



**FROM COMFORT TO CONCERN: THE EFFECT OF ARTIFICIAL INTELLIGENCE
(AI) PERSONALIZATION AND DATA PRIVACY RISK PERCEPTION ON
CONSUMER LOYALTY ON SHOPEE E-COMMERCE IN SURABAYA**

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Abstract

Shopee is the most used e-commerce platform in Indonesia, and its product recommendations depend on AI that processes users' personal data. Drawing on privacy calculus theory, this study examines how AI Personalization and Data Privacy Risk Perception affect the loyalty of Shopee users in Surabaya. The study used an explanatory quantitative design. The sample consisted of 150 respondents aged 18 to 28 who lived in Surabaya and had purchased through the Shopee app, selected by purposive sampling. Data came from a five-point Likert questionnaire with items adapted from recent empirical studies and were analyzed in IBM SPSS Statistics 23 through validity, reliability, and classical assumption tests, multiple linear regression, the t-test, and the F-test. AI Personalization has a positive and significant effect on Consumer Loyalty. Data Privacy Risk Perception is also significant, but its coefficient is positive, so H2, which predicted a negative effect, is rejected. This result points to a privacy paradox among young users. Taken together, the two variables significantly explain Consumer Loyalty.

Keywords: Artificial Intelligence (AI) Personalization, Data Privacy Risk, Consumer Loyalty, E-Commerce



INTRODUCTION

Over the past decade, digital technology has reshaped how Indonesians buy and sell, and buying everyday goods online has grown faster than almost any other retail channel. Online marketplaces let shoppers compare and order products in a few taps, a process that is far quicker than visiting physical stores. Among these marketplaces, Shopee stands out because it bundles search, payment, promotion, and delivery features into a single application. Its widespread use signals a change in shopping habits, as more consumers now depend on digital services to meet their daily needs.

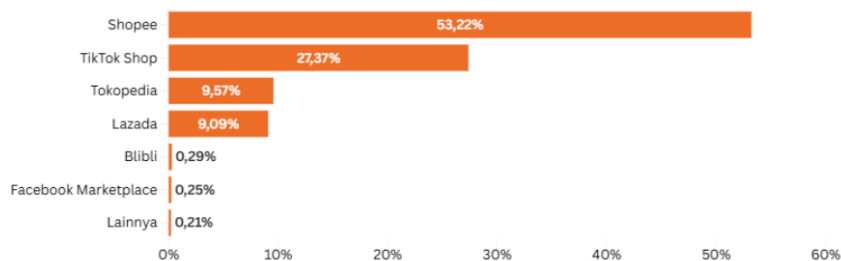


Figure 1.
Most Accessed E-Commerce Platforms in Indonesia in 2025

Source: goodstats.id (2025)

Shopee was chosen as the object of this study because of its market position. A 2025 survey published by goodstats.id placed Shopee as the e-commerce platform Indonesians access most often, at 53.22%, well ahead of its competitors. Such a large share means that users meet Shopee's AI-driven product recommendations very frequently. Frequent use, in turn, exposes consumers both to the advantages of personalized content and to the possibility that their personal data are exploited, particularly as their reliance on digital services keeps rising (Islamiati et al., 2023).

To compete, e-commerce platforms rely on AI to improve the services they offer. On Shopee, AI is built into the search function so that users can narrow results by location, seller type, payment method, shipping option, promotion, price range, rating, brand, and category, after which the results are adjusted to each user (Zikry et al., 2024). AI also drives the product suggestions that appear on the home page, which are drawn from a user's earlier searches and preferences, so that every user sees a different and more relevant display. Through this personalization, Shopee seeks to make shopping more convenient, and earlier studies report that such technology improves users' shopping experience (Rabani et al., 2024).



The use of AI, however, brings its own problems, especially regarding data privacy and security. Because personalization requires large amounts of user data, consumers may worry that their personal information will be used in ways they did not agree to, and this perceived risk can lower their trust in e-commerce services (Setyawan, 2022). Platforms such as Shopee therefore face a dilemma: they need to make personalization as effective as possible while keeping users confident that their data are safe.

The relationship among personalization, privacy risk, and loyalty can be explained through the privacy calculus perspective, which views consumers as weighing the benefits of personalized services against the perceived costs of disclosing personal data (McKee et al., 2024). On the benefit side, personalized recommendations increase perceived relevance and usefulness, which in turn encourages continued use of the platform (An & Ngo, 2025). On the cost side, concerns about excessive data collection, unauthorized secondary use, improper access, and low transparency are perceived as potential losses that can erode trust (Khoa et al., 2024; Gouthier et al., 2022). When consumers perceive that these risks outweigh the benefits, trust declines and psychological reactance increases, which ultimately weakens loyalty (Chen et al., 2022). On this basis, expect users who see more privacy risk to be less loyal. However, studies on the personalization–privacy paradox also show that consumers, especially younger generations, often remain loyal to a platform even though they are concerned about their data, because the perceived benefits are considered greater (McKee et al., 2024). This contradictory possibility makes the role of privacy risk in shaping loyalty on Shopee important to test empirically.

Earlier work has looked at how online marketplaces apply AI to tailor what each shopper sees. The expansion of marketplaces as a form of digital trade has noticeably reshaped the way people transact, and Shopee has emerged as the dominant marketplace in Indonesia, making it a frequent object of research on digital platform features (Alamin et al., 2023; Risnaldi et al., 2023). AI-based service personalization has been proven to enhance digital marketing effectiveness, as the system can tailor product content according to individual user preferences. This technology also benefits micro, small, and medium enterprises (MSMEs) marketing products through marketplaces (Santoso et al., 2024), while increasing product visibility through recommendation systems based on consumer behavior data (Aryana & Wedagama, 2025).

Studies on loyalty in digital platforms further indicate that a good user experience strengthens consumers' long-term attachment to a platform (Sabila,



2025), and that loyalty grows when a platform offers relevant services that match user needs (Rahmat et al., 2026). Even so, research that brings AI personalization, data privacy risk, and consumer loyalty together in a single model for Shopee users in Indonesia remains scarce.

Theoretically, add to research on digital consumers by checking whether the privacy calculus, with personalization as the benefit and privacy risk as the cost, explains why Shopee users in Indonesia stay loyal. For practice, Shopee and the MSMEs selling on it can use the results when they plan personalization, so that recommendations sell well without costing users' trust in how their data are handled. Given Shopee's dominance in Indonesia and users' growing awareness of their data rights, these questions deserve timely answers that MSMEs can act on.

LITERATURE REVIEW

Artificial Intelligence (AI) Personalization

In digital services, AI describes software that reads data, learns from how people behave, and makes decisions through algorithms. In e-commerce platforms, AI is applied in the form of recommendation systems that adjust the display of products, promotions, and content based on user preferences and behavior (Zikry et al., 2024). AI Personalization in this study is defined as the user's perception of the extent to which AI-based recommendations on the platform are tailored to his or her interests, needs, and preferences, based on historical data such as search history, purchase patterns, and in-app interactions (Maylinda & Andarini, 2024; An & Ngo, 2025). Accordingly, this variable is measured from the user's perceived personalization rather than from the technical capabilities of AI.

Following recent studies on perceived personalization in AI-driven e-commerce (Chen et al., 2022; An & Ngo, 2025; Hassan et al., 2025; Maylinda & Andarini, 2024), AI Personalization is measured using five indicators: (1) interest fit, that is, recommendations match the user's interests; (2) need fit, that is, the products displayed match the user's needs; (3) preference understanding, that is, the system understands what the user is looking for; (4) perceived relevance, that is, recommendations are relevant to the user's preferences; and (5) ease of product discovery, that is, recommendations make it easier for the user to find the desired products.

Data Privacy Risk

Data privacy risk refers to consumers' perception of the potential misuse, leakage, or unauthorized use of personal data during digital transactions. In e-



commerce systems, collecting personal data is an essential part of service personalization mechanisms used by platforms to understand consumer behavior (Prayuti, 2024). However, the larger the volume of data collected, the higher the potential risk perceived by users, and perceived risk is a factor influencing consumers' online decisions (Wati & Rijali, 2024). In the context of e-commerce, data security and transparency of privacy policies are critical factors in building consumer trust in digital platforms (Shabilla et al., 2025). Based on the dimensions of concern for information privacy used in recent e-commerce studies (Khoa et al., 2024; Gouthier et al., 2022; McKee et al., 2024), data privacy risk is measured using five indicators: (1) concern about data misuse (unauthorized secondary use); (2) perceived data insecurity; (3) concern about data leakage (improper access); (4) lack of transparency in data use (awareness); and (5) excessive data collection.

Consumer Loyalty

Consumer loyalty is the commitment of consumers to continue using and repurchasing from a platform and to maintain a long-term relationship with it, reflected not only in repeat purchases but also in the willingness to recommend the platform to others and resistance to switching to competitors (Sabila, 2025; Risnaldi et al., 2023). In e-commerce, consumer loyalty is influenced by the platform usage experience, service quality, and trust in the digital system used (Maylinda & Andarini, 2024; Chen et al., 2022).

Referring to recent studies on e-commerce loyalty (Risnaldi et al., 2023; Hassan et al., 2025; Amarili & Widjajanti, 2026), consumer loyalty is measured using five indicators: (1) continuance (reuse) intention; (2) repeat purchase; (3) resistance to switching to other platforms; (4) willingness to recommend; and (5) first-choice preference, that is, making Shopee the main choice for online shopping.

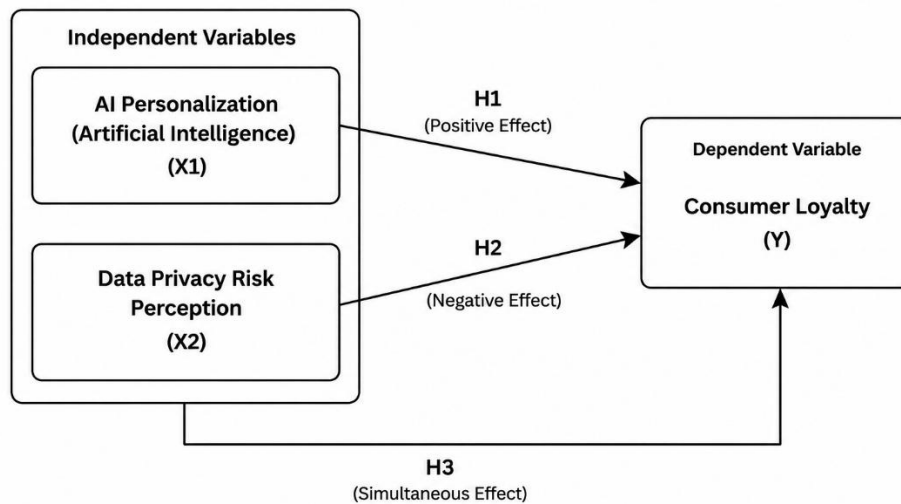


Figure 2.
Research Model

Based on the privacy calculus perspective, personalized recommendations are a benefit that increases relevance, convenience, and trust, thereby strengthening loyalty (An & Ngo, 2025; Hassan et al., 2025). Conversely, perceived data privacy risk is a cost that reduces trust and triggers reactance, so higher perceived risk is expected to weaken loyalty (Chen et al., 2022; McKee et al., 2024). Users weigh the two against each other when they judge the platform as a whole. Figure 2 leads to three hypotheses:

1. H1: The more personalized Shopee users in Surabaya find the AI recommendations, the more loyal they are.
2. H2: The more data privacy risk Shopee users in Surabaya perceive, the less loyal they are.
3. H3: AI Personalization and perceived data privacy risk jointly influence the loyalty of Shopee users in Surabaya.

RESEARCH METHOD

Used an explanatory quantitative design because the aim is to test how far personalization and privacy risk drive loyalty. This design follows previous studies that examined the effect of AI personalization on the loyalty of Shopee users using a quantitative survey and regression analysis (Maylinda & Andarini, 2024; Rahmat et al., 2026). The target population was Shopee users in Surabaya between 18 and 28 years old. Respondents were picked purposively and had to meet three conditions: they were 18 to 28, lived in Surabaya, and had completed at least one purchase on Shopee while seeing its recommendation feature.



Because the population size is unknown and the analysis uses multiple linear regression, the minimum sample size refers to the regression rule of thumb $N \geq 50 + 8m$, where m is the number of independent variables (Memon et al., 2020). This model has two predictors, which puts the minimum at 66 respondents, so a sample of 150 is adequate and also meet the ratio of ten respondents per questionnaire item (15 items).

Shared a Google Form link between April and May 2026. Respondents rated each statement from 1 (strongly disagree) to 5 (strongly agree). All 15 statements came from recent studies. Table 1 lists each variable's definition, indicators, and sources.

Table 1.
Variable Identification

Variable	Definition	Indicator
AI Personalization (X1)	The user's perception of the extent to which AI-based product recommendations on Shopee are tailored to his or her interests, needs, and preferences based on search history, purchase patterns, and in-app interactions (Maylinda & Andarini, 2024; An & Ngo, 2025); Hassan et al. (2025); Chen et al. (2022); Maylinda & Andarini (2024)	Interest fit (X1.1) Need fit (X1.2) Preference understanding (X1.3) Perceived relevance (X1.4) Ease of product discovery (X1.5)
Data Privacy Risk Perception (X2)	The consumer's perception of potential losses from the collection, misuse, leakage, and non-transparent use of personal data by the platform (Khoa et al., 2024); Gouthier et al. (2022); McKee et al. (2024)	Concern about data misuse (X2.1) Perceived data insecurity (X2.2) Concern about data leakage (X2.3) Lack of transparency (X2.4) Excessive data collection (X2.5)
Consumer Loyalty (Y)	The consumer's commitment to keep using and repurchasing from Shopee, to recommend it to others, and not to switch to other	Continuance intention (Y1.1) Repeat purchase (Y1.2)



et al. (2025); platforms (Risnaldi et al., 2023; Resistance to switching
Amarili & Hassan et al., 2025). (Y1.3)
Widjajanti Willingness to
(2026) recommend (Y1.4)
First-choice preference
(Y1.5)

Source: Concept developed in this research, 2026

RESULTS AND DISCUSSION

Validity Test

Correlated each item with its construct total (Pearson) in IBM SPSS Statistics 23..

Table 2.
Validity Test Results

Variable	Item	r calculated	r table	Sig. (2- tailed)	Description
Artificial Intelligence Personalization (X1)	(AI) X1.1	0.682	0.160	<0.001	Valid
	X1.2	0.734	0.160	<0.001	Valid
	X1.3	0.737	0.160	<0.001	Valid
	X1.4	0.727	0.160	<0.001	Valid
	X1.5	0.745	0.160	<0.001	Valid
Data Privacy Risk (X2)	X2.1	0.664	0.160	<0.001	Valid
	X2.2	0.752	0.160	<0.001	Valid
	X2.3	0.734	0.160	<0.001	Valid
	X2.4	0.640	0.160	<0.001	Valid
	X2.5	0.782	0.160	<0.001	Valid
Consumer Loyalty (Y)	Y1.1	0.727	0.160	<0.001	Valid
	Y1.2	0.699	0.160	<0.001	Valid
	Y1.3	0.766	0.160	<0.001	Valid
	Y1.4	0.698	0.160	<0.001	Valid
	Y1.5	0.718	0.160	<0.001	Valid

Source: Data processed using IBM SPSS 23



The lowest item correlation was 0.640, above the 0.160 cut-off, and every p-value fell under 0.05, so none of the 15 items had to be dropped.

Reliability Test

Internal consistency was checked with Cronbach's Alpha against a minimum of 0.70.

Table 3.
Reliability Test Results

Variable	Cronbach's Alpha	Standard	N of Items	Description
Artificial Intelligence (AI) Personalization (X1)	0.774	0.70	5	Reliable
Data Privacy Risk (X2)	0.761	0.70	5	Reliable
Consumer Loyalty (Y)	0.770	0.70	5	Reliable

Source: Data processed using IBM SPSS 23

The coefficients were 0.774 for X1, 0.761 for X2, and 0.770 for Y. All three clear the 0.70 threshold, so the scales measure their constructs consistently.

Classical Assumption Test

Normality Test

Tested whether the regression residuals are normally distributed using the One-Sample Kolmogorov-Smirnov test.

Table 4.
Normality Test Results

Parameter	Unstandardized Residual
N	150
Mean	0.0000000
Std. Deviation	2.286972
Most Extreme Differences (Absolute)	0.072
Most Extreme Differences (Positive)	0.038
Most Extreme Differences (Negative)	-0.072
Test Statistic	0.072
Asymp. Sig. (2-tailed)	0.055

Source: Data processed using IBM SPSS 23

Its significance value of 0.055 is slightly above 0.05, so cannot reject normality and the assumption is met.

**Multicollinearity Test**

Next checked that the two predictors do not overlap too much, using the usual limits of Tolerance > 0.10 and VIF < 10 .

Table 5.**Multicollinearity Test Results**

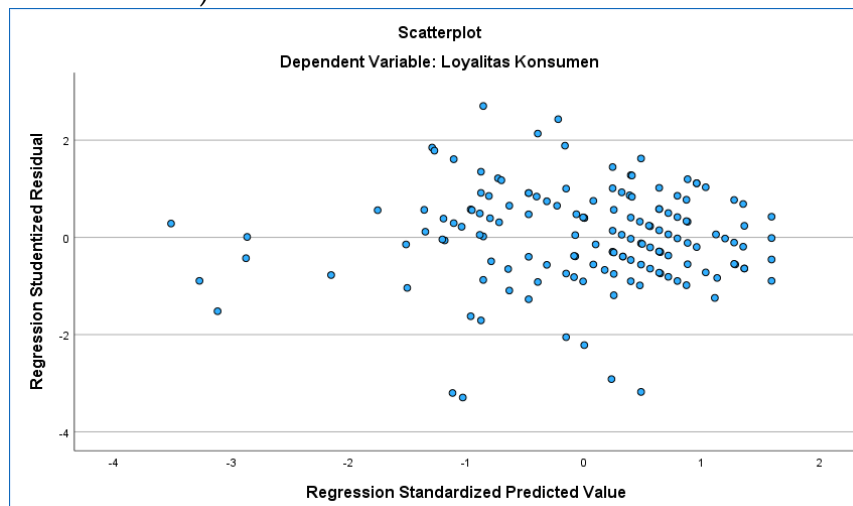
Model	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1 (Constant)	4.294	1.246		3.446	0.001		
AI Personalization	0.598	0.071	0.599	8.378	0.001	0.612	1.634
Data Privacy Risk	0.191	0.071	0.193	2.703	0.008	0.612	1.634

Source: Data processed using IBM SPSS 23

Each predictor has a Tolerance of 0.612 and a VIF of 1.634, well inside those limits, so overlap between X1 and X2 is not a problem.

Heteroskedasticity Test

Furthermore, potential heteroscedasticity (unequal residual variance across predicted values) was checked.

**Figure 3.****Scatterplot Graph**

Source: Data processed using IBM SPSS 23

The points in Figure 3 scatter on both sides of the zero line with no funnel or curve, which suggests the residual variance is roughly constant.

Multiple Linear Regression Analysis**Table 6.****Multiple Linear Regression Results**

Model	B	Std. Error	Beta	t	Sig.
1 (Constant)	4.294	1.246		3.446	0.001



Model	B	Std. Error	Beta	t	Sig.
AI Personalization	0.598	0.071	0.599	8.378	0.000
Data Privacy Risk	0.191	0.071	0.193	2.703	0.008

Source: Data processed using IBM SPSS 23

The coefficients table gives a constant of 4.294, a coefficient of 0.598 for AI Personalization, and a coefficient of 0.191 for Data Privacy Risk, so the regression equation is:

$$Y = 4.294 + 0.598X_1 + 0.191X_2 + e$$

Notes:

- Y = Consumer Loyalty
- X_1 = AI Personalization
- X_2 = Data Privacy Risk
- e = error

Interpretation of the regression equation:

1. The constant of 4.294 means that Consumer Loyalty (Y) equals 4.294 when AI Personalization (X_1) and Data Privacy Risk (X_2) are both zero.
2. The AI Personalization (X_1) coefficient of 0.598 shows that a one-unit rise in X_1 raises Consumer Loyalty (Y) by 0.598, holding the other variable constant, meaning that the two variables move in the same direction.
3. For X_2 the coefficient is 0.191: when perceived privacy risk goes up by one point and personalization stays the same, loyalty goes up by 0.191. which runs contrary to the predicted direction.

T-Test

Table 7.
T-Test Results

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.
	B	Std. Error	Beta	
1 (Constant)	4.294	1.246		3.446
AI Personalization	0.598	0.071	0.599	8.378
Data Privacy Risk	0.191	0.071	0.193	2.703

a. Dependent Variable: Consumer Loyalty

Source: Data processed using IBM SPSS 23

The t-test shows whether each predictor matters on its own, using $p < 0.05$ as the rule.



- For AI Personalization (X1), $t = 8.378$ and $p < 0.001$. The coefficient is positive, so personalization raises loyalty and H1 is supported.
- For Data Privacy Risk (X2), $t = 2.703$ and $p = 0.008$, so it also affects loyalty significantly. The coefficient, however, is positive ($B = 0.191$) while H2 predicted a negative one. Because the sign runs against the prediction, H2 is rejected.

F-Test

The F-test asks whether the two predictors, taken together, explain loyalty; it does so when $p < 0.05$ or F-count exceeds F-table.

Table 8.

F-Test Results (ANOVA)

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	915.734	2	457.867	86.367	<0.001
Residual	779.306	147	5.301		
Total	1695.040	149			

a. Dependent Variable: Consumer Loyalty

b. Predictors: (Constant), Data Privacy Risk, AI Personalization

Source: Data processed using IBM SPSS 23

ANOVA gives $F = 86.367$ with $p < 0.001$, so personalization and privacy risk together explain loyalty among Surabaya's Shopee users, and H3 is supported.

Personalized Recommendations and Loyalty to Shopee

H1 is supported: Shopee users in Surabaya who feel the recommendations fit them are more loyal. Recommendations that follow a user's interests, needs, and preferences cut the time spent searching for the right product. The better the personalization perceived by users, the higher their loyalty to Shopee. These results align with Maylinda & Andarini (2024) and Hassan et al. (2025), who found that relevant and accurate personalized recommendations strengthen user experience and loyalty in AI-driven e-commerce.

Privacy Risk and Loyalty: A Result in the Opposite Direction

The results show that Perceived Data Privacy Risk significantly affects Consumer Loyalty, but in a positive direction. Therefore, the second hypothesis (H2), stating that perceived data privacy risk negatively affects consumer loyalty, is rejected. This finding indicates a personalization–privacy paradox: respondents remain loyal to Shopee even though they are aware of, and even concerned about, the risks to their personal data. From the privacy calculus perspective, young



consumers aged 18–28 years tend to judge the benefits of convenience, relevant recommendations, promotions, and the habit of using Shopee as greater than the perceived privacy costs, so privacy concerns do not translate into reduced loyalty (McKee et al., 2024). In addition, the more intensively consumers use Shopee, the more personal data they share and the more aware they become of privacy risks, so heavy and loyal users may also report higher risk perceptions. This result differs from Chen et al. (2022), who found that high privacy concerns weaken the effect of personalization on loyalty through reactance, but it is consistent with the view that trust in the platform and data protection practices remain important in maintaining loyalty (Shabilla et al., 2025). Future studies are recommended to examine trust or perceived benefits as mediating variables to explain this mechanism more clearly.

The Joint Role of Personalization and Privacy Risk

H3 is also supported, since the two predictors together explain a significant part of loyalty among Shopee users in Surabaya. Consumer loyalty on Shopee is shaped by the overall evaluation of the benefits of relevant product recommendations and the perceived risks related to personal data. Consistent with the privacy calculus perspective, consumers tend to continue using the platform when the benefits of personalization are perceived as dominant, although data security and transparency remain part of their consideration (McKee et al., 2024; An & Ngo, 2025).

CONCLUSION

The study reaches three conclusions:

1. Shopee users in Surabaya who find the AI recommendations well matched to their needs are more loyal, so personalization has a positive and significant effect (X1 on Y).
2. Perceived privacy risk (X2) also matters, but users who worry more about their data turn out to be more loyal, not less. H2 is therefore rejected, and the pattern fits a privacy paradox in which young users stay because they value what Shopee gives them more than they fear for their data.
3. Together, X1 and X2 explain loyalty significantly: whether users stay depends on both the quality of the recommendations and how securely and openly Shopee handles their data.

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