Ilomata International Journal of Management

Check for updates

OPEN ACCESS

RECEIVED 6 January 2026
ACCEPTED 9 April 2026
PUBLISHED 30 April 2026

CITATION
Wahyudi, MA, (2026). Effects of AI Based Personalization, Perceived Privacy Risk, and Service Quality on Customer Loyalty in E-Commerce Platform. Ilomata International Journal of Management. 7 (2), 772-779.
doi: 10.61194/ijjm.v7i2.2098

TYPE Original Research
PUBLISHED 30 April 2026
DOI 10.61194/ijjm.v7i2.2098
VOL 7 Issue 2 April 2026

COPYRIGHT
© 2026 Wahyudi. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Effects of AI Based Personalization, Perceived Privacy Risk, and Service Quality on Customer Loyalty in E-Commerce Platform

Muhamad Aria Wahyudi
Kwik Kian Gie School of Business, Jakarta, Indonesia
Correspondence: arialwahyudi@gmail.com[1]

Abstract

The rapid expansion of e-commerce in Indonesia has encouraged platforms to adopt AI-based personalization to enhance customer experience and loyalty. However, privacy concerns and service quality remain critical factors influencing customer retention. This study examines the effects of AI-based personalization, perceived privacy risk, and service quality on customer loyalty in Indonesian e-commerce platforms. Novelty: This study offers a novel contribution by empirically integrating AI-based personalization, perceived privacy risk, and service quality into a single explanatory model of customer loyalty within the Indonesian e-commerce context. A quantitative explanatory approach was employed using a cross-sectional survey of Indonesian e-commerce users (n = 260). Data were collected through an online questionnaire and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings show that AI-based personalization and service quality positively and significantly affect customer loyalty, while perceived privacy risk has a negative effect. Service quality demonstrates the strongest influence on customer loyalty. Customer loyalty in Indonesian e-commerce platforms depends on effective AI personalization supported by high service quality and careful management of privacy risks.

KEYWORDS

ai-based personalization; perceived privacy risk; service quality; customer loyalty; e-commerce.

Introduction

E-commerce in Indonesia has witnessed explosive growth over the past decade, driven by widespread internet adoption, smartphone penetration, and shifts in consumer purchasing behavior (Dewi & Hartono, 2025). Indonesia's digital economy is forecast to continually expand, positioning e-commerce as one of the country's most dynamic commercial sectors. This rapid transformation has also intensified competition among local and global e-commerce platforms, compelling firms to innovate in how they attract, serve, and retain customers (Moodley & Sookhdeo, 2025). A critical component of this digital competition is the use of Artificial Intelligence (AI)-based personalization, which enables platforms to tailor user experiences based on individual preferences, behavioral data, and interaction histories. AI personalization in recommendation systems, targeted promotions, and adaptive interfaces has been linked to enhanced user engagement and loyalty across different markets (Madhuranthakam, 2025; Yu, 2021).

AI-driven personalization goes beyond traditional segmentation by leveraging machine learning and advanced analytics to offer real-time customized content. In the e-commerce context, personalized features can include product suggestions, tailored search results, dynamic pricing offers, and individualized recommendation feeds that aim to increase relevance for each user (Mohsin, 2024). Research demonstrates that such personalization can significantly enhance customer satisfaction and subsequently foster customer loyalty, as consumers are more likely to repeat purchases when the shopping experience aligns with their individual preferences (Chen et al., 2025). However, despite these advantages, the effectiveness of AI personalization is not

guaranteed, particularly if customers perceive that the personalization process compromises their privacy or is intrusive (Koneti, 2025).

Perceived privacy risk emerges as a central concern in the digital economy, especially where vast amounts of personal data are collected, processed, and stored to fuel AI algorithms (Kafey, 2025). Customers are increasingly aware and cautious about how their data is used, stored, and potentially shared, with privacy concerns capable of diminishing trust and even discouraging engagement with a platform. Studies have indicated that privacy concerns can moderate or weaken the positive impact of personalization on customer engagement and loyalty (Panya & Leelasantitham, 2025; Shabankareh et al., 2025). In the Indonesian e-commerce landscape, where data protection regulations and consumer awareness are still evolving, perceived privacy risk represents a particularly urgent issue. Platforms that aggressively personalize experiences without robust data governance or transparent communication risk alienating users who feel their personal information is exploited (Rolando, 2025).

In addition to personalization and privacy, service quality remains a foundational determinant of customer loyalty in e-commerce (Alwitigala et al., 2025). Quality in e-commerce service delivery encompasses dimensions such as website reliability, responsiveness, convenience, efficiency, trustworthiness, and assurance. Empirical studies in Indonesia have shown that higher e-service quality positively influences customer satisfaction, which in turn translates into stronger loyalty and repeat purchasing behavior (Gupta et al., 2024; John, 2025). Furthermore, integrating AI into service quality, for example through AI chatbots, automated inquiry resolution, and intelligent logistics tracking, has the potential to elevate both utilitarian and hedonic aspects of service quality, thereby enhancing overall customer experience (Raji et al., 2024).

In the Indonesian case, issues related to data privacy have gained greater relevance in the wake of the implementation of the Personal Data Protection Act (Undang-Undang Perlindungan Data Pribadi/PDP Act No. 27 of 2022). The law provides detailed guidance on issues such as collecting, processing, storing, and protecting personal data with an emphasis on user consent, transparency, and accountability from digital platforms. In light of increasing application of AI personalization in e-commerce, which depends greatly on user information, the significance of perceived privacy risk has gained greater importance under this new law. Compliance with the data privacy law does not only imply the possibility of losing consumer confidence but can also create legal and reputation problems for businesses. For this reason, it is crucial to study perceived privacy risk as it relates to customer loyalty in Indonesia in this context of changing legislation and growing consumer awareness about data privacy.

Despite the apparent benefits of AI personalization and improved service quality, the interplay between these factors and privacy concerns has not been fully examined in Indonesia, particularly as it relates to their combined effects on customer loyalty. E-commerce platforms such as Tokopedia, Shopee, and Lazada dominate the Indonesian marketplace, yet the ways in which AI strategies, privacy perceptions, and service quality influence long-term customer commitment are still under-researched (Owen & Moore, 2023; Yin et al., 2025). Given the scale of the Indonesian market and the strategic importance of customer retention in digital commerce, understanding these relationships has both theoretical and practical significance. Research on AI personalization to date often highlights its potential to boost loyalty, but there is a clear gap regarding how it interacts with privacy risk perceptions and service quality dimensions within the Indonesian context.

The urgency of addressing this research gap is further heightened by changes in consumer expectations and regulatory environments. As Indonesian consumers become more digitally savvy, their expectations for secure, relevant, and high-quality online shopping experiences increase. Simultaneously, evolving global standards for data protection make it imperative for e-commerce platforms to balance personalization with ethical and transparent data practices. Firms that mismanage this balance may experience deteriorating customer trust and diminished loyalty, undermining long-term sustainability. Therefore, a better understanding of how AI-based personalization, perceived privacy risk, and service quality jointly shape customer loyalty can provide actionable insights for practitioners seeking to optimize customer retention strategies and comply with emerging data governance norms.

Despite the growing adoption of AI technologies in Indonesian e-commerce and the acknowledged importance of personalization, privacy, and service quality for customer retention, there is limited empirical evidence on how AI-based personalization, perceived privacy risk, and service quality simultaneously influence customer loyalty within this specific market context. Previous studies separately examine personalization's effects on engagement and loyalty, privacy concerns as isolated moderating constructs, and service quality's direct impact on satisfaction and loyalty, but few have integrated these variables into a comprehensive model applicable to Indonesia's diverse and rapidly evolving e-commerce ecosystem. This research seeks to address this gap by investigating the combined effects of these constructs on customer loyalty, thereby offering insights into how businesses can strategically manage personalization and privacy while maintaining high service standards to foster lasting customer relationships.

The research aims to determine how AI-driven personalization strategies influence customer loyalty directly and indirectly, assess how perceived privacy risk moderates these relationships, and evaluate the role of service quality as a predictor of loyalty outcomes.

Methods

Research Type

This study employs a quantitative research approach with an explanatory research design. The purpose of explanatory research is to examine causal relationships between independent variables and a dependent variable through hypothesis testing. In this study, AI-based personalization, perceived privacy risk, and service quality are treated as independent variables, while customer loyalty is the dependent variable. A quantitative approach is considered appropriate because it allows for objective measurement of variables, statistical testing of relationships, and generalization of findings to a broader population of e-commerce users (Hair et al., 2019). The research uses a cross-sectional survey design, in which data are collected from respondents at a single point in time. This design is widely used in e-commerce and consumer behavior studies, particularly when examining perceptions, attitudes, and behavioral intentions such as customer loyalty (Annuncia & Sundari, n.d.).

Figure 1 illustrates the research flow of this study, starting from problem identification, literature review, and hypothesis development, followed by data collection through an online survey. The collected data were then analyzed using PLS-SEM to test the proposed relationships. Finally, the results were interpreted and discussed to provide theoretical and practical implications.

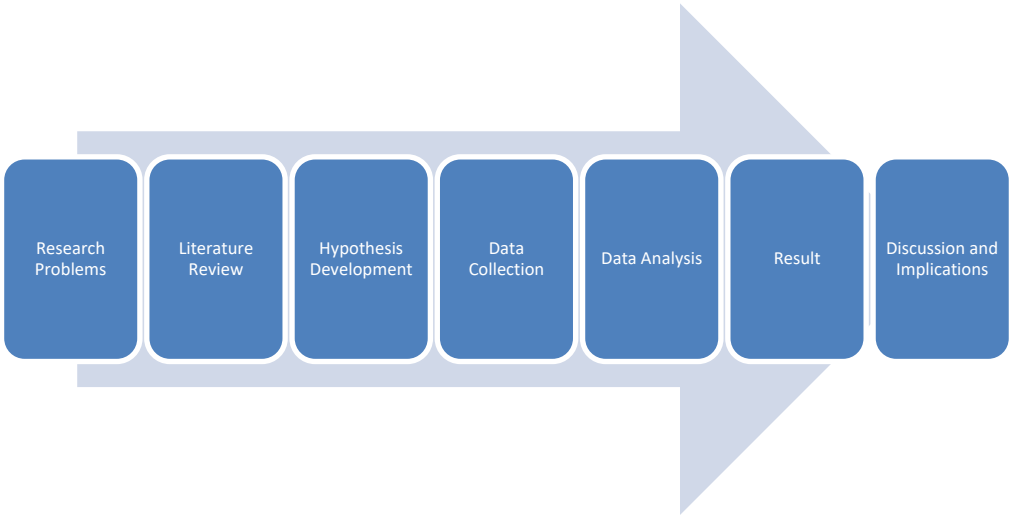

Figure 1. Flowchart of The Study's Process

Table 1. Respondent Demography

Demographic Variable	Category	Frequency (N)	Percentage (%)
Gender	Male	118	45.4%
	Female	139	53.5%
	Prefer not to say	3	1.1%
Age	17–25 years	142	54.6%
	26–35 years	78	30.0%
	36–45 years	28	10.8%
	>45 years	12	4.6%
E-commerce Platform Usage	Shopee	156	60.0%
	Tokopedia	61	23.5%
	Lazada	29	11.2%
	Others	14	5.3%

Source: Primary Data

Population and Sample/Informants

The population of this study consists of all Indonesian consumers who have used e-commerce platforms (such as Tokopedia, Shopee, Lazada, Bukalapak, or similar platforms) and have made at least one online purchase within the last six months. This criterion ensures that respondents have recent experience with AI-driven personalization features, service quality, and data privacy practices on e-commerce platforms. Given the large and undefined size of the population, this study uses a non-probability sampling technique, specifically purposive sampling. Respondents are selected based on predefined criteria: (1) Indonesian residents aged 17 years or older, (2) Active users of e-commerce platforms, and, (3) Having experience interacting with personalized features such as product recommendations, targeted promotions, or personalized content. The sample size follows the recommendation for multivariate analysis and structural equation modeling (SEM), which suggests a minimum of 5–10 respondents per indicator or at least 200 respondents to ensure robust statistical results (Hair et al., 2019). Therefore, this study targets a minimum sample of 260 respondents to enhance reliability and generalizability.

Table 1 presents the demographic profile of the respondents involved in this study. Based on gender distribution, the majority of respondents are female (53.5%), followed by male respondents (45.4%), while a small proportion (1.1%) preferred not to disclose their gender. This distribution indicates a slightly higher representation of female users in e-commerce activities, which is consistent with prior studies suggesting that female consumers tend to engage more actively in online shopping behavior. In terms of age, the largest proportion of respondents falls within the 17–25 years category (54.6%), followed by those aged 26–35 years (30.0%). Respondents aged 36–45 years account for 10.8%, while only 4.6% are above 45 years old. This distribution suggests that the sample is dominated by younger consumers, particularly those belonging to the digital-native generation who are more familiar with technology and more likely to interact with AI-based personalization features in e-commerce platforms. This demographic characteristic strengthens the relevance of the study, as younger users represent the primary target market of digital commerce in Indonesia. Regarding e-commerce platform usage, Shopee emerges as the most frequently used platform among respondents (60.0%), followed by Tokopedia (23.5%), Lazada (11.2%), and other platforms (5.3%). This finding reflects the competitive landscape of the Indonesian e-commerce market, where Shopee holds a dominant position in terms of user engagement and transaction volume. The diversity of platform usage also indicates that respondents have experience with multiple e-commerce environments, thereby enhancing the generalizability of the findings.

Research Location

This study is conducted in Indonesia, focusing on e-commerce users across major urban and semi-urban areas. Due to the online nature of e-commerce and the use of an online questionnaire, data collection is not restricted to a single city or region. Instead, respondents are reached nationwide through digital distribution channels. This approach reflects the geographically dispersed nature of e-commerce users and supports broader representation of Indonesian online consumers.

Instrumentation or Tools

Data are collected using a structured questionnaire designed based on established measurement scales from prior studies to ensure content validity and reliability. The questionnaire is divided into two main sections: respondent demographic information and measurement of research variables. All construct items are measured using a five-point Likert scale, ranging from 1 = "strongly disagree" to 5 = "strongly agree," which is commonly used in consumer behavior and marketing research (Sekaran & Bougie, 2016).

1. AI-Based Personalization is measured using items adapted from prior studies on personalization and AI-enabled recommendation systems, focusing on relevance,

customization, and usefulness of personalized content (Cheng & Jiang, 2020).
2. Perceived Privacy Risk is measured using indicators related to concerns over data misuse, unauthorized access, and lack of control over personal information, adapted from established privacy risk scales (Chen et al., 2025).
3. Service Quality is measured using e-service quality dimensions such as efficiency, system availability, responsiveness, reliability, and assurance, adapted from the E-S-QUAL framework (Parasuraman & Zeithaml, 2002).
4. Customer Loyalty is measured through indicators capturing repurchase intention, willingness to recommend, and preference for the platform over competitors (Sipos, 2025).

Before full distribution, a pilot test is conducted with a small group of respondents to ensure clarity, reliability, and validity of the questionnaire items.

Data Collection Procedures

Data collection is carried out using an online survey method, which is suitable for research involving digital platform users. The questionnaire is distributed through social media platforms, online communities, and messaging applications commonly used in Indonesia. Respondents are informed about the purpose of the study and assured of the confidentiality and anonymity of their responses. Participation is voluntary, and informed consent is obtained before respondents proceed with the questionnaire. The data collection process is conducted over three months (from November of 2025 till January of 2026) to ensure adequate response rates and data completeness.

Data Analysis

The collected data are analyzed using statistical analysis software such as SPSS and SmartPLS. The analysis process consists of several stages: (1) descriptive analysis, (2) validity and reliability testing, (3) hypothesis testing. Descriptive statistics are used to summarize respondent demographics and general response patterns. Construct validity is assessed through factor loadings, Average Variance Extracted (AVE), and discriminant validity, while reliability is evaluated using Cronbach's alpha and composite reliability (Hair et al., 2019). Structural Equation Modeling (SEM) using the Partial Least Squares (PLS) approach is employed to test the relationships between AI-based personalization, perceived privacy risk, service quality, and customer loyalty. PLS-SEM is suitable for predictive research models and complex relationships involving multiple constructs. Path coefficients, t-statistics, and p-values are analyzed to determine the significance and strength of relationships among variables.

Result and Discussion

Descriptive Statistics

Table 2 presents the descriptive statistics of the research variables. The mean values indicate that respondents generally perceived AI-based personalization and service quality positively, while perceived privacy risk remained at a moderate level. Customer loyalty showed a relatively high mean value, reflecting strong behavioral intentions toward e-commerce platforms.

Table 2 presents the descriptive statistics of the research variables, showing that respondents generally hold positive perceptions toward Indonesian e-commerce platforms. Service quality has the highest mean value (4.121), indicating that respondents strongly agree that e-commerce platforms provide reliable, efficient, and responsive services. Customer loyalty also demonstrates a high mean score (4.034), suggesting a strong intention among users to continue using and recommending the platforms. AI-based personalization records a relatively high mean value (3.987), reflecting favorable customer perceptions of personalized recommendations and content. In contrast, perceived privacy risk has a moderate mean value (3.102), indicating that while respondents do experience concerns regarding the use and protection of personal data, these concerns are not excessively high. The standard deviation values for all variables are relatively low, suggesting consistent responses among participants.

Outer Model (Validity and Reliability Test)

Convergent Validity

Convergent validity was assessed through indicator loadings and Average Variance Extracted (AVE). All indicator loadings exceeded 0.70, and AVE values were above 0.50, indicating adequate convergent validity.

Table 3 presents the results of indicator loadings as well as convergent validity and reliability tests for all constructs. The loading factor values for all indicators exceed the

Table 2. Descriptive Statistics

Variable	Mean	Std. Deviation
AI-Based Personalization	3.987	0.612
Perceived Privacy Risk	3.102	0.701
Service Quality	4.121	0.583
Customer Loyalty	4.034	0.621

Source: Primary Data

Table 3. Indicator Loadings and Convergent Validity and Reliability

Construct	Loading Factor	Cronbach's Alpha	Composite Reliability	AVE
AI-Based Personalization	0.812 0.845 0.828 0.791	0.842	0.894	0.679
Perceived Privacy Risk	0.834 0.872 0.809	0.801	0.869	0.689
Service Quality	0.846 0.882 0.861 0.823	0.882	0.919	0.740
Customer Loyalty	CL1 CL2 CL3	0.864	0.914	0.780

Source: Data Analyzed

Table 4. HTMT Ratio

Construct	AP	PR	SQ	CL
AI-Based Personalization (AP)	—			
Perceived Privacy Risk (PR)	0.364	—		
Service Quality (SQ)	0.612	0.341	—	
Customer Loyalty (CL)	0.648	0.472	0.739	—

Source: Data Analyzed

Table 5. VIF Values

Predictor	VIF
AI-Based Personalization	1.842
Perceived Privacy Risk	1.376
Service Quality	2.104

Source: Data Analyzed

Table 6. Model Fit

Fit Index	Value	Threshold
SRMR	0.061	< 0.080

Source: Data Analyzed

Table 7. R2 Value

Endogenous Variable	R^2
Customer Loyalty	0.628

Source: Data Analyzed recommended threshold of 0.70,

Table 8. F2 Effect Size

Relationship	F^2	Effect Size
AI-Based Personalization → Customer Loyalty	0.143	Medium
Perceived Privacy Risk → Customer Loyalty	0.092	Small
Service Quality → Customer Loyalty	0.381	Large

Source: Data Analyzed

indicating that each indicator reliably measures its respective construct. The Cronbach's alpha values for AI-based personalization (0.842), perceived privacy risk (0.801), service quality (0.882), and customer loyalty (0.864) are all above 0.70, demonstrating satisfactory internal consistency. Similarly, composite reliability values range from 0.869 to 0.919, confirming strong construct reliability. Furthermore, the Average Variance Extracted (AVE) values for all constructs exceed the minimum criterion of 0.50, indicating that each construct explains more than half of the variance of its indicators.

Discriminant Validity (HTMT Ratio)

Discriminant validity was assessed using the Heterotrait–Monotrait Ratio (HTMT), as recommended for PLS-SEM analysis. HTMT values below 0.85 (strict criterion) or 0.90 (liberal criterion) indicate adequate discriminant validity. The

results in Table 4 show that all HTMT values are below 0.85, confirming that each construct is empirically distinct from the others. Therefore, discriminant validity is established for all latent variables in the research model.

The HTMT ratios between AI-based personalization and perceived privacy risk (0.364), AI-based personalization and service quality (0.612), and AI-based personalization and customer loyalty (0.648) are all below the recommended threshold. Similarly, the HTMT values involving perceived privacy risk, service quality, and customer loyalty are within acceptable limits. These findings indicate that the constructs used in this study measure conceptually distinct phenomena and do not suffer from discriminant validity issues.

Multicollinearity Test

Multicollinearity was examined using Variance Inflation Factor (VIF). All VIF values were below 5.0, indicating no multicollinearity issues.

Table 5 presents the results of the multicollinearity test using Variance Inflation Factor (VIF) values for all predictor variables. The VIF values for AI-based personalization (1.842), perceived privacy risk (1.376), and service quality (2.104) are all below the recommended threshold of 5.0, indicating that multicollinearity is not a concern in this study. These results suggest that each independent variable contributes uniquely to explaining customer loyalty and that there is no strong linear relationship among the predictors that could distort the estimation of the structural model. Therefore, the model is free from multicollinearity issues and suitable for hypothesis testing.

Model Fit

Model fit was evaluated using the Standardized Root Mean Square Residual (SRMR).

Table 6 presents the model fit assessment using the Standardized Root Mean Square Residual (SRMR). The SRMR value obtained is 0.061, which is below the recommended threshold of 0.080. This result indicates that the proposed structural model demonstrates a good level of fit between the observed data and the hypothesized relationships. Therefore, the model is considered acceptable and appropriate for explaining the relationships among AI-based personalization, perceived privacy risk, service quality, and customer loyalty.

Coefficient of Determination (R^2)

The R^2 value indicates that the model has moderate to strong explanatory power.

Table 7 shows the coefficient of determination (R^2) for the endogenous variable, customer loyalty. The R^2 value of 0.628 indicates that AI-based personalization, perceived privacy risk, and service quality collectively explain 62.8% of the variance in customer loyalty. This value reflects a substantial level of explanatory power, suggesting that the proposed model effectively captures the key factors influencing customer loyalty in Indonesian e-commerce platforms.

Effect Size

Effect size analysis shows the relative contribution of each exogenous variable.

Table 8 presents the effect size (F^2) values, which indicate the relative contribution of each independent variable to customer loyalty. Service quality shows the largest effect size (F^2 = 0.381), indicating a strong influence on customer loyalty and highlighting its dominant role in the model. AI-based personalization has a medium effect size (F^2 = 0.143), suggesting that personalization meaningfully contributes to enhancing customer loyalty, although its impact is less substantial than service quality. In contrast, perceived privacy risk exhibits a small effect size (F^2 = 0.092), indicating that while privacy concerns significantly influence customer loyalty, their relative contribution is smaller compared to the other predictors.

Inner Model (Hypothesis Test)

Direct effects were tested using bootstrapping with 5,000 subsamples.

The results for Hypothesis 1 indicate that AI-based personalization has a positive and significant effect on customer loyalty (β = 0.267; t = 4.812; p = 0.000). This finding suggests that when e-commerce platforms effectively utilizeAI to deliver personalized recommendations, promotions, and

Table 9. Direct Effect Results

H1	AI-Based Personalization → Customer Loyalty	0.267	4.812	0.000	Supported
H2	Perceived Privacy Risk → Customer Loyalty	-0.198	3.921	0.000	Supported
H3	Service Quality → Customer Loyalty	0.462	7.643	0.000	Supported

Source: Data Analyzed

content, customers are more likely to remain loyal. Personalized experiences enhance perceived relevance and convenience, which encourage repeat purchases and strengthen customers' emotional attachment to the platform. Hypothesis 2 is also supported, showing that perceived privacy risk has a negative and significant effect on customer loyalty (β = −0.198; t = 3.921; p = 0.000). This result indicates that higher levels of concern regarding data security, misuse of personal information, and lack of privacy control reduce customers' willingness to continue using an e-commerce platform. Although personalization provides benefits, excessive privacy concerns can undermine trust and weaken long-term customer relationships.

The results for Hypothesis 3 demonstrate that service quality has a positive and highly significant effect on customer loyalty (β = 0.462; t = 7.643; p = 0.000). This finding confirms that service quality is the strongest determinant of customer loyalty in the model. High levels of system reliability, responsiveness, and efficiency significantly enhance customers' intention to repurchase and recommend the platform. This emphasizes that maintaining excellent service quality is essential for sustaining customer loyalty in Indonesian e-commerce platforms (see Table 9).

The discussion section interprets the findings of this study within the context of existing research, explores their practical implications, evaluates the strengths and limitations, and provides recommendations for future research.

Interpretation of Key Findings

The objective of this study was to examine the effects of AI-based personalization, perceived privacy risk, and service quality on customer loyalty in Indonesian e-commerce platforms. The findings demonstrate that all proposed relationships are statistically significant, indicating that technological and service-related factors play a crucial role in shaping customer loyalty in digital commerce environments. However, these results should be interpreted in light of mixed evidence in prior literature. While numerous studies report that AI-based personalization positively influences customer loyalty, other research suggests that personalization does not always translate into loyalty, particularly when privacy concerns are salient or when consumers perceive personalization as intrusive. In high-privacy-sensitivity contexts, personalization efforts may trigger psychological reactance or data vulnerability perceptions, thereby weakening loyalty intentions. The present study, however, finds that personalization retains a positive and significant effect on loyalty despite the negative role of perceived privacy risk. One possible explanation is contextual: Indonesian consumers may prioritize convenience, efficiency, and value over privacy concerns, especially in rapidly developing digital markets where e-commerce adoption is driven by practical benefits. Additionally, the strong influence of service quality in the model suggests that high system reliability and responsiveness may buffer potential negative reactions to personalization. Thus, rather than operating independently, personalization and privacy perceptions appear to coexist within a broader service evaluation framework. These findings contribute to the personalization–privacy paradox debate by suggesting that in emerging markets, the trade-off between personalization benefits and privacy risks may be resolved in favor of perceived utility when service quality remains high. This extends prior research by demonstrating that contextual factors such as digital maturity and consumer adaptation to AI technologies may condition the personalization–loyalty relationship.

First, the results reveal that AI-based personalization has a positive and significant effect on customer loyalty. This indicates that consumers who perceive personalized recommendations, promotions, and content as relevant and useful are more likely to remain loyal to an e-commerce platform. Personalized experiences help reduce information overload and enhance perceived value, which encourages repeat purchase behavior and positive word-of-mouth. In the Indonesian context, where e-commerce platforms compete intensely for customer attention, effective AI personalization serves as a strategic tool to differentiate services and build long-term customer relationships.

Second, the findings show that perceived privacy risk has a negative and significant effect on customer loyalty. This suggests that concerns about data misuse, lack of transparency, or unauthorized access to personal information can undermine customers' trust and reduce their commitment to a platform. Although AI personalization enhances convenience, customers may become reluctant to continue using a platform if they feel that their privacy is compromised. This result highlights the importance of balancing personalization benefits with responsible data management practices, especially in Indonesia, where awareness of digital privacy is increasing. The enactment of Indonesia's Personal Data Protection Law (Undang-Undang Perlindungan Data Pribadi/PDP Law No. 27 of 2022) represents a significant regulatory milestone that reshapes how digital platforms collect, process, and store consumer data. The PDP Law introduces stricter requirements regarding user consent, data transparency, purpose limitation, and sanctions for data misuse. As a result, e-commerce platforms operating in Indonesia must navigate a more regulated data environment, where aggressive personalization strategies without clear consent mechanisms may expose firms to legal and reputational risks. Within this evolving regulatory landscape, the balance between AI-driven personalization and privacy protection becomes particularly salient. The findings of this study suggest that while personalization positively contributes to loyalty, its sustainability depends on compliance with emerging legal standards and transparent data governance practices. Therefore, the Indonesian context provides a distinctive institutional setting in which the personalization–privacy trade-off is not merely psychological but also regulatory. This reinforces the local specificity of the study and highlights the importance of aligning AI strategies with national data protection frameworks.

Third, service quality emerges as the strongest predictor of customer loyalty among the examined variables. High levels of system reliability, responsiveness, assurance, and efficiency significantly strengthen customers' intentions to repurchase and recommend the platform. This finding underscores that advanced AI technologies alone are insufficient to sustain loyalty if core service quality expectations are not met. In e-commerce, seamless transaction processes, timely delivery, effective customer support, and system availability remain fundamental drivers of customer retention.

Comparison with Previous Studies

The findings of this study are consistent with prior research emphasizing the positive role of personalization in enhancing customer loyalty in digital platforms. Previous studies have shown that AI-driven personalization increases perceived relevance and satisfaction, which in turn strengthens loyalty intentions (Abdullah, 2025; Amil, 2024; Hassan et al., 2025; Jayapal, 2025). This study extends those findings by confirming that AI-based personalization remains effective in the Indonesian e-commerce context, a market characterized by high competition and rapid digital adoption. The negative effect of perceived privacy risk on customer loyalty aligns with earlier studies that identify privacy concerns as a critical barrier to trust in online environments (Edberg, 2025). Similar research has demonstrated that when customers perceive high levels of privacy risk, they are less willing to share personal information and less likely to remain loyal to digital platforms (Nadeem, n.d.; Tzavlopoulos et al., 2019). This study reinforces these conclusions and highlights the growing relevance of privacy issues in emerging digital economies such as Indonesia. Furthermore, the strong impact of service quality on customer loyalty supports extensive literature in e-service quality research. Prior studies using the E-S-QUAL framework consistently show that reliability, efficiency, and responsiveness are essential determinants of loyalty in e-commerce (RC & Dulloo, 2024; Zed et al., 2024). This study contributes to the literature by demonstrating that even in AI-enhanced environments, traditional service quality dimensions remain dominant predictors of loyalty. While AI-based personalization significantly enhances customer experience, it does not outweigh the impact of service quality in shaping long-term loyalty. This finding can be theoretically interpreted through expectation–confirmation theory and foundational service quality models, which posit that reliability, responsiveness, and assurance constitute core evaluative criteria in consumer decision-making. In other words, personalization may enhance relevance, but loyalty ultimately depends on whether the platform consistently delivers functional and operational excellence. From a contextual perspective, this pattern may also reflect cultural and infrastructural characteristics of emerging markets such as Indonesia. In environments where logistics reliability, delivery timeliness, payment system stability, and customer service responsiveness remain critical concerns, consumers may prioritize tangible service performance over algorithmic sophistication. Moreover, collectivist cultural tendencies and uncertainty avoidance may lead consumers to value assurance and reliability more strongly than personalized novelty. Consequently, AI personalization functions as a value-added feature rather than a substitute for foundational service quality. This suggests that technological sophistication alone is insufficient to secure loyalty unless embedded within a robust service infrastructure.

Practical Implications

From a managerial perspective, the findings provide several actionable implications for e-commerce platforms operating in Indonesia. First, firms should prioritize maintaining high service quality, particularly in terms of system reliability, responsiveness, and efficient customer support, as these factors have the strongest impact on customer loyalty. Second, while AI-based personalization can enhance customer experience, it should be implemented in a way that remains relevant and non-intrusive to avoid triggering negative perceptions. Third, e-commerce platforms must strengthen data transparency and privacy protection practices by clearly communicating how customer data are collected, used, and safeguarded. Providing users with greater control over their personal data, such as opt-in preferences and privacy settings, can help mitigate perceived privacy risks and build long-term trust. By balancing personalization strategies with transparent data governance and high service quality, firms can effectively foster sustainable customer loyalty in competitive digital markets.

Contributions of Study

This study contributes to the literature in several ways. First, it provides empirical evidence on the combined effects of AI-based personalization, perceived privacy risk, and service quality on customer loyalty within the Indonesian e-commerce context. Second, it extends existing research by demonstrating that service quality remains the dominant factor influencing customer loyalty, even in AI-driven environments. Third, the study highlights the importance of balancing personalization strategies with privacy protection, offering insights into the personalization–privacy trade-off in emerging digital markets. These contributions enrich the understanding of customer behavior and provide a more integrated framework for future research in e-commerce.

Limitations and Cautions

Despite its contributions, this study has several limitations that should be considered when interpreting the results. First, the research employed a cross-sectional design, which limits the ability to infer causal relationships over time. The findings capture customer perceptions at a specific point in time and therefore reflect short-term evaluative judgments rather than stable, longitudinal behavioral patterns. In rapidly evolving digital environments such as Indonesian e-commerce, consumer attitudes toward personalization, privacy, and service quality may shift quickly due to technological advancements, regulatory updates, platform innovations, or emerging privacy incidents. Consequently, caution should be exercised in generalizing these results as enduring or time-invariant relationships. Second, the study relied on self-reported survey data, which may be subject to common method bias and social desirability bias. Although statistical procedures were applied to ensure construct validity and reliability, the results remain perception-based rather than behavior-based. Given the dynamic nature of digital consumption behavior, actual transactional loyalty may diverge from stated intentions. Therefore, the conclusions should be interpreted as reflecting perceptual loyalty tendencies rather than verified long-term behavioral commitment. Future studies could incorporate behavioral data, such as transaction history or usage logs, to complement perceptual measures. Third, the use of non-probability purposive sampling may limit the generalizability of the findings. Although the sample reflects active Indonesian e-commerce users, it may not fully represent all demographic segments, particularly users in rural areas or those with limited digital literacy.

Recommendations for Future Research

Based on the findings and limitations of this study, several directions for future research are recommended. First, future studies could adopt a longitudinal research design to examine how customer loyalty evolves over time in response to changes in AI personalization strategies and privacy regulations. Second, researchers may explore additional mediating or moderating variables, such as trust, customer satisfaction, perceived transparency, or digital literacy, to further explain the relationship between personalization and loyalty. Incorporating trust may provide deeper insights into how privacy concerns influence customer behavior. Third, comparative studies could be conducted across different countries or regions to identify cultural and regulatory differences in customer responses to AI personalization and privacy risk. Such studies would enhance the generalizability of findings and contribute to cross-cultural e-commerce literature. Future research could focus on platform-specific analysis, comparing local and international e-commerce platforms operating in Indonesia. This approach

would help identify best practices in AI personalization and service quality management that effectively enhance customer loyalty while minimizing privacy concerns.

Conclusion

This study aims to examine the effects of AI-based personalization, perceived privacy risk, and service quality on customer loyalty in Indonesian e-commerce platforms. The findings confirm that AI-based personalization and service quality positively influence customer loyalty, while perceived privacy risk has a negative effect. Among these variables, service quality emerges as the most influential factor. These results indicate that customer loyalty is shaped not only by technological innovation but also by the quality of service delivery and the management of privacy concerns. Therefore, e-commerce platforms must strategically integrate AI personalization with high service standards and transparent data practices to sustain customer loyalty in the Indonesian market.

Author contributions

The author was solely responsible for the entire research process, including conceptualization, research design, data collection, data analysis, interpretation of results, and manuscript preparation.

Acknowledgements

The author would like to express sincere gratitude to all respondents who participated in this study. Appreciation is also extended to colleagues and reviewers who provided valuable feedback and suggestions for improving this manuscript.

References

Abdullah, M. S. (2025). EXAMINING THE EFFECT OF AI-POWERED PERSONALIZATION ON CUSTOMER LOYALTY: A META-ANALYSIS OF E-COMMERCE STUDIES. *Review of Applied Science and Technology*, *4*(02), 309–338.

Alwitigala, D. L. B., Jayathilake, C. L., & Mirshad, M. M. M. (2025). A Machine Learning-Driven Framework for Optimizing AI Chatbot Personalization in E-commerce: A Comprehensive Empirical Analysis of Customer Satisfaction Determinants. *Available at SSRN 5786683*.

Amil, Y. (2024). *The Impact of AI-Driven Personalization Tools on Privacy Concerns and Consumer Trust in E-commerce*.

Annuncia, B. J., & Sundari, R. (n.d.). *Impact of Generative AI and AI-Recommenders on Brand and Loyalty and Consumer trust in E-Commerce*.

Chen, T., Liu, F., Shen, X.-L., Wu, J., & Liu, Y. (2025). Conceptualization of privacy concerns and their influence on consumers' resistance to AI-based recommender systems in e-commerce. *Industrial Management & Data Systems*, *125*(5), 1844–1868.

Cheng, Y., & Jiang, H. (2020). How do AI-driven chatbots impact user experience? Examining gratifications, perceived privacy risk, satisfaction, loyalty, and continued use. *Journal of Broadcasting & Electronic Media*, *64*(4), 592–614.

Dewi, A. P., & Hartono, A. (2025). Analysis Of The Effect Of Personalization On Customer Experience In The Use Of Chatbot: Case Study Of Shopee E-Commerce Chatbot. *EKOMBIS REVIEW: Jurnal Ilmiah Ekonomi Dan Bisnis*, *13*(4), 3461–3472.

Edberg, A. (2025). *AI-Driven Personalization and Customer Loyalty in Swedish E-Commerce-Exploring the Effectiveness of AI as a Strategic CRM Practice*.

Gupta, C. P., Kumar, V. V. R., & Khurana, A. (2024). Artificial intelligence application in e-commerce: Transforming customer service, personalization and marketing. *2024 11th International Conference on Computing for Sustainable Global Development (INDIACom)*, 10–16.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, *31*(1), 2–24. https://doi.org/https://doi.org/10.1108/EBR-11-2018-0203

Hassan, N., Abdelraouf, M., & El-Shihy, D. (2025). The moderating role of personalized recommendations in the trust–satisfaction–loyalty relationship: an empirical study of AI-driven e-commerce. *Future Business Journal*, *11*(1), 66.

Jayapal, J. (2025). Unveiling the Impact of AI-Driven Personalization on Customer Loyalty in Online Shopping: The Moderating Effects of Privacy Concerns. *Journal of Promotion Management*, 1–30.

John, B. (2025). *The Role of AI Chatbots in Shaping Customer Loyalty Investigating User Perceptions of Privacy Risks and Service Continuity*.

Kafey, A. (2025). *The Role of Artificial Intelligence in Enhancing Customer Experience in E-commerce Among Young Consumers (18–35)*.

Koneti, C. (2025). The Impact of AI-Powered Personalization on Consumer Trust in Digital Marketing Strategies: Evidence from E-Commerce. *Advances in Consumer Research*, *2*(4).

Madhuranthakam, R. S. (2025). Revolutionizing E-Commerce: AI for Personalized Shopping Experiences. *Available at SSRN 5239955*.

Mohsin, S. (2024). The Influence of AI-Driven Personalization on Consumer Decision-Making in E-Commerce Platforms. *Al-Rafidain Journal of Engineering Sciences*, 249–261.

Moodley, K., & Sookhdeo, L. (2025). The role of artificial intelligence personalisation in e-commerce: Customer purchase decisions in the retail sector. *South African Journal of Information Management*, *27*(1), 1–16.

Nadeem, O. (n.d.). *AI Personalization, Service Quality, and Brand Loyalty in Cross-Border Fast-Food E-Commerce: The Mediating Role of Consumer Trust and the Moderating Role of Personality Traits*.

Owen, A., & Moore, J. (2023). *Ethical Considerations in AI-Driven E-Commerce Solutions: Balancing Personalization and Privacy*.

Panya, V., & Leelasantitham, A. (2025). Ai-powered personalization in online shopping: key factors influencing customer retention. *Journal of Mobile Multimedia*, *21*(2), 307–342.

Parasuraman, A., & Zeithaml, V. A. (2002). Understanding and Improving Service. *Handbook of Marketing*, 339.

Raji, M. A., Olodo, H. B., Oke, T. T., Addy, W. A., Ofodile, O. C., & Oyewole, A. T. (2024). E-commerce and consumer behavior: A review of AI-powered personalization and market trends. *GSC Advanced Research and Reviews*, *18*(3), 66–77.

RC, A., & Dulloo, R. (2024). The Impact of AI-Driven Personalization on Customer Satisfaction in E-Commerce: Balancing Technology, Transparency, and Control. *Journal of Computational Analysis & Applications*, *33*(2).

Rolando, B. (2025). THE IMPACT OF ARTIFICIAL INTELLIGENCE-BASED RECOMMENDATION SYSTEMS ON CONSUMER PURCHASE DECISIONS IN E-COMMERCE. *AIRA (Artificial Intelligence Research and Applied Learning)*, *4*(2), 14–38.

Sekaran, U., & Bougie, R. (2016). Research Methods for Business A Skill-Building Approach Seventh Edition. In *john wiley & sons*. https://doi.org/10.1007/978-94-007-0753-5_102084

Shabankareh, M., Kalantari Daronkola, H., Sarhadi, A., Thaichon, P., & Nazarian, A. (2025). The influence of artificial intelligence quality on business-to-business relationships on E-commerce platforms: unveiling the nexus. *International Journal of Advertising*, 1–40.

Sipos, D. (2025). The Effects of AI-Powered Personalization on Consumer Trust, Satisfaction, and Purchase Intent. *European Journal of Applied Science, Engineering and Technology*, *3*(2), 14–24.

Tzavlopoulos, I., Gotzamani, K., Andronikidis, A., & Vassiliadis, C. (2019). Determining the impact of e-commerce quality on customers' perceived risk, satisfaction, value and loyalty. *International Journal of Quality and Service Sciences*, *11*(4), 576–587.

Yin, J., Qiu, X., & Wang, Y. (2025). The Impact of AI-Personalized Recommendations on Clicking Intentions: Evidence from Chinese E-Commerce. *Journal of Theoretical and Applied Electronic Commerce Research*, *20*(1), 21.

Yu, J. (2021). The moderating role of perceived risk between AI chatbots, purchase intentions and customer loyalty in customer service. *Diss. Auckland University of Technology*.

Zed, E. Z., Kartini, T. M., & Purnamasari, P. (2024). The Power Of Personalization: Exploring The Impact Of Ai-Driven Marketing Strategies On Consumer Loyalty In E-Commerce. *Jurnal Ekonomi*, *13*(04), 1303–1314.