

# Understanding Consumer Purchase Behavior in Digital Marketplaces: A SEM-PLS Approach to Ease of Use, Trust, and Transaction Security

Ibrahim Fanji Dipura<sup>1</sup>, Hulwatul Adzro<sup>1</sup>, Muhammad Rizky<sup>1</sup>, Taufik Hudha Nursyafaah<sup>1</sup>, Neni Alyani<sup>1,2</sup>, M Miftahul Madya<sup>1</sup>

<sup>1</sup>Lembaga Riset AI Creation (LRAC), Depok, Indonesia

<sup>2</sup>Institut Pemerintahan Dalam Negeri, Sumedang, Indonesia

\*corresponding author: mmiftahulm29@gmail.com

Received 2 April 2026;

Accepted 6 April 2026;

Available Online 30 April 2026

## *Keywords:*

Consumer Trust;  
Digital Marketplace;  
Perceived Ease of Use;  
Purchase Decision;  
Transaction Security

## *Abstract:*

The rapid growth of digital marketplaces has significantly influenced consumer purchasing behavior, highlighting the importance of understanding key determinants such as ease of use, trust, and transaction security. This study aims to analyze the influence of perceived ease of use and consumer trust on purchase intention and purchase decisions, with transaction security as a moderating variable. A quantitative approach was employed using the SEM-PLS method with data collected from 100 respondents through a Likert scale questionnaire (1–5). The analysis focused on evaluating the measurement model using outer loading, AVE, Cronbach's Alpha, rho\_c, and VIF. The results indicate that most constructs do not meet the required validity and reliability thresholds, as reflected by low AVE and reliability values, along with several weak and negative indicator loadings. These findings suggest limitations in the measurement model. In conclusion, refinement of measurement instruments is necessary to obtain more accurate results in analyzing consumer behavior in digital marketplace contexts.

## *Abstrak:*

Perkembangan pesat marketplace digital telah secara signifikan memengaruhi perilaku pembelian konsumen, sehingga penting untuk memahami faktor-faktor utama seperti kemudahan penggunaan, kepercayaan, dan keamanan transaksi. Penelitian ini bertujuan untuk menganalisis pengaruh perceived ease of use dan kepercayaan konsumen terhadap niat beli dan keputusan pembelian, dengan keamanan transaksi sebagai variabel moderasi. Penelitian ini menggunakan pendekatan kuantitatif dengan metode SEM-PLS terhadap 100 responden melalui kuesioner skala Likert (1–5). Analisis difokuskan pada evaluasi model pengukuran menggunakan outer loading, AVE, Cronbach's Alpha, rho\_c, dan VIF. Hasil penelitian menunjukkan bahwa sebagian besar konstruk belum memenuhi kriteria validitas dan reliabilitas, ditandai dengan nilai AVE dan reliabilitas yang rendah serta adanya beberapa indikator dengan loading lemah dan negatif. Temuan ini menunjukkan adanya keterbatasan pada model pengukuran. Kesimpulannya, diperlukan perbaikan instrumen penelitian untuk memperoleh hasil yang lebih akurat.

## 1. INTRODUCTION

The rapid development of digital technology has significantly transformed consumer behavior, particularly in the context of online shopping through marketplaces. Platforms such as e-commerce applications have enabled consumers to access a wide range of products and services efficiently, thereby increasing the importance of understanding the factors that influence online purchasing behavior. Among these factors, perceived ease of use and consumer trust have been widely recognized as key determinants in shaping consumer attitudes and decisions in digital environments. According to Fred D. Davis, perceived ease of use refers to the degree to which a person believes that using a system would be free of effort, which directly influences behavioral intention [1]. Meanwhile, trust plays a critical role in reducing uncertainty and perceived risk in online transactions [2].

In the context of marketplace platforms, ease of use (PEOU) and consumer trust (TRUST) are closely associated with consumers' purchase intention (PI) and purchase decisions (PD). A user-friendly interface allows consumers to navigate the application easily, search for products efficiently, and complete transactions without difficulty, thereby enhancing their intention to purchase. On the other hand, trust in the

platform and sellers ensures that consumers feel confident in the reliability of product information and the security of transactions. Furthermore, transaction security (SEC) is an essential factor that can strengthen or weaken the relationship between these variables, as concerns over data privacy and payment safety remain major issues in online commerce [3].

Several previous studies have employed the Partial Least Squares Structural Equation Modeling (SEM-PLS) approach to analyze relationships among behavioral and technological variables across various contexts. SEM-PLS is considered suitable for exploratory research and complex models involving multiple constructs and moderating variables, particularly in studies examining technology adoption and behavioral intention [4]. Prior research also highlights that trust and satisfaction significantly influence long-term relationships in e-commerce environments [5]. Furthermore, empirical studies demonstrate that SEM-PLS has been widely applied to analyze technology acceptance and sustainability, such as in vocational education where factors like communication, ease of use, and effectiveness influence continued technology usage after the pandemic [6]. In the field of scientific education, SEM-PLS has been used to confirm that perception and knowledge significantly affect

analytical competencies, emphasizing the importance of data literacy in AI-based learning [7]. Additionally, research on multicultural communities reveals that SEM-PLS can effectively model complex relationships among leadership, cultural intelligence, and social adaptation in shaping tolerance [8]. In organizational and professional contexts, SEM-PLS has also been utilized to examine the role of program quality and mentor support in improving work readiness, with technological tools acting as moderating variables that strengthen these relationships [9]. Similarly, studies in digital commerce show that promotion and social influence significantly affect purchase decisions, both directly and through mediating variables such as convenience [10]. Other research highlights that service awareness and management quality influence behavioral outcomes like library visit frequency through user interest as a mediator [11]. Moreover, SEM-PLS has been applied to analyze how work environment and motivation affect work readiness through competence as a mediating variable [12]. In the context of digital transformation, studies indicate that technology readiness plays a crucial role in the adoption of AI and its impact on organizational performance [13]. Likewise, digital capability has been shown to influence innovation capability and operational efficiency through AI utilization, although some measurement

indicators still require refinement [14]. Finally, research specifically addressing perceived ease of use demonstrates its significant role in driving technology adoption and enhancing competitive advantage in digital startups [15]. In addition, recent studies in the field of chemical education highlight that SEM-PLS can effectively analyze cognitive variables influencing method validation practices, emphasizing that conceptual understanding of validation parameters, such as accuracy and precision, plays a crucial role in ensuring reliable and standardized analytical outcomes [16].

Recent developments in chemometric analysis further demonstrate the application of SEM-PLS in evaluating simple technology implementation, particularly using tools such as Orange Data Mining. Studies show that while simple technology improves accessibility in spectral data analysis, its effectiveness is highly dependent on users' analytical capabilities and data literacy, which often act as moderating variables [17]. Additionally, research on spectral preprocessing using the Savitzky-Golay method indicates that although preprocessing accuracy may meet validity and reliability standards, limitations in measurement indicators and user competency can affect the overall structural model evaluation [18]. Similarly, other studies reveal that simple technology implementation can

enhance statistical understanding but has limited impact on more complex analytical tasks such as outlier detection, highlighting the need for stronger data literacy and analytical skills to optimize technology utilization [19]. Despite the extensive use of SEM-PLS in these studies, the role of transaction security as a moderating variable in shaping online purchase intention and purchase decisions remains underexplored, particularly in marketplace contexts where cybersecurity concerns continue to evolve.

Despite the extensive body of literature utilizing SEM-PLS to examine relationships among technological, behavioral, and organizational variables, several research gaps remain. First, prior studies have predominantly focused on direct and mediating relationships, while the moderating role of transaction security has received relatively limited attention, particularly in the context of online marketplaces. Second, although perceived ease of use and consumer trust have been widely acknowledged as key determinants of purchase intention and purchase decisions, the simultaneous examination of these variables within an integrated model that includes both intention and actual decision-making behavior is still insufficient. Third, the rapid evolution of digital marketplaces, accompanied by increasing concerns over data privacy and transaction

security, necessitates a more comprehensive analysis of how security perceptions influence consumer behavior. Therefore, this study aims to analyze the influence of perceived ease of use and consumer trust on purchase intention and purchase decisions in marketplaces, with transaction security as a moderating variable. This research is expected to contribute to the development of consumer behavior theory in digital contexts and provide practical insights for marketplace providers in enhancing user trust, system usability, and transaction security.

## 2. METHOD

This study employs a quantitative research approach using the Partial Least Squares Structural Equation Modeling (SEM-PLS) method to analyze the relationships among variables. SEM-PLS is considered appropriate for this study due to its ability to handle complex models involving multiple constructs, including moderating variables, and its suitability for predictive and exploratory analysis [20]. The model in this research consists of five main variables, namely Perceived Ease of Use (PEOU) and Consumer Trust (TRUST) as independent variables, Transaction Security (SEC) as a moderating variable, and Purchase Intention (PI) and Purchase Decision (PD) as dependent variables.

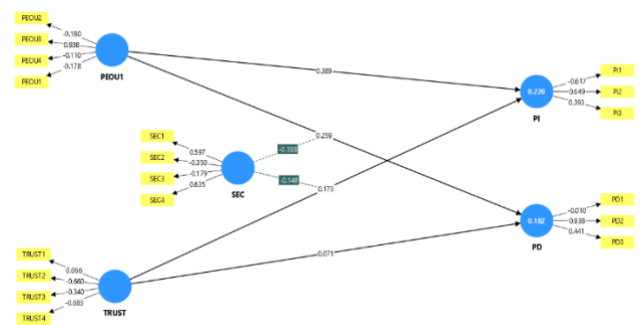
The data were collected through a survey using a structured questionnaire distributed to 100 respondents who have experience using marketplace platforms. The sampling technique applied in this study is purposive sampling, targeting individuals who have conducted online transactions. The measurement of all variables was conducted using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), which is commonly used to capture respondents' perceptions and attitudes toward technology usage and online purchasing behavior [21]. The indicators used to measure each variable are presented in a separate table and are not described narratively in this section.

**Table 1** Variable, Definition, and Indicator

Variable	Type	Code	Indicator
Perceived Ease of Use (PEOU)	Independent	PEOU1	Easy to learn
		PEOU2	Easy to understand
		PEOU3	Easy to use
		PEOU4	Facilitates transaction process
Consumer Trust (TRUST)	Independent	TRUST 1	Trust in marketplace
		TRUST 2	Trust in seller
		TRUST 3	Honest information
		TRUST 4	Secure transaction
Transaction Security (SEC)	Moderating	SEC1	Payment security
		SEC2	Data protection
		SEC3	Privacy protection
		SEC4	Transaction safety
Purchase Intention (PI)	Dependent	PI1	Intention to buy

		PI2	Interest in product
		PI3	Willingness to purchase
Purchase Decision (PD)	Dependent	PD1	Product selection
		PD2	Actual purchase
		PD3	Decision confirmation

Data analysis was conducted using the SEM-PLS approach, which involves two main stages: measurement model (outer model) evaluation and structural model (inner model) evaluation. In this study, the evaluation focuses on the measurement model to ensure the validity and reliability of the constructs. The criteria used include outer loading to assess indicator reliability, Variance Inflation Factor (VIF) to detect multicollinearity, Average Variance Extracted (AVE) to evaluate convergent validity, as well as Cronbach's Alpha and composite reliability (rho\_c) to assess internal consistency reliability [20], [22].



**Fig. 1** Model Diagram and Intervariable Relationship

Furthermore, the moderating effect of transaction security (SEC) is analyzed by

examining the interaction effect between independent variables (PEOU and TRUST) and the dependent variables (PI and PD). SEM-PLS allows for the estimation of such interaction effects effectively, even with relatively small sample sizes [20]. The results of this analysis are expected to provide a comprehensive understanding of how transaction security influences the strength of relationships between ease of use, trust, purchase intention, and purchase decisions in marketplace contexts.

### 3. RESULT AND DISCUSSION

The evaluation of the measurement model (outer model) in this study aims to assess the validity and reliability of the constructs used to measure perceived ease of use (PEOU), consumer trust (TRUST), transaction security (SEC), purchase intention (PI), and purchase decision (PD). The assessment is based on several criteria, including outer loading, Average Variance Extracted (AVE), Cronbach's Alpha, composite reliability (rho\_c), and Variance Inflation Factor (VIF). According to established SEM-PLS guidelines, an acceptable outer loading value should exceed 0.70, AVE should be above 0.50, and reliability values (Cronbach's Alpha and composite reliability) should also exceed 0.70 to ensure construct validity and internal consistency [23], [24].

Based on the results, most constructs in this study do not meet the recommended

thresholds for validity and reliability. The AVE values for all variables, namely PEOU (0.239), TRUST (0.256), SEC (0.228), PI (0.319), and PD (0.358), are below the acceptable threshold of 0.50, indicating that the constructs do not sufficiently explain the variance of their indicators. Similarly, the Cronbach's Alpha and composite reliability (rho\_c) values for all constructs are below 0.70, suggesting weak internal consistency. For instance, PEOU has a Cronbach's Alpha of 0.011 and rho\_c of 0.068, while TRUST shows values of 0.081 and 0.468, respectively. These findings indicate that the measurement model lacks reliability and requires refinement [23].

In terms of indicator reliability, the outer loading results reveal that only a few indicators meet the acceptable threshold. For example, PEOU3 (0.938) and PD2 (0.938) demonstrate strong loadings, indicating that these indicators are valid measures of their respective constructs. However, most other indicators show low or even negative loadings, such as PEOU1 (-0.178), TRUST2 (-0.660), and PI1 (-0.617). Negative loadings suggest that the indicators may not align with the intended construct or that there are issues with measurement design, such as poorly formulated questionnaire items or inconsistent respondent understanding [24]. This condition

indicates that several indicators should be removed or revised to improve construct validity.

Despite these limitations, the VIF values for all indicators are below the threshold of 5, indicating that there is no multicollinearity issue among the indicators. This suggests that the indicators are not highly correlated with each other, and redundancy is not a major concern in the model [23]. Additionally, the moderating constructs (SEC × PEOU and SEC × TRUST) show VIF values of 1.000, indicating stable interaction terms. However, the lack of validity and reliability in the main constructs limits the ability to interpret the moderating effects accurately.

From a theoretical perspective, the findings of this study are not fully consistent with previous research, which generally found that perceived ease of use and trust significantly influence purchase intention and purchase decisions in online environments [1], [2]. The inconsistency in this study may be attributed to measurement issues, such as inadequate indicator design, limited sample size, or respondents' misunderstanding of questionnaire items. Previous studies using SEM-PLS have emphasized the importance of valid and reliable measurement models before proceeding to structural model analysis [4], [23].

Practically, these results imply that marketplace providers should not only focus on improving ease

of use and trust but also ensure that users clearly perceive these aspects through well-designed interfaces and transparent communication. Moreover, the weak measurement of transaction security suggests that consumers may not fully recognize or understand security features, which could reduce the effectiveness of security as a moderating factor. Therefore, enhancing user awareness of security mechanisms, such as secure payment systems and data protection policies, is crucial in strengthening consumer confidence [25].

In conclusion, the outer model evaluation indicates that the current measurement model requires significant improvement before further analysis can be conducted. Future research should refine the measurement instruments by revising or removing invalid indicators, increasing the sample size, and ensuring better alignment between theoretical constructs and empirical measures. By improving the measurement model, subsequent studies can provide more accurate insights into the relationships between ease of use, trust, transaction security, and online purchasing behavior.

Construct & Indicator	Loading Factor	AVE	Cronbach's Alpha	rho <sub>c</sub>	VIF
<b>PEOU</b>		0.239	0.011	0.068	
PEOU1	-0.178				1.056
PEOU2	-0.180				1.012
PEOU3	0.938				1.026
PEOU4	-0.110				1.068

<b>TRUST</b>		0.256	0.081	0.468	
TRUST1	0.066				1.015
TRUST2	-0.660				1.011
TRUST3	-0.340				1.010
TRUST4	-0.683				1.006
<b>SEC</b>		0.228	0.060	0.138	
SEC1	0.597				1.009
SEC2	-0.350				1.019
SEC3	-0.179				1.012
SEC4	0.635				1.013
<b>PI</b>		0.319	0.209	0.081	
PI1	-0.617				1.009
PI2	0.649				1.015
PI3	0.393				1.015
<b>PD</b>		0.358	0.031	0.493	
PD1	-0.010				1.010
PD2	0.938				1.021
PD3	0.441				1.013
SEC <sup>x</sup> PEOU1	1.000				1.000
SEC <sup>x</sup> TRUST	1.000				1.000

Construct & Indicator	Description
<b>PEOU</b>	<b>Not valid and not reliable</b>
PEOU1	Not valid
PEOU2	Not valid
PEOU3	Valid
PEOU4	Not valid
<b>TRUST</b>	<b>Not valid and not reliable</b>
TRUST1	Not valid
TRUST2	Not valid
TRUST3	Not valid
TRUST4	Not valid
<b>SEC</b>	<b>Not valid and not reliable</b>
SEC1	Valid
SEC2	Not valid
SEC3	Not valid
SEC4	Valid
<b>PI</b>	<b>Not valid and not reliable</b>
PI1	Not valid
PI2	Valid
PI3	Not valid
<b>PD</b>	<b>Not valid and not reliable</b>
PD1	Not valid
PD2	Valid
PD3	Not valid

## 4. CONCLUSION

This study aimed to examine the influence of perceived ease of use and consumer trust on purchase intention and purchase decisions in

marketplaces, with transaction security as a moderating variable using the SEM-PLS approach. The results of the outer model evaluation indicate that most constructs do not meet the required validity and reliability criteria, as reflected by low AVE, Cronbach's Alpha, and composite reliability values. Only a few indicators demonstrate acceptable loading values, while several others show weak or negative loadings, suggesting measurement issues. These findings imply that the current measurement model requires refinement before further structural analysis can be conducted. Future research is recommended to improve the quality of measurement instruments by revising or removing invalid indicators and ensuring better alignment between constructs and indicators. Despite these limitations, this study highlights the importance of ease of use, trust, and transaction security in understanding consumer behavior in digital marketplace contexts.

## REFERENCES

- [1] F. D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," *MIS Quarterly*, vol. 13, no. 3, pp. 319–340, 1989.
- [2] D. Gefen, E. Karahanna, and D. W. Straub, "Trust and TAM in online shopping: An integrated model," *MIS Quarterly*, vol. 27, no. 1, pp. 51–90, 2003.

- [3] P. A. Pavlou, "Consumer acceptance of electronic commerce: Integrating trust and risk with the technology acceptance model," *International Journal of Electronic Commerce*, vol. 7, no. 3, pp. 101–134, 2003.
- [4] Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). Sage.
- [5] Kim, S., Ferrin, J., & Rao, H. (2009). Trust and satisfaction, two stepping stones for successful e-commerce relationships: A longitudinal exploration. *Information Systems Research*, 20(2), 237–257.
- [6] Pratama, M. O., et al. (2025). Analisis kebutuhan dan minat dalam pemanfaatan teknologi digital di SMK Depok menggunakan SEM-PLS. *Jurnal Terapan Informatika Nusantara*, 6(6), 635–643.
- [7] Alyani, N., et al. (2025). Analysis of perception and knowledge on chemometric competence among students and practitioners using SEM-PLS. *Jurnal Manajemen Sumber Daya Aparatur*, 13(2).
- [8] Alyani, N., et al. (2025). Building a culture of tolerance through sustainable leadership, cultural intelligence, and social adaptation: Evidence from a multicultural community in Indonesia. *Khazanah Sosial*, 7(4).
- [9] Adzro, H., et al. (2026). Analysis of interns' work readiness: The roles of program quality, mentor support, and project management tools using SEM-PLS. *J-GADS: Journal of Governance and Applied Data Science*, 1(1).
- [10] Dipura, I. F., et al. (2026). The influence of promotion and social influence on online purchase decisions mediated by convenience. *J-GADS: Journal of Governance and Applied Data Science*, 1(1).
- [11] Alyani, N., et al. (2026). Service awareness and management effects on library visit frequency mediated by user interest using SEM-PLS. *J-GADS: Journal of Governance and Applied Data Science*, 1(1).
- [12] Nursyafaah, T. H., et al. (2026). The effect of work environment and motivation on work readiness through competence using a SEM-PLS approach. *J-GADS: Journal of Governance and Applied Data Science*, 1(1).
- [13] Nursyafaah, T. H., et al. (2026). Pengaruh teknologi readiness terhadap adopsi AI generatif dan dampaknya terhadap kinerja startup menggunakan SEM-PLS. *J-KBDI: Jurnal Kecerdasan Buatan dan Data Science Industri*, 1(1).
- [14] Alyani, N., et al. (2026). Pengaruh digital capability terhadap innovation capability dan operational efficiency startup melalui pemanfaatan AI generatif. *J-KBDI: Jurnal*

- Kecerdasan Buatan dan Data Science Industri*, 1(1).
- [15] Alyani, N., et al. (2026). Pengaruh perceived ease of use terhadap AI generative adoption dalam meningkatkan competitive advantage startup digital. *J-KBDI: Jurnal Kecerdasan Buatan dan Data Science Industri*, 1(1).
- [16] Nursyafaah, T. H., et al. (2026). Pemanfaatan SEM-PLS dalam menganalisis variabel kognitif terhadap validasi metode pada bidang kimia. *J-TP MIPA: Jurnal Transformasi Pendidikan MIPA*, 1(1).
- [17] Dipura, I. F., et al. (2026). The effect of simple technology implementation on the quality of spectral signal analysis in beginner researcher communities using Orange Data Mining. *INJCEI: International Journal of Community Engagement and Impact*, 1(1).
- [18] Nursyafaah, T. H., et al. (2026). The effect of simple technology implementation on spectral preprocessing accuracy using the Savitzky-Golay method in chemometric analysis based on Orange Data Mining. *INJCEI: International Journal of Community Engagement and Impact*, 1(1).
- [19] Rizky, M., et al. (2026). The effect of simple technology implementation on chemometric analysis performance through statistical understanding and outlier detection. *INJCEI: International Journal of Community Engagement and Impact*, 1(1).
- [20] J. F. Hair, G. T. M. Hult, C. M. Ringle, and M. Sarstedt, *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, 2nd ed. Thousand Oaks, CA: Sage, 2017.
- [21] R. Likert, "A technique for the measurement of attitudes," *Archives of Psychology*, vol. 22, no. 140, pp. 1–55, 1932.
- [22] C. M. Ringle, S. Wende, and J.-M. Becker, "SmartPLS 3," SmartPLS GmbH, Boenningstedt, Germany, 2015.
- [23] J. F. Hair, C. M. Ringle, and M. Sarstedt, "PLS-SEM: Indeed a silver bullet," *Journal of Marketing Theory and Practice*, vol. 19, no. 2, pp. 139–152, 2011.
- [24] W. W. Chin, "The partial least squares approach to structural equation modeling," in *Modern Methods for Business Research*, G. A. Marcoulides, Ed. Mahwah, NJ: Lawrence Erlbaum Associates, 1998, pp. 295–336.
- [25] P. A. Pavlou and D. Gefen, "Building effective online marketplaces with institution-based trust," *Information Systems Research*, vol. 15, no. 1, pp. 37–59, 2004.