022)	Financial knowledge (X1.1-X1.3), financial attitude and behavior (X1.4-X1.6), financial skills (X1.7-X1.9), level of confidence (X1.10-X1.12)	Likert

Variables	Variable Definition	Indicators (questionnaire items)	Scale
Perceived Security (X ₂)	The belief that a system or application is able to protect personal data and transactions from the threat of data leakage or account misuse (Sastraman Farasi et al., 2025)	Transaction security assurance (X2.1-X2.4) and data confidentiality (X2.5-X2.9)	Likert
Trust (Z)	The willingness of a person to rely on or accept vulnerability to the actions of another party based on the expectation that the other party can act as expected despite risk and uncertainty (Mayer et al., 1995)	Ability (Z.1-Z.4), benevolence (Z.5-Z.9), and integrity (Z.10-Z.15)	Likert
Cashless Behavior (Y)	The concept of a cashless society is a condition in which digital payment instruments are used as a habit for conducting economic transactions. At the individual level, this habit is reflected in cashless transaction behavior, which is called cashless behavior (Rahadi et al., 2021)	Frequency of use (Y.1-Y.4), intensity/habit of use (Y.5-Y.8), satisfaction with use (Y.9-Y.13), and recommendation (Y.14-Y.17)	Likert

The final literacy items are self-assessments of knowledge, financial attitudes and behavior, financial skills, and confidence. They do not ask respondents to solve a scored financial knowledge test. Perceived security includes transaction protection and data confidentiality. Trust includes ability, benevolence, and integrity. Cashless behavior includes four frequency items, four habit/intensity items, five satisfaction items, and four recommendation items. One frequency statement refers to using non-cash payment three to five times a week, but respondents answer by agreement rather than entering a recorded transaction count. Satisfaction and recommendation are evaluations associated with use and are not themselves transaction events. Accordingly, the dependent construct is described throughout as self-reported cashless behavior. Scale adaptation requires attention to the meaning of such changes, not only to statistical reliability ([Heggstad et al., 2019](#)). Appendix A reports the final item wording so that the scope and overlap of the measurement blocks can be inspected.

The original analysis used PLS-SEM in SmartPLS version 3 to estimate the measurement and structural models. This approach accommodates a model with several multi-item constructs and direct and indirect relationships without requiring multivariate normality; its use does not remove the requirements for an adequate sample size or a defensible measurement specification ([Sihombing et al., 2024](#); [Hair et al., 2019](#)). PLS-SEM has also been applied to purposively selected accounting respondents by [Hevi et al. \(2026\)](#), although a study on village-fund fraud prevention does not establish the validity or power of the present payment model. All four constructs were operationalized as first-order reflective blocks: the items were treated as manifestations of financial self-assessment, perceived protection, provider trust, or payment-use experience, rather than weighted causes defining an index. Correlated responses within each block are expected under this specification. Financial literacy and cashless behavior nevertheless cover several dimensions, making the reflective specification a substantive assumption that requires scrutiny of item content as well as reliability ([Hair et al., 2020](#)). No separate higher-order model was estimated.

Measurement assessment considers outer loadings, AVE, standardized Cronbach alpha, composite reliability, and HTMT. Loadings of approximately 0.70 or higher are preferred ([Gunistiyo et al., 2024](#)); items between 0.40 and 0.70 are considered in relation to AVE, reliability, and content coverage rather than automatically removed ([Hair et al., 2020](#)). An AVE of at least 0.50 and reliability of at least 0.70 provide conventional reference points ([Duryadi, 2021](#)). HTMT is assessed against 0.90, with the more restrictive 0.85 benchmark and bootstrap intervals used to identify borderline

distinctions ([Henseler et al., 2015](#)). Structural assessment uses R^2 and adjusted R^2 , the original blindfolding Q^2 values, f^2 , and inner VIF. The descriptive R^2 benchmarks of 0.67, 0.33, and 0.19 follow the source methodology ([Gunistiyo et al., 2024](#)), while f^2 values of 0.02, 0.15, and 0.35 describe small, medium, and large contributions ([Hair et al., 2019](#)). A VIF below 5 is treated as below the selected critical threshold, rather than proof that shared variance is absent. The original hypotheses were evaluated at the two-sided 5% level, using $t > 1.96$ and $p < 0.05$.

For the supplementary analysis, the thesis appendix response tables were transcribed by respondent number and item position, without retaining names or student identification numbers. A repeated literacy row at a page boundary was identical and was counted once; repeated merged Word cells were also counted once. This yielded 141 aligned respondent records with 53 item scores each. All retained scores were in the permitted 1-4 range, and no item score was missing in the transcribed final matrix. The survey record did not document additional pre-analysis exclusions, time-based screening, attention checks, or outlier removal; therefore, these were not retrospectively claimed. The original SmartPLS bootstrap settings, including the resample count, random seed, sign-change option, and confidence-interval method, were not recorded. Table 7 therefore preserves the original t-statistics and p-values, while new intervals are reported separately in Table 8.

Supplementary computation used standardized indicators, reflective Mode A weight updates, path weighting, a maximum of 300 iterations, and a weight-change tolerance of 0.0000001. The resulting five direct and two indirect coefficients reproduced the source results to three decimal places. For each of the 5,000 respondent-level bootstrap samples drawn with replacement, the complete final model was re-estimated. The samples contained 141 respondents, a fixed random seed of 20261014 was used, and 95% percentile intervals were taken from the 2.5th and 97.5th percentiles. Positive item orientation was maintained; no explicit post-estimation sign-change correction was applied. Total effects were calculated as the direct coefficient plus the product of the two relevant indirect-path coefficients within each resample. HTMT was calculated from absolute item correlations and bootstrapped using the same respondent resamples. These settings describe the supplementary analysis and should not be mistaken for undocumented settings from the original SmartPLS run.

Common method bias is a concern because every scale was completed by the same respondent using the same questionnaire and agreement format. Shared wording, positive evaluation of a familiar provider, or general confidence may contribute to correlations. The recorded design does not document temporal separation, a marker variable, or an independent transaction measure. Therefore, we do not claim that common method bias has been eliminated. Inner VIF describes predictor collinearity and is not a substitute for a dedicated method-bias assessment. As discussed by [Podsakoff et al. \(2024\)](#), method bias can have several sources and cannot be ruled out by one favorable diagnostic. The findings are interpreted with this limitation, and future studies should combine procedural separation with an independent behavioral measure where possible.

4. RESULTS AND DISCUSSION

The initial measurement model consisted of 61 indicators and produced an Average Variance Extracted (AVE) value of 0.448 for financial literacy, despite a composite reliability value of 0.942. This indicated that internal consistency alone was insufficient to establish convergent validity. Eight financial literacy indicators were subsequently eliminated, resulting in a final model comprising 53 indicators. Figure 4 illustrates the final measurement model after indicator elimination.

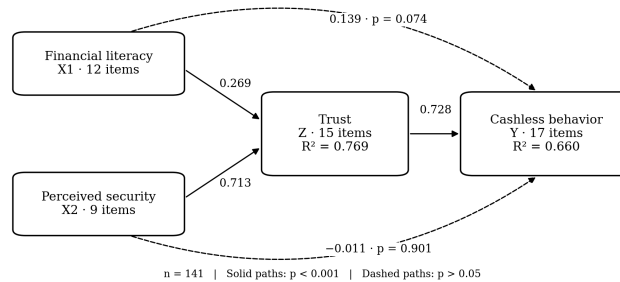


Figure 4. Final model after indicator elimination

Note: Initial values follow the pre-elimination model, while final values were reproduced from 141 response records. Financial literacy indicator codes were relabeled consecutively in the final questionnaire. Minor differences reflect rounding, and an em dash indicates a removed indicator.

Table 2. Complete indicator loadings before and after literacy-item elimination

Initial item	Initial loading	Final item	Final loading	Status
<i>X_{1.1}</i>	0.629	X1.1	0.642	Retained
<i>X_{1.2}</i>	0.645	X1.2	0.646	Retained
<i>X_{1.3}</i>	0.600	—	—	Removed
<i>X_{1.4}</i>	0.674	X1.3	0.693	Retained
<i>X_{1.5}</i>	0.714	X1.4	0.714	Retained
<i>X_{1.6}</i>	0.677	X1.5	0.700	Retained
<i>X_{1.7}</i>	0.648	—	—	Removed
<i>X_{1.8}</i>	0.670	—	—	Removed
<i>X_{1.9}</i>	0.665	X1.6	0.668	Retained
<i>X_{1.10}</i>	0.594	—	—	Removed
<i>X_{1.11}</i>	0.645	—	—	Removed
<i>X_{1.12}</i>	0.678	X1.7	0.693	Retained
<i>X_{1.13}</i>	0.727	X1.8	0.727	Retained
<i>X_{1.14}</i>	0.723	X1.9	0.758	Retained
<i>X_{1.15}</i>	0.645	—	—	Removed
<i>X_{1.16}</i>	0.556	—	—	Removed
<i>X_{1.17}</i>	0.751	X1.10	0.764	Retained
<i>X_{1.18}</i>	0.778	X1.11	0.800	Retained
<i>X_{1.19}</i>	0.674	X1.12	0.684	Retained
<i>X_{1.20}</i>	0.647	—	—	Removed
<i>X_{2.1}</i>	0.751	X2.1	0.751	Retained
<i>X_{2.2}</i>	0.787	X2.2	0.787	Retained
<i>X_{2.3}</i>	0.868	X2.3	0.868	Retained
<i>X_{2.4}</i>	0.864	X2.4	0.864	Retained
<i>X_{2.5}</i>	0.799	X2.5	0.798	Retained
<i>X_{2.6}</i>	0.838	X2.6	0.838	Retained
<i>X_{2.7}</i>	0.796	X2.7	0.796	Retained
<i>X_{2.8}</i>	0.723	X2.8	0.723	Retained
<i>X_{2.9}</i>	0.795	X2.9	0.795	Retained
<i>Z.1</i>	0.734	Z.1	0.734	Retained
<i>Z.2</i>	0.737	Z.2	0.736	Retained
<i>Z.3</i>	0.784	Z.3	0.784	Retained

Initial item	Initial loading	Final item	Final loading	Status
Z.4	0.679	Z.4	0.679	Retained
Z.5	0.716	Z.5	0.715	Retained
Z.6	0.756	Z.6	0.755	Retained
Z.7	0.749	Z.7	0.748	Retained
Z.8	0.789	Z.8	0.789	Retained
Z.9	0.744	Z.9	0.744	Retained
Z.10	0.734	Z.10	0.735	Retained
Z.11	0.825	Z.11	0.826	Retained
Z.12	0.857	Z.12	0.857	Retained
Z.13	0.831	Z.13	0.831	Retained
Z.14	0.844	Z.14	0.844	Retained
Z.15	0.876	Z.15	0.876	Retained
Y.1	0.643	Y.1	0.642	Retained
Y.2	0.606	Y.2	0.605	Retained
Y.3	0.745	Y.3	0.744	Retained
Y.4	0.769	Y.4	0.769	Retained
Y.5	0.705	Y.5	0.706	Retained
Y.6	0.794	Y.6	0.794	Retained
Y.7	0.784	Y.7	0.784	Retained
Y.8	0.704	Y.8	0.704	Retained
Y.9	0.871	Y.9	0.871	Retained
Y.10	0.817	Y.10	0.817	Retained
Y.11	0.790	Y.11	0.790	Retained
Y.12	0.841	Y.12	0.841	Retained
Y.13	0.862	Y.13	0.863	Retained
Y.14	0.808	Y.14	0.808	Retained
Y.15	0.804	Y.15	0.803	Retained
Y.16	0.813	Y.16	0.813	Retained
Y.17	0.731	Y.17	0.731	Retained

Table 2 presents the indicator loadings before and after financial literacy item elimination. Eight financial literacy indicators, namely *X_{1.3}*, *X_{1.7}*, *X_{1.8}*, *X_{1.10}*, *X_{1.11}*, *X_{1.15}*, *X_{1.16}*, and *X_{1.20}*, were removed because their initial loadings were below 0.70 and their elimination improved the convergent validity of the construct. The final model retained 12 financial literacy indicators representing financial knowledge, financial attitudes and behavior, financial skills, and financial confidence. Several retained indicators continued to exhibit loadings below 0.70, indicating that measurement quality remained uneven across items. These indicators were preserved to maintain the conceptual coverage of financial literacy rather than prioritizing statistical improvement at the expense of construct representation. The elimination process therefore considered both measurement performance and theoretical relevance.

The decision to retain weaker financial literacy indicators reflects the importance of preserving distinct aspects of financial understanding, expenditure evaluation, financial decision-making, and confidence in money management. Removing all indicators with loadings below 0.70 would have eliminated the remaining financial knowledge items and narrowed the construct's conceptual scope. The original deletion record does not provide complete item wording or response records for the eight excluded indicators; consequently, full preservation of the original 20-item content cannot be demonstrated. The supplementary sensitivity analyses presented in Table 9 provide limited checks of the final specification but do not replace independent instrument validation.

Table 3. Reliability and average variance extracted in the final measurement model

Construct	Cronbach Alpha	Composite Reliability	AVE	Remark
Financial Literacy (X_1)	0.910	0.923	0.503	Reliable
Perceived Security (X_2)	0.931	0.942	0.646	Reliable
Trust (Z)	0.953	0.958	0.607	Reliable
Cashless Behavior (Y)	0.957	0.962	0.598	Reliable

Table 3 shows that the AVE values exceed 0.50, while Cronbach alpha and composite reliability exceed 0.70 for all four constructs, meeting the selected criteria for convergent validity and internal consistency (Duryadi, 2021). Trust comprises 15 indicators (Z_1 – Z_{15}), while cashless behavior comprises 17 indicators (Y_1 – Y_{17}). The financial literacy AVE of 0.503 represents a marginal result rather than strong evidence that all literacy dimensions were measured equally well. Several retained literacy indicators, particularly those representing financial knowledge, remained below the recommended loading threshold. Their retention preserved the conceptual breadth of the construct, although internal consistency cannot substitute for content validity or objective financial knowledge assessment. The high reliability coefficients for trust and cashless behavior may also reflect similarities or redundancy among questionnaire items, suggesting the need for further instrument refinement (Hair et al., 2020).

Table 4. Heterotrait-Monotrait ratios in the final measurement model

Construct	Financial Literacy (X_1)	Perceived Security (X_2)	Cashless Behavior (Y)	Trust (Z)
Financial Literacy (X_1)				
Perceived Security (X_2)	0.528			
Cashless Behavior (Y)	0.600	0.700		
Trust (Z)	0.659	0.893	0.826	

Table 4 presents the Heterotrait-Monotrait (HTMT) ratios used to assess discriminant validity among the study constructs. The values range from 0.528 for financial literacy and perceived security to 0.893 for perceived security and trust. Although all point estimates fall below the selected threshold of 0.90, the security–trust ratio approaches this boundary and exceeds the stricter benchmark of 0.85. The trust–cashless behavior ratio of 0.826 also indicates a relatively strong relationship between these constructs. These findings suggest that the constructs generally demonstrate empirical distinction, but the separation between perceived security and trust requires caution. The HTMT point estimates alone do not provide sufficient evidence for an unqualified discriminant validity conclusion.

Table 5. Supplementary bootstrap confidence intervals for HTMT

Construct pair	HTMT	95% percentile CI	Assessment
X_1 – X_2	0.528	[0.379, 0.661]	Upper bound < 0.90
X_1 –Y	0.600	[0.432, 0.737]	Upper bound < 0.90
X_1 –Z	0.659	[0.506, 0.779]	Upper bound < 0.90
X_2 –Y	0.700	[0.584, 0.795]	Upper bound < 0.90
X_2 –Z	0.893	[0.840, 0.937]	Upper bound > 0.90
Z–Y	0.826	[0.733, 0.896]	Upper bound < 0.90

Note: Confidence intervals were estimated using 5,000 respondent-level bootstrap resamples. X_1 = financial literacy; X_2 = perceived security; Z = trust; Y = cashless behavior.

Table 5 reports supplementary 95% percentile confidence intervals for the HTMT ratios based on 5,000 bootstrap resamples. Five construct pairs have confidence interval upper bounds below 0.90, supporting their empirical distinction under the selected criterion. In contrast, the confidence interval for perceived security and trust ranges from 0.840 to 0.937, exceeding the 0.90 threshold at its upper

bound. Although this interval excludes 1.00, it does not establish that the security–trust HTMT remains below 0.90 with 95% confidence. Discriminant validity between perceived security and trust therefore remains uncertain. This finding is particularly important when interpreting the strong security–trust structural relationship and the indirect association between perceived security and cashless behavior through trust.

The structural model was subsequently evaluated to examine its explanatory power, predictive relevance, and relationships among constructs. Cashless behavior produced an R^2 value of 0.660 and an adjusted R^2 of 0.652, while trust produced an R^2 value of 0.769 and an adjusted R^2 of 0.766. These findings indicate that the specified predictors explain 66.0% of the variation in cashless behavior and 76.9% of the variation in trust. The remaining variation may reflect omitted predictors, measurement error, and model specification limitations. Based on the descriptive criteria applied in the study, the explanatory levels were classified as moderate and high, respectively (Duryadi, 2021). The original blindfolding results also produced positive Q^2 values of 0.372 for cashless behavior and 0.456 for trust, indicating predictive relevance within the cross-validated redundancy procedure (Hair et al., 2019). These statistics do not establish predictive accuracy in an independent sample because no separate holdout-sample validation was performed.

Table 6. Effect size and inner collinearity assessment

Relationship	f Square	Effect	VIF	Remark
Financial Literacy (X_1) → Cashless Behavior (Y)	0.035	Small	1.643	Below 5
Perceived Security (X_2) → Cashless Behavior (Y)	0.000	Not meaningful	3.523	Below 5, inspect
Financial Literacy (X_1) → Trust (Z)	0.237	Medium	1.321	Below 5
Perceived Security (X_2) → Trust (Z)	1.666	Large	1.321	Below 5
Trust (Z) → Cashless Behavior (Y)	0.359	Large	4.333	Below 5, inspect

Table 6 shows that financial literacy makes a small incremental contribution to cashless behavior ($f^2 = 0.035$) and a medium contribution to trust ($f^2 = 0.237$). Perceived security contributes negligibly to cashless behavior ($f^2 = 0.000$) but demonstrates a large contribution to trust ($f^2 = 1.666$). Trust also contributes substantially to cashless behavior ($f^2 = 0.359$). These effect sizes represent changes in explained variance within the specified statistical model rather than causal effects. All inner Variance Inflation Factor (VIF) values fall below 5, indicating that none exceeds the selected collinearity threshold. Nevertheless, the VIF values of 3.523 for perceived security and 4.333 for trust in the cashless behavior equation indicate considerable shared predictor variance. A VIF of 4.333 corresponds to an approximate standard error inflation factor of 2.08 relative to an otherwise comparable model with orthogonal predictors. These results suggest that shared variance may reduce the precision of individual direct-path estimates, particularly when perceived security and trust are included simultaneously. The collinearity assessment should therefore be considered alongside the discriminant validity concerns identified in Tables 4 and 5 (Hair et al., 2019).

Table 7. Original direct and indirect hypothesis-test results

Relationship	Original Sample	T-Statistics	P-Values	Decision
Financial Literacy (X_1) → Cashless Behavior (Y)	0.139	1.793	0.074	H_1 not supported
Perceived Security (X_2) → Cashless Behavior (Y)	-0.011	0.124	0.901	H_2 not supported
Financial Literacy (X_1) → Trust (Z)	0.269	5.016	< 0.001	H_3 supported
Perceived Security (X_2) → Trust (Z)	0.713	14.735	< 0.001	H_4 supported
Trust (Z) → Cashless Behavior (Y)	0.728	7.249	< 0.001	H_5 supported

Relationship	Original Sample	T-Statistics	P-Values	Decision
Financial Literacy (X_1) $\rightarrow$ Trust (Z) $\rightarrow$ Cashless Behavior (Y)	0.195	4.170	< 0.001	H_6 supported
Perceived Security (X_2) $\rightarrow$ Trust (Z) $\rightarrow$ Cashless Behavior (Y)	0.519	6.104	< 0.001	H_7 supported

Table 7 presents the original hypothesis-testing results for five direct relationships and two indirect relationships. Financial literacy ($\beta = 0.139$, $p = 0.074$) and perceived security ($\beta = -0.011$, $p = 0.901$) were not significantly associated with cashless behavior, indicating that H_1 and H_2 were not supported. Financial literacy ($\beta = 0.269$, $p < 0.001$) and perceived security ($\beta = 0.713$, $p < 0.001$) demonstrated significant positive associations with trust, supporting H_3 and H_4 . Trust was also positively associated with cashless behavior ($\beta = 0.728$, $p < 0.001$), supporting H_5 . The indirect relationships through trust were significant for financial literacy ($\beta = 0.195$, $p < 0.001$) and perceived security ($\beta = 0.519$, $p < 0.001$), supporting H_6 and H_7 . These findings are consistent with indirect-only statistical mediation because the indirect relationships were significant while the corresponding direct relationships were not. This interpretation describes statistical associations and does not establish causal mediation because the variables were measured using a cross-sectional research design.

Table 8. Supplementary direct indirect and total-effect confidence intervals

Relationship	Coefficient	95% percentile CI	Assessment
$X_1 \rightarrow Y$	0.139	[-0.008, 0.298]	Includes zero
$X_2 \rightarrow Y$	-0.011	[-0.198, 0.170]	Includes zero
$X_1 \rightarrow Z$	0.269	[0.169, 0.371]	Excludes zero
$X_2 \rightarrow Z$	0.713	[0.615, 0.795]	Excludes zero
$Z \rightarrow Y$	0.728	[0.520, 0.927]	Excludes zero
$X_1 \rightarrow Z \rightarrow Y$	0.195	[0.110, 0.287]	Excludes zero
$X_2 \rightarrow Z \rightarrow Y$	0.519	[0.354, 0.693]	Excludes zero
$X_1 \rightarrow Y$ total	0.334	[0.172, 0.490]	Excludes zero
$X_2 \rightarrow Y$ total	0.508	[0.359, 0.649]	Excludes zero

Note: Coefficients and confidence intervals were obtained from the supplementary Mode A path-weighting analysis of the final 53-item response matrix. Original t-statistics and p-values are reported in Table 7. Total coefficients were calculated before rounding.

Table 8 presents supplementary 95% percentile confidence intervals for the direct, indirect, and total relationships among the research variables. The direct relationships of financial literacy and perceived security with cashless behavior have confidence intervals of [-0.008, 0.298] and [-0.198, 0.170], respectively, both including zero. Conversely, the indirect relationships through trust have confidence intervals of [0.110, 0.287] for financial literacy and [0.354, 0.693] for perceived security, both excluding zero. The total relationships are also positive, with coefficients of 0.334 for financial literacy and 0.508 for perceived security, supported by confidence intervals of [0.172, 0.490] and [0.359, 0.649], respectively. These findings provide additional support for the interpretation of indirect-only statistical mediation by demonstrating uncertainty around the direct estimates alongside consistently positive indirect estimates. The total coefficients were calculated using unrounded estimates, explaining minor discrepancies when rounded coefficients are summed. The results should be interpreted as statistical associations rather than causal relationships and considered in conjunction with the measurement limitations identified in the discriminant validity assessment.

4.1 The Effect of Financial Literacy on Cashless Behavior

The direct financial literacy coefficient is positive ($\beta = 0.139$), but the original p-value of 0.074 and t-statistic of 1.793 do not support H_1 at the 5% level. The supplementary interval of [-0.008, 0.298] includes zero and also allows a modest positive association. Therefore, the result means that a

unique direct literacy relationship is not established after security and trust are included; it does not mean that financial literacy is irrelevant to cashless behavior. The positive indirect coefficient of 0.195 and total coefficient of 0.334 show why the direct-path interpretation needs this qualification. In substantive terms, knowing how to manage money and evaluate services may be associated with confidence in the provider, while the remaining association with payment practices is small or imprecisely estimated. Needs, merchant acceptance, convenience, and established routines are plausible additional explanations, but their separate effects were not measured here.

TPB links beliefs about behavioral consequences to evaluations and intentions by [Ajzen \(1991\)](#), making financial knowledge a plausible input to the evaluation of payment services ([Widhiari, Laksmana, & Rinaldi, 2025](#)). The present model does not test the intervening TPB attitude or intention constructs; therefore, the insignificant direct path is not a rejection of TPB. This finding is consistent with the insignificant literacy relationships reported by [Giriani \(2021\)](#) and [Seputri and Yafiz \(2022\)](#), but differs from [Sari, Ruscitasari, and Suhada \(2022\)](#), [Wati and Hwihanus \(2025\)](#), and [Muttasari and Lukiastuti \(2020\)](#). These comparisons need to account for different outcomes and the inclusion of trust: a direct coefficient in a mediation model estimates a conditional association and is not necessarily comparable to a coefficient from a model omitting the mediator. [Munasib and Fitriyah \(2025\)](#) also reported an insignificant direct literacy relationship in an MSME performance model, but business performance is a different outcome and cannot validate the present payment finding. The comparison instead illustrates why financial capability should be examined with the specific behavioral context and intervening variables made explicit.

4.2 The Effect of Perceived Security on Cashless Behavior

H_2 is not supported because the direct perceived security coefficient is close to zero ($\beta = -0.011$; $t = 0.124$; $p = 0.901$). Its supplementary interval, $[-0.198, 0.170]$, contains both negative and positive values; therefore, the small negative point estimate should not be interpreted as evidence that greater security reduces cashless behavior. Security perceptions may be associated with a broader confidence judgment that is represented by trust in the model. In that case, little independent security association remains after trust is controlled, even though the indirect and total coefficients are positive. The selection of existing non-cash users may also restrict the variation in payment experience compared with a sample including non-users. This is a possible selection-related explanation, not a measured finding that experienced respondents ignore security.

Perceived security can inform beliefs about obstacles to performing a payment, but it is only one aspect of perceived control ([Ajzen, 1991](#)). [Kamil \(2020\)](#) and [Azmi et al. \(2025\)](#) provide positive findings in related financial technology settings, whereas [Rahadi et al. \(2021\)](#) reported an insignificant security relationship in their Generation Z cashless model. These different results do not establish that security is unimportant; rather, they suggest that its association may depend on the outcome, user group, and inclusion of other evaluations. [Sutrisna et al. \(2026\)](#), including Anita Kusuma Dewi of Politeknik Negeri Lampung, found that self-efficacy was not significantly related to tax-consultant career interest among accounting graduates. This TPB-informed career study addresses another behavior and is not direct evidence about payment security, but it illustrates the need to test control-related assumptions in each context. [Supriatna and Widiyanto \(2026\)](#) considered security through technology adoption, which is also a different intervening construct. Convenience, habits, and transaction requirements remain plausible unmeasured explanations for cashless use; the present estimates directly evaluate only the proposed trust pathway.

4.3 The Effect of Financial Literacy on Trust

Financial literacy is positively associated with trust ($\beta = 0.269$; $t = 5.016$; $p < 0.001$), supporting H_3 . The supplementary interval of $[0.169, 0.371]$ excludes zero. Students who report stronger financial knowledge, management skills, and confidence also report more favorable judgments of provider ability, benevolence, and integrity. One interpretation is that financial understanding helps users evaluate information and recognize whether a payment service suits their financial needs ([Hatari, & Wediawati, 2024](#); [Kantika, Kurniasari, & Mulyono, 2022](#)). This interpretation is consistent with the relationship reported by [Ningrum and Soepatini \(2026\)](#), although their study concerns digital payment

intention. The TPB provides a reason to connect financial understanding with belief-based evaluations by [Ajzen \(1991\)](#), but the direction of formation was not observed in the present survey. Because literacy was measured through self-assessment rather than correct answers to a knowledge test, confidence in one's financial abilities may contribute to the association. General confidence, positive service experiences, or response style could also relate to both scales. The coefficient therefore supports a positive association within the specified model, rather than demonstrating that additional financial instruction necessarily increases trust.

4.4 The Effect of Perceived Security on Trust

Perceived security had the largest coefficient in the trust equation ($\beta = 0.713$; $t = 14.735$; $p < 0.001$), supporting H_4 , with a supplementary interval of [0.615, 0.795]. This is consistent with the view that perceived transaction protection and data confidentiality provide information for judging whether a provider can be relied upon ([Rafii et al., 2025](#); [Kantika et al., 2022](#)). [Mayasari et al. \(2025\)](#) likewise associated security with students' e-wallet trust. However, the size of the relationship requires particular caution. Security and trust had HTMT = 0.893, and its supplementary interval extends above 0.90, even though it remains below 1.00. One trust item explicitly concerns the provider's ability to provide users with security, creating a concrete source of content overlap. Excluding that item leaves the security–trust coefficient at 0.712 and HTMT at 0.893 (Table 9). Thus, the association is not explained entirely by this single item, but the broader overlap remains unresolved. The finding supports a strong relationship between perceived protection and provider confidence in this sample, with a provisional distinction between the constructs.

4.5 The Effect of Trust on Cashless Behavior

Trust is positively associated with reported cashless behavior ($\beta = 0.728$; $t = 7.249$; $p < 0.001$), supporting H_5 ; the supplementary interval is [0.520, 0.927]. This is consistent with [Putri et al. \(2023\)](#) on QRIS transaction decisions and [Aldiansyah et al. \(2024\)](#) on non-cash transaction use, while [Dayan \(2020\)](#) provides an insignificant comparison. In a payment transaction, users depend on providers to process the instruction correctly and handle information appropriately. Confidence in that service may therefore be associated with a willingness to use it repeatedly ([Seputri & Yafiz, 2022](#)). TPB offers an interpretation in which favorable beliefs contribute to intention and behavior, but intention was not separately measured; therefore, the present data do not demonstrate an intention-to-behavior sequence. The dependent block includes satisfaction and recommendation alongside reported use, and these evaluative items may be especially close to favorable provider judgments. Successful past payment experiences could also be associated with greater trust. The large coefficient is consequently interpreted as an association with the broad reported payment-use construct, conditional on the included predictors, rather than a verified increase in transaction frequency.

4.6 The Effect of Financial Literacy on Cashless Behavior with Trust as a Mediating Variable

The financial literacy–trust–cashless behavior indirect coefficient was positive ($\beta = 0.195$; $t = 4.170$; original $p < 0.001$), supporting H_6 . Its supplementary interval, [0.110, 0.287], excludes zero, whereas the direct interval includes zero. This is an indirect-only mediation pattern within the model ([Nitzl et al., 2016](#)). The substantive interpretation is that financial self-assessment is associated with provider confidence, which is in turn linked to reported payment practices. [Maghfiroh and Arwani \(2025\)](#), [Alawi et al. \(2020\)](#), and [Selfianti et al. \(2025\)](#) provide related evidence involving literacy, trust, and digital financial participation, although they examine different services and outcomes. [Ningrum and Soepatini \(2026\)](#) studied payment intention rather than the broad behavior scale. This outcome distinction is a relevant extension and should not be overstated as evidence from actual transaction records. The alternative specification removing the weakest literacy item increases the literacy AVE from 0.503 to 0.516 and retains a positive indirect coefficient of 0.192 with an interval of [0.108, 0.286]. The pattern is therefore stable to this limited item change, but it does not establish stability across the full original 20-item instrument or prove a causal psychological sequence.

4.7 The Effect of Perceived Security on Cashless Behavior with Trust as a Mediating Variable

The perceived security trust cashless behavior indirect coefficient is positive ($\beta = 0.519$; $t = 6.104$; original $p < 0.001$), supporting H_7 . Its supplementary interval, [0.354, 0.693], excludes zero,

while the direct security interval includes zero. This pattern is consistent with indirect-only statistical mediation, with a positive total coefficient of 0.508. [Faridah and Kuswati \(2024\)](#) examined e-wallet adoption through trust, and [Casanova and Nugroho \(2024\)](#) and [Handayani and Anggrainie \(2024\)](#) examined interest in particular services. These studies support the comparison of security and trust but do not make the present outcome equivalent to adoption intention. Perceived protection may accompany confidence that the provider will process transactions as expected ([Safinka & Kristianto, 2026](#)); confidence may then be associated with reported use, satisfaction, and recommendation. Removing the security-related trust item retains an indirect coefficient of 0.515 with an interval of [0.351, 0.688]. This supports stability to that limited specification change, while the HTMT interval still extends above 0.90. Measurement overlap and common response method consequently remain material qualifications. Statistical mediation describes the distribution of associations under the model, not proof that security first produces trust and then produces cashless behavior over time.

4.8 Theoretical interpretation and measurement sensitivity

The joint pattern suggests that trust captures an important part of the association between financial self-assessment, perceived protection, and reported payment practices within the specified model. This finding is consistent with the argument that users evaluate both their understanding of financial services and their confidence in service reliability when engaging in cashless transactions. Trust is identified as the principal proposed psychological mechanism within the tested framework, although alternative mediators such as behavioral intention, perceived usefulness, and convenience were not examined. Consequently, the findings do not establish trust as the dominant mechanism across all digital financial behavior. From a technology acceptance perspective, positive evaluations of service reliability may accompany greater participation in cashless payments, but the cross-sectional data cannot distinguish beliefs that precede usage from those developed through previous transaction experiences. A comprehensive examination of the Theory of Planned Behavior (TPB) would also require separate measurements of attitudes, subjective norms, perceived behavioral control, and behavioral intentions.

To examine the stability of the estimated relationships, supplementary sensitivity analyses were conducted using two alternative indicator specifications. The first specification excluded $X_{I,1}$, the weakest retained financial literacy indicator, while the second excluded Z_{I2} , a trust indicator containing security-related wording. Both specifications were estimated using the same 141 respondents and 5,000 bootstrap resamples. Table 9 presents the resulting financial literacy AVE values, direct coefficients, indirect coefficients, and their corresponding 95% percentile confidence intervals.

Table 9. Sensitivity to alternative final-indicator specifications

Specification	X_I AVE	$X_I \rightarrow Y$	$X_Z \rightarrow Y$	$X_I \rightarrow Z \rightarrow Y$	$X_Z \rightarrow Z \rightarrow Y$
Final 53-item model	0.503	0.139 [-0.008, 0.298]	-0.011 [-0.198, 0.170]	0.195 [0.110, 0.287]	0.519 [0.354, 0.693]
Exclude final $X_{I,1}$	0.516	0.133 [-0.014, 0.290]	-0.014 [-0.202, 0.167]	0.192 [0.108, 0.286]	0.526 [0.362, 0.699]
Exclude Z_{I2}	0.503	0.142 [-0.005, 0.299]	-0.007 [-0.195, 0.170]	0.193 [0.109, 0.282]	0.515 [0.351, 0.688]

Note: Each structural relationship is presented as a coefficient followed by its 95% percentile confidence interval. All specifications used 141 respondents and 5,000 respondent-level bootstrap resamples. X_I represents financial literacy, X_Z represents perceived security, Z represents trust, and Y represents cashless behavior. $X_{I,1}$ is the weakest retained financial literacy indicator, while Z_{I2} contains security-related wording. These analyses assess the sensitivity of the final instrument and do not reconstruct the original 20-item financial literacy measurement block.

Table 9 presents the sensitivity analysis results for alternative indicator specifications to evaluate the stability of the estimated structural relationships. The original 53-item model produced a financial literacy AVE of 0.503. Excluding the weakest retained literacy indicator ($X_{I,1}$) increased the

AVE to 0.516, while the direct relationships of financial literacy ($\beta = 0.133$) and perceived security ($\beta = -0.014$) with cashless behavior remained statistically unsupported because their confidence intervals included zero. The corresponding indirect coefficients were 0.192 and 0.526, with confidence intervals excluding zero. Similarly, excluding the security-related trust indicator (Z_{12}) produced direct coefficients of 0.142 and -0.007 and indirect coefficients of 0.193 and 0.515, preserving the same pattern of statistical significance. These results indicate that the indirect-only statistical mediation pattern remains consistent across the two alternative specifications. Nevertheless, the security–trust HTMT remained approximately 0.893, with an upper confidence bound exceeding 0.90, indicating that discriminant validity concerns persist. The sensitivity analysis therefore supports the stability of the estimated relationships under the examined specifications but does not establish complete measurement validity or causal mediation.

The findings also have practical implications for financial education and digital payment services. Financial literacy initiatives should emphasize informed decision-making, evaluation of transaction risks, and responsible financial management rather than merely encouraging more frequent cashless transactions. Digital payment providers should prioritize service reliability, transparent security procedures, and effective complaint resolution to strengthen users' confidence. The measurement of cashless behavior in this study incorporates self-reported frequency, habits, satisfaction, and recommendations, which should not be interpreted as verified transaction activity or evidence of improved financial welfare. Convenience, transaction necessity, and habitual usage may also influence payment behavior, although these factors were not independently examined in the present model. Future research should incorporate longitudinal observations, objective transaction records, and additional explanatory variables to distinguish the proposed trust mechanism from alternative pathways and evaluate potential causal relationships ([Rohrer, 2018](#)).

5. CONCLUSIONS

5.1 Conclusion

The seven hypotheses yielded a consistent pattern. H_1 and H_2 are not supported: financial literacy and perceived security do not have statistically significant direct relationships with self-reported cashless behavior after trust is included in the model. H_3 and H_4 are supported because both predictors are positively associated with trust, and H_5 is supported because trust is positively associated with cashless behavior. H_6 and H_7 were supported by positive indirect relationships through trust. The supplementary indirect-effect intervals excluded zero, whereas both direct-effect intervals included zero, supporting an indirect-only statistical mediation classification. The principal empirical contribution is this joint comparison in a sample of existing non-cash payment users studying accounting at Politeknik Negeri Lampung, Indonesia. The results are consistent with trust as an intervening evaluation connecting financial self-assessment and perceived protection to reported digital financial practices. The cross-sectional design, common response method, and borderline security–trust distinction do not establish trust as a causal mechanism for the results.

The theoretical implication is that conditional direct paths and indirect paths should be interpreted together in digital financial behavior research. A weak remaining direct relationship can coexist with a meaningful indirect association, without implying that literacy or protection has no overall relevance. The practical recommendations are distinct from this theoretical interpretation. Students can use payment records to evaluate expenditure, assess whether a service meets their needs, and protect access credentials and personal information. Providers can improve transparent information, reliable transaction processing, complaint handling, and user-facing explanations of security controls. Accounting educators can connect financial management topics with critical evaluation of payment services. These applications are consistent with the constructs and findings; however, their effectiveness was not tested as interventions in this study.

5.2 Research Limitations

This study is limited to voluntarily participating students in the Tax Accounting and Digital Business Accounting programs at one institution. Purposive sampling provides no known selection probability, so neither a population margin of error nor representativeness of Indonesian Generation Z

can be claimed. The generation label is not supported by a separately reported age distribution. The sample-size sensitivity assessment supports the detection of moderately sized paths under its approximation but not high power for every small direct effect or indirect product. All constructs were reported by the same respondents at one time. Financial literacy represents perceived knowledge, financial practices, skills, and confidence rather than an objectively scored knowledge test; cashless behavior includes frequency and habit together with satisfaction and recommendation rather than independently verified transaction counts. Common method bias, social desirability, omitted predictors, and reverse-direction relationships therefore cannot be ruled out. The security–trust HTMT interval does not satisfy a strict upper-bound-below-0.90 rule. The final literacy AVE only narrowly meets 0.50, and removing eight items may change the breadth of the original construct even though the four final dimensions remain represented. Complete wording and item-level response data for all eight deleted items are unavailable in the retained instrument record, preventing full 61-item sensitivity re-estimation. Pre-survey pilot validation and translation-equivalence procedures were not documented. Finally, 34.0% of cashless behavior variance and 23.1% of trust variance remain unexplained, and the blindfolding results do not substitute for external predictive validation.

5.3 Suggestions and Directions for Future Research

Future research should use multi-institutional samples and, where feasible, probability-based recruitment to examine the transferability of the model. Financial knowledge should be assessed using objectively scored questions alongside self-assessment, and payment behavior should be separated from satisfaction and recommendations. Consent-based transaction diaries or anonymized provider records would permit a comparison between reported habits and recorded transactions. Longitudinal measurements of literacy, security, trust, and subsequent payment use are needed to examine temporal ordering. An educational or service-design intervention would require an appropriate comparison design before causal effects can be claimed. Ease of use, perceived usefulness, social influence, merchant acceptance, and habit should be specified and measured as additional variables rather than as assumed explanations. Future instrument work should recover and document the full original 61-item version, record translation and expert review procedures where relevant, and evaluate whether a multidimensional measurement specification is preferable. Security and trust items should be refined to distinguish protection assessments from provider ability, benevolence, and integrity issues. Sample sizes should be planned prospectively for the smallest substantively important direct and indirect relationships, with adequate resampling and external predictive assessments.

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AUTHOR CONTRIBUTIONS

SMP conducted the source thesis research and empirical analysis. EY served as a contributing author and participated in manuscript drafting and critical review. II supervised the research and contributed to the manuscript review and finalization. AKD contributed to data validation, manuscript improvement, and final editing. All authors have reviewed and approved the final version of the manuscript.

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