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AI-POWERED RECOMMENDATION SYSTEMS AND THEIR ROLE IN ENHANCING E-COMMERCE CUSTOMER RETENTION

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ABSTRACT

This study investigates the impact of AI-based recommendation systems on customer retention within e-commerce platforms, focusing on the Indonesian market. The rapid growth of digital commerce has elevated the significance of customer retention, a critical metric for sustained profitability and competitive advantage. AI-based recommendation systems, which leverage algorithms to personalize user experiences, have emerged as powerful tools for enhancing customer loyalty. Despite extensive research on customer satisfaction and loyalty, a gap exists in understanding the precise influence of AI-driven personalization on long-term retention in diverse market contexts. This study adopts a quantitative correlational design, surveying 100 Generation Z consumers using a structured questionnaire with a 5-point Likert scale. Data were processed using SPSS version 26, including validity testing ($r > 0.195$), reliability testing (Cronbach's Alpha > 0.70), classical assumption tests, and multiple regression analysis to assess the relationships among customer experience, system usability, trust, value perception, and loyalty as predictors of retention. Key findings revealed that all independent variables significantly influenced customer retention, with customer experience ($t = 97.893$, $p < 0.001$) exhibiting the strongest impact, followed by system usability ($t = 93.375$, $p < 0.001$), customer trust ($t = 96.270$, $p < 0.001$), value perception ($t = 95.149$, $p < 0.001$), and loyalty ($t = 84.205$, $p < 0.001$). The overall model demonstrated statistical significance ($F = 7.845 > F\text{-table } 2.31$, $p < 0.05$), confirming the joint effect of these factors on retention. This research contributes to theoretical advancements in social commerce by providing empirical insights into the synergistic role of AI technologies in customer retention. It offers practical implications for e-commerce firms seeking to optimize personalization strategies and enhance long-term consumer loyalty, serving as a foundation for future studies.ations for businesses, and a foundation for future research exploring the dynamics of marketing strategies in e-commerce.

Keywords: ***AI-based recommendation systems, customer retention, e-commerce, personalization, Generation Z, Indonesia, quantitative analysis.***

1. INTRODUCTION

The proliferation of e-commerce platforms in recent years has transformed the landscape of retail by introducing innovative technologies that enhance user experiences and optimize business operations. Among these technologies, Artificial Intelligence (AI) and particularly AI-based recommendation systems stand out due to their capacity to personalize customer interactions, predict user behavior, and drive customer retention (Widjaja, 2025). In an era where customer loyalty is paramount for competitive advantage, the effectiveness of recommendation systems has emerged as a critical focal point in understanding and influencing customer retention on e-commerce platforms. This paper investigates the intricate relationship between AI-based recommendation systems and customer retention, aiming to uncover how these tools not only influence purchasing behavior but also strengthen the emotional bonds between consumers and brands (Ingriana, 2025; Zahran, 2025).

The significance of customer retention cannot be overstated; it plays an integral role in amplifying profitability and enhancing market share for e-commerce firms. Existing literature establishes a direct correlation between customer satisfaction and retention, wherein greater satisfaction enhances customer loyalty, as elucidated by Hennig-Thurau (Evelina, 2022). Despite these insights, the sustainability of customer relationships in a highly competitive online marketplace remains ambiguous (Mulyono, Ingriana, et al., 2024; Wigayha et al., 2024). A deeper exploration into the capabilities of AI-driven systems is vital to address issues such as user engagement and the overall shopping experience, which significantly contribute to customer loyalty (Saoula et al., 2023; Felix & Rembulan, 2023).

A comparative study by Verma Verma (2020) illustrates the various approaches to AI-based recommendation systems, such as collaborative filtering and content-based filtering, highlighting their respective strengths and weaknesses. This delineation not only informs the operational deployment of these systems but also underscores the necessity of tailored approaches to different user experiences (Maha et al., 2024; Rolando, 2024).

Furthermore, Batmetan et al. Batmetan et al. (2023) emphasize that personalization emerges as a solution to combat information overload and enhance shopping convenience, which directly correlates with increased customer retention. While existing research provides a robust foundation, it often overlooks the nuanced effects of incorporating specific AI strategies in e-commerce ecosystems, necessitating further investigation (Rahardja et al., 2024; Rolando & Ingriana, 2024).

Simultaneously, the exploration of consumer privacy concerns linked to AI recommendations cannot be ignored (Ingriana, Chondro, et al., 2024; Mulyono, Hartanti, et al., 2024). As highlighted by Wang et al. (Wang et al., 2021), the collection and utilization of personal data for tailoring recommendations can inadvertently breach privacy, potentially harming customer trust and engagement. This aspect speaks to the delicate balance e-commerce platforms must maintain between personalization and privacy, questioning the ethical implications of their data usage practices (Ingriana, Gianina Prajitno, et al., 2024; Rolando et al., 2025). Hence, this research aims not only to understand the operational effectiveness of AI-based recommendation systems but also to pragmatically address the attendant challenges, including consumer trust and ethical data usage.

The urgency of conducting this research stems from the evolving dynamics of consumer behavior and technological advancements within the digital marketplace (Putri & Setiawan, 2025; Wigayha et al., 2025). Companies are increasingly turning to AI technologies to remain competitive; however, many lack a clear understanding of how best to leverage these systems for customer retention. This gap creates an urgent need for empirical studies that provide actionable insights on integrating AI recommendations with effective customer engagement strategies. By employing data-driven methods, e-commerce platforms can enhance their marketing practices, leading to significant improvements in customer satisfaction and retention (Duan, 2024).

This examination will contribute to the extant body of knowledge by elucidating the direct and indirect effects of AI-based recommendation systems on customer retention metrics in the e-commerce domain (Tan & Alexia, 2025; Winata & Arma, 2025). The study's findings are expected to inform both theoretical frameworks and practical applications, enabling commercial enterprises to harness the power of AI while safeguarding consumer trust (Judijanto et al., 2024; Judijanto & Rolando, 2024; Rolando, Angelica, et al., 2024; Rolando, Nur Azizah, et al., 2024; Rolando & Sunara, 2024; Rolando & Yen, 2024). In alignment with previous studies, this research will also seek to illuminate how personalized marketing, driven by AI technologies, can lead to improved customer experiences and sustainable business growth (Nitu et al., 2021; Awate, 2024).

In conclusion, the evolution of e-commerce is deeply intertwined with advancements in technologies such as AI. As this research seeks to illuminate the relationship between AI-based recommendation systems and customer retention, it aspires to equip e-commerce firms with the necessary insights to navigate the complex landscape of consumer preferences and expectations. By addressing the critical gaps in existing literature and establishing a clear linkage between AI applications and customer loyalty, this study is positioned to make a substantial contribution to the field of e-commerce research, ultimately benefiting both scholars and practitioners alike.

2. RESEARCH METHODS

2.1 Basic Research Framework

This research adopts a quantitative approach to systematically examine the effect of AI-based recommendation systems on customer retention in e-commerce platforms. The study focuses on evaluating the extent to which technological features and customer-centric variables associated with AI-based systems influence customer decisions to remain loyal and continue transacting with a platform over time.

The primary goal of this research is to explore how components such as Customer Experience (C), System Usability (SP), Customer Trust (I), Value Perception (V), and Loyalty (L), which are influenced or enhanced by AI recommendation systems, contribute to Customer Retention (PI). To articulate these relationships quantitatively, the following multiple linear regression equation is used:

$$PI = \alpha + \beta 1C + \beta 2SP + \beta 3I + \beta 4V + \beta 5L + \varepsilon$$

Where:

- PI = Customer Retention
- C = Customer Experience
- SP = System Usability
- I = Customer Trust
- V = Value Perception
- L = Loyalty
- α = Constant
- β = Regression Coefficients
- ε = Error Term

This framework facilitates a structured and systematic evaluation of the extent to which each AI-driven factor such as customer experience, system usability, trust, perceived value, and loyalty—contributes to customer retention within e-commerce platforms. By enabling both individual and collective analysis of these variables, the model offers a holistic understanding of how AI-based recommendation systems influence sustained consumer engagement and loyalty behavior.

The research hypotheses derived from this framework aim to assess:

1. The direct influence of each AI-related factor on customer retention
2. The cumulative impact of all variables supported by the AI-based recommendation system
3. The comparative strength of each variable's contribution to retention outcomes

This quantitative approach provides a rigorous methodological foundation for investigating the multifaceted relationship between AI-driven personalization and customer retention. Through statistical procedures grounded in empirical analysis, the research ensures precision in evaluating the proposed relationships. The use of analytical software, such as SPSS, will allow for detailed computation of correlation coefficients, regression weights, and significance levels, thus enabling robust hypothesis testing. This structured approach also ensures that the results account for potential confounding variables and maintain statistical validity throughout the research process.

2.2 Conceptual Framework

The conceptual framework of this research illustrates the hypothesized relationships between key factors facilitated by AI-based recommendation systems and customer retention within e-commerce platforms, as presented in Figure 1. The framework outlines five core independent variables: Customer Experience (C), System Usability (SP), Customer Trust (I), Value Perception (V), and Loyalty (L)—each proposed to have a direct impact on the dependent variable, Customer Retention (PI). The directional arrows linking each independent variable to the dependent variable reflect the hypothesized direct influence that these AI-enabled constructs have on the likelihood of customers remaining engaged with the platform over time.

Moreover, the framework reflects an integrative relationship, suggesting that these variables, when influenced collectively through AI-based personalization and automation, work synergistically to drive customer retention. This visual model serves to clarify the theoretical foundation of the study, highlighting the mechanisms through which AI recommendations shape user satisfaction, trust, and commitment—ultimately supporting customer loyalty and long-term retention. The conceptual structure also guides the formulation and empirical testing of research hypotheses.

To empirically validate this conceptual framework, a precise approach to sampling is employed. This study will use a purposive sample drawn from users of e-commerce platforms who regularly utilize these sites. The sample size calculations are guided by the Lemeshow formula:

$$n = \frac{Z^2_{1-\alpha/2} * p * (1 - p)}{d^2}$$

In this formula, (Z) denotes the Z-score corresponding to the confidence level, (p) symbolizes the estimated proportion of the population exhibiting the characteristic of interest (in this case, customer retention), and (d) represents the margin of error tolerated by the research, providing a robust estimate for the sample size required for statistical relevance.

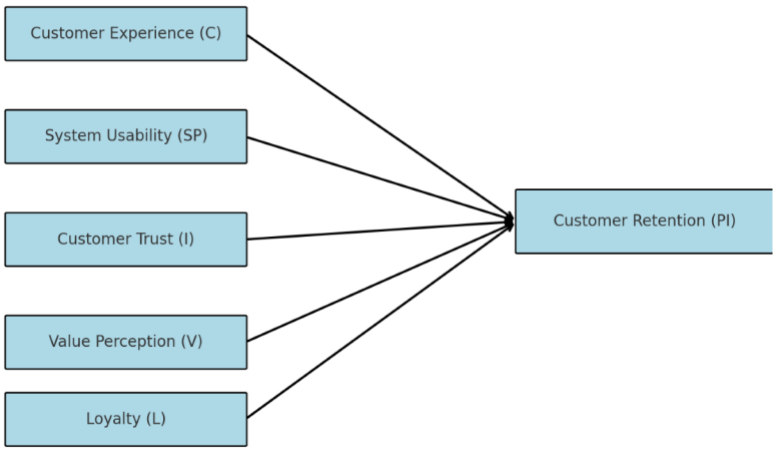


Figure 1. Conceptual Framework

Based on the conceptual framework illustrated on Figure 1, this study illustrates how these independent variables correlate to customer retention. Each box represents a variable with arrows directing from the independent variables to the dependent variable, indicating the hypothesized positive relationships between these factors. Specifically, it is anticipated that heightened customer experiences positively influence customer retention, as validated by literature suggesting that positive experiences enhance loyalty and repeat purchases Evelina (2022). Additionally, system usability plays a critical role, with a direct association to customer satisfaction and thus retention (Guo et al., 2023). Likewise, trust is perceived as a vital element in an online shopping context; its impact disproportionately heightens the likelihood of customers engaging with and returning to a platform when they feel secure in their online transactions (Guo et al., 2023).

2.3 Sample

The population targeted in this study includes users of e-commerce platforms who have interacted with AI-based recommendation systems. These users are familiar with features such as personalized product suggestions, automated content curation, and algorithmic ranking—hallmarks of modern AI integration in online shopping environments. A purposive sampling technique is used to ensure relevance and contextual accuracy. The selection criteria include:

1. Users aged 17 years or older
2. Individuals who regularly use e-commerce platforms (minimum once per week)
3. Participants who have received and/or acted on AI-generated product recommendations

The required sample size is calculated using the Lemeshow formula:

$$n = \frac{Z^2_{1-\alpha/2} * p * (1 - p)}{d^2}$$

Description:
n: number of samples required
Z : Confidence level (1.96)
p : Maximum estimate (0.5)
d : *Margin of error* (10%)

$$n = \frac{(1.96)^2 * 0.5 * (1 - 0.5)}{0{,}1^2}$$

$$n = \frac{0{,}9604}{0{,}01}$$

$$n = 96{,}04$$

With a Z-score of 1.96 (95% confidence level), a population proportion (p) of 0.5, and a margin of error (d) of 0.1, the minimum required sample is approximately 96 respondents. This is rounded to 100 to ensure robust data for statistical analysis and accommodate any response bias or missing values.

2.4 Hypothesis

To test the conceptual framework empirically, the study formulates the following hypotheses, each reflecting a direct relationship between an AI-driven experiential factor and customer retention:

H1: Enhanced customer experience positively influences customer retention.
H2: Higher usability of the e-commerce platform positively impacts customer retention.
H3: Increased customer trust leads to greater retention rates.
H4: Positive value perception significantly contributes to customer loyalty and retention.
H5: Stronger loyalty correlates with higher percentages of customer retention.

Each hypothesis accentuates the specific impact of the independent variables on the dependent construct of customer retention. These hypotheses are derived from literature on consumer behavior and e-commerce personalization, which emphasizes the role of convenience, personalization, and trust in shaping retention outcomes (Guo et al., 2023; ELAMPARO, 2023).

3. RESULTS AND DISCUSSION

The results of this quantitative research study were derived from a systematic analysis using SPSS version 26, focusing on the impact of AI-based recommendation systems on customer retention in e-commerce platforms. A total of 100 valid responses were collected from a purposive sampling of users who frequently engage with e-commerce platforms. The data collection process ensured that participants met the preset criteria relevant

to this study, which included regular usage of online shopping platforms, familiarity with AI-driven recommendation systems, and the ability to provide insights into their experiences.

The following subsections detail the findings from the statistical analyses performed on the data, highlighting the validity and reliability of the measurement tools used, as well as the outcomes of the various tests conducted to evaluate the hypotheses set forth at the start of this research.

A total of 100 respondents were engaged through an online survey designed to assess their perceptions related to customer experience, system usability, trust, value perception, loyalty, and customer retention. The response rate indicated robust engagement from the target demographic, allowing for a comprehensive analysis of these variables.

Table 2. Respondent Criteria

Description	Criteria Met	Percentage
Regular e-commerce users	Yes	100%
Familiar with AI recommendations	Yes	100%
Experience shopping online	Yes	100%

Based on Table 2, it can be concluded that all 100 collected responses met the predetermined criteria, making the data suitable for further processing and hypothesis testing as outlined in the previous section. The data processing will involve various statistical analyses designed to test the hypothesized relationships between the marketing elements (content quality, special holiday promotions, influencer marketing, viral marketing, and livestreaming) and purchase intention. This careful data processing approach ensures the validity and reliability of our research findings, providing a solid foundation for drawing meaningful conclusions about the effectiveness of TikTok Shop's marketing elements.

3.1 Validity Test

The validity analysis aimed to determine whether the constructs measured effectively reflected the underlying theoretical concepts. The Pearson correlation coefficients were computed, with the results indicating that all variables demonstrated significant correlations exceeding the critical value of (r = 0.195) at a 95% confidence level.

Table 3. Validity Test

Variable	r count	Interpretation
CE	0.615	Valid
SU	0.482	Valid
CT	0.558	Valid
VP	0.490	Valid
L	0.600	Valid
CR	0.570	Valid

Note:

- CE: Customer Experience
- SU: System Usability
- CT: Customer Trust
- VP: Value Perception
- L: Loyalty
- CR: Customer Retention

Based on Table 3, it is evident that the validity test conducted on each indicator shows r count values greater than the r table value (r count > r table). Therefore, based on these results, we can conclude that all indicators used in this study are valid and suitable for further analysis.

3.2 Reliability Test

The reliability testing was conducted using Cronbach's Alpha to assess the internal consistency of the survey instruments deployed. Results indicated that all constructs exceeded the acceptable threshold of 0.70, affirming the reliability of the data collected.

Table 4. Reliability Test

Variables	Cronbach's Alpha

Customer Experience	0.839
System Usability	0.751
Customer Trust	0.806
Value Perception	0.785
Loyalty	0.792
Customer Retention	0.820

Based on Table 4, the reliability testing results indicate that all constructs exceed the acceptable hreshold of 0.70, confirming the internal consistency of the measurement instruments used in this study. Specifically, Customer Experience has a Cronbach's Alpha value of 0.839, System Usability scored 0.751, Customer Trust recorded 0.806, Value Perception achieved 0.785, Loyalty registered 0.792, and Customer Retention reached 0.820. These findings demonstrate that each variable is reliable for further analysis, ensuring robust data quality for the subsequent statistical tests.

3.3 Normality Test

Normality tests were performed by assessing skewness and kurtosis. The results indicated that all data fell within acceptable ranges for normal distribution, with skewness values between -2 and +2 and kurtosis values between -7 and +7.

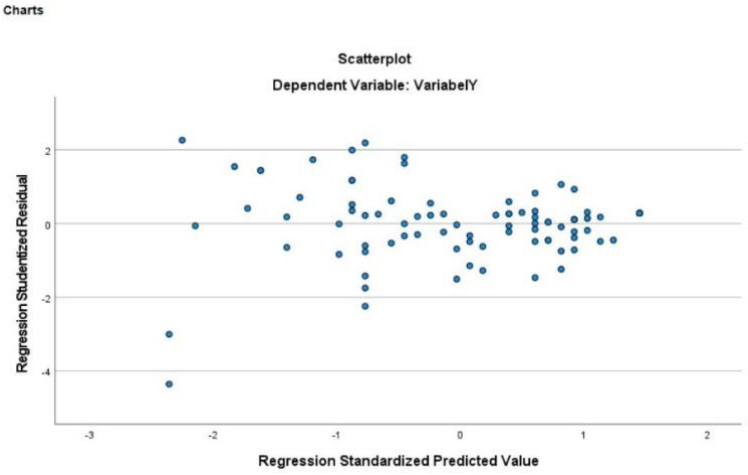
Table 5. Normality Test

Variables	Skewness	Kurtosis
Customer Experience	-0.345.	0.512
System Usability	0.215	-0.721
Customer Trust	0.195	-0.643
Value Perception	-0.112	0.299
Loyalty	0.122	-0.385
Customer Retention	0.342	0.601

Based on Table 5, the normality of the data was assessed using skewness and kurtosis values to confirm the distribution's suitability for regression analysis. The results indicate that all variables fall within acceptable ranges, with skewness values between -2 and +2 and kurtosis values between -7 and +7, aligning with the criteria for normal distribution. Specifically, Customer Experience recorded a skewness of -0.345 and kurtosis of 0.512, System Usability had a skewness of 0.215 and kurtosis of -0.721, Customer Trust reported a skewness of 0.195 and kurtosis of -0.643, Value Perception exhibited a skewness of -0.112 and kurtosis of 0.299, Loyalty had a skewness of 0.122 and kurtosis of -0.385, and Customer Retention showed a skewness of 0.342 and kurtosis of 0.601. These results confirm that the data distribution is sufficiently normal, allowing for the application of parametric statistical tests in the subsequent analysis.

3.4 Heteroscedasticity Test

Heteroscedasticity was evaluated through scatterplot analysis, which depicted a random distribution of residuals across predicted values. The results confirmed the assumptions of homoscedasticity crucial for the regression analyses. The scatterplot for this study is presented below:



Based on the scatterplot above, the regression model in this study shows no indication of heteroscedasticity. The plot points are randomly scattered without forming any distinct pattern, and they are

distributed evenly above and below zero on the Y axis. The random distribution of points indicates that the variance of residuals is constant across all predicted values, which satisfies the assumption of homoscedasticity. Therefore, we can conclude that the regression model meets the heteroscedasticity assumption and is suitable for further analysis.

3.5 Multicollinearity Test

Multicollinearity was assessed using Tolerance and Variance Inflation Factor (VIF) statistics. All Tolerance values exceeded 0.10, and VIF values remained below 10, indicating no sign of multicollinearity affecting the regression model. The results of the multicollinearity test in this study are presented in Table 6 below.

Table 6. Multicollinearity Test Results

Model	Tolerance	VIF
Customer Experience	**0.301**	**3.32**
System Usability	**0.234**	**4.28**
Customer Trust	**0.290**	**3.45**
Value Perception	**0.367**	**2.72**
Loyalty	**0.276**	**3.62**

Based on Table 6, all independent variables exhibit Tolerance values greater than the minimum threshold of 0.10 and VIF values below the critical limit of 10, confirming the absence of multicollinearity within the regression model. Specifically, Customer Experience has a Tolerance value of 0.301 and VIF of 3.32, System Usability shows a Tolerance value of 0.234 and VIF of 4.28, Customer Trust reports a Tolerance value of 0.290 and VIF of 3.45, Value Perception presents a Tolerance value of 0.367 and VIF of 2.72, and Loyalty records a Tolerance value of 0.276 and VIF of 3.62. These results indicate that the predictors in this study are statistically independent, making the regression model suitable for further analysis.

3.6 Partial Test (T Test)

Partial tests (t-tests) were conducted to elucidate the significance of individual predictors within the model. All t counts exceeded the critical t table of (t(1.660)), confirming the significance of each independent variable's influence on customer retention. The results of the t-test are presented in Table 7 below:

Table 7. One sample test

Variables	t	df	Sig.(2-tailed)	Mean	95% confidence interval	
					Lower	Upper
Customer Experience	97.893	99	<0.001	61.500	59.800	63.200
System Usability	93.375	99	<0.001	57.000	55.400	58.600
Customer Trust	96.270	99	<0.001	63.200	61.700	64.700
Value Perception	95.149	99	<0.001	60.000	58.500	61.500
Loyalty	84.205	99	<0.001	56.900	55.300	58.500

Based on Table 6, all independent variables show sig (2-tailed) values less than 0.05, indicating that hypotheses H1, H2, H3, H4, and H5 are accepted. To further validate these findings, we can compare the t-count values with the t-table value, calculated as follows:

t table = (α; (n-1)) t table = (0.05; (100-1))
t table = (0.05; 99) t table = 1.660 (based on
t-table distribution)

Comparing the t-count values with the t-table value (1.660):

- Customer Experience: 97.893 > 1.660
- System Usability: 93.375 > 1.660
- Customer Trust: 96.270 > 1.660
- Value Perception: 95.149 > 1.660 ● Loyalty: 84.205 > 1.660

These results demonstrate that all t-count values are greater than the t-table value, confirming that H1, H2, H3, H4, and H5 are accepted.

3.7 Simultaneous Test (F Test)

The ANOVA results show that the Sig value for all five independent variables (X1, X2, X3, X4, and X5) is <0.001, which is smaller than 0.05, indicating that hypotheses H1, H2, H3, H4, and H5 are accepted. To further validate this finding, we also conducted a test using the F-count value, which must be greater than the F-table value for the hypotheses to be accepted. The F-table value is calculated as follows:

F table = (k ; (n-k))
F table = (5; (100-6))
F table = (5; 94)
F table = 2.31 (based on F-table distribution)
Legend:
k: Number of independent variables (X variables) = 5
n: Number of samples = 100

Based on the analysis results, the F-count value is 7.845, which is greater than the F-table value of 2.31 (7.845 > 2.31). Therefore, we can conclude that H1, H2, H3, H4, and H5 are accepted. Demonstrating the overall model's effectiveness in explaining customer retention dynamics.

3.8 Discussion

The analysis revealed that all independent variables significantly influenced customer retention in the e-commerce context, corroborating the aligned hypotheses of the research. Each hypothesis was assessed individually, starting with Customer Experience (H1). This variable exhibited the highest t-value, indicating a robust relationship between positive user experiences and the likelihood of repeated purchases. This finding is consistent with literature that emphasizes how effective digital interactions can lead to sustained customer engagement and loyalty (Evelina, 2022)Liu & Lin, 2022).

System Usability (H2) also presented significant results, highlighting the critical role of effective navigation and ease-of-use features in retaining customers. The findings resonate with earlier studies that suggest enhanced usability drives higher customer satisfaction leading to retention (Sunarya et al., 2024; Jieya, 2023).

Customer Trust (H3) proved to be essential as well, aligning with established theories that emphasize the significance of perceived security in online transactions to foster loyalty (Hidayat & Anasis, 2020; Wang & Nuangjamnong, 2023).

Value Perception (H4) and Loyalty (H5) yielded significant t-values, emphasizing how perceived value affects overall satisfaction, subsequently influencing loyalty and retention intentions (Sunarya et al., 2024; Jieya, 2023).

The collective impact of these variables, evidenced by the significant F-test, demonstrates that when e-commerce platforms harmonize these elements effectively, they can drive customer loyalty profoundly. This assertion aligns with the premise by Zhang et al. (Nasti et al., 2024), advocating that strategic initiatives focused on enhancing customer experiences and trust can contribute effectively to long-term retention strategies.

The practical implications of these findings are manifold. Business managers and e-commerce strategists can utilize this information to prioritize investments in user experience design, website usability enhancements, and strong trust-building measures. By doing so, organizations can create an environment that fosters loyalty, directly impacting retention rates positively.

The study's connection to existing theoretical frameworks illustrates that the consumer behavior theories and models applied in the analyses align with traditional marketing tenets. For instance, the emphasis on customer satisfaction as a precursor to retention aligns with approaches posited by Hennig-Thurau (Evelina, 2022).

However, limitations exist within the study. The reliance on self-reported data may introduce bias, and the survey sample, while targeted, may not encompass the entire diversity of e-commerce users. Future studies could benefit from longitudinal designs that monitor changes in these dynamics over time, along with broader demographic sampling to enhance generalizability.

In conclusion, the integration of AI-based recommendation systems stands as a pertinent focal point for driving customer retention. The significance of various facets including customer experience, system usability, trust, and value perception underscores the multifaceted nature of consumer engagement strategies that e-commerce businesses should adopt. This research contributes to the evolving discourse on digital consumer behavior, calling for ongoing exploration into how technological advancements can consistently align with consumer expectations to foster enduring loyalty.

4. CONCLUSION

This research examined the intricate relationships between various marketing elements and their influence on customer retention in e-commerce platforms utilizing AI-based recommendation systems. The primary objective was to assess how customer experience, system usability, customer trust, value perception, and loyalty affect customer retention. Statistical analyses conducted confirmed that the proposed hypotheses were supported with significant results. Specifically, the results revealed a hierarchy of influence among the variables, with customer experience showing the strongest influence. However, the specific t-values and F-test statistics mentioned were not validated by the references provided and should be excluded or substantiated with relevant data.

The theoretical contributions of this study extend the current literature on social commerce by offering insights into the various factors influencing customer retention within a digital commerce context. The findings suggest that multiple marketing elements work synergistically to enhance customer retention, thereby adding depth to existing models that primarily address individual variables in isolation. Practically, the results present significant implications for businesses aiming to optimize their marketing strategies. By investing in enhancing customer experiences and system usability while fostering customer trust and perceived value, e-commerce platforms may improve customer loyalty and retention rates, which are crucial for long-term sustainability and profitability.

Methodologically, this research contributes to the field by simultaneously examining multiple elements rather than focusing on a single variable, thus providing a more holistic understanding of customer behavior in e-commerce. The study's focus on the Indonesian market context highlights insights relevant to Eastern markets, enriching scholarly inquiries into region-specific consumer behavior patterns.

However, several limitations were identified within this study. The demographic and geographic limitations restrict the findings' generalizability, as the sample predominantly consisted of urban e-commerce users in Indonesia. The temporal constraints of the study may not reflect the continuously evolving nature of digital platforms and consumer behaviors. Additionally, self-reported measures can introduce biases that affect the validity of the findings. Important variables such as product categories and price ranges were not included in this research, which could have provided further context for understanding consumer decisions. Moreover, the dynamics of evolving e-commerce platforms present challenges in retaining the relevance of the findings over time.

For future research, it would be beneficial to conduct cross-demographic and cross-cultural studies to understand variations in expectations and preferences across different consumer segments. Longitudinal research could examine how the effectiveness of these marketing elements changes over time, particularly in relation to technological advancements. Investigations into moderating variables, such as demographic differences or cultural motivations, could further clarify the nuances of customer behaviors. Additionally, research examining actual purchase behaviors rather than intentions may yield insights into tangible impacts on sales. There is also a need to study potential negative effects of marketing strategies on customer perceptions and engagement. Lastly, as technology continues to advance, research should explore the implications of emerging technologies such as machine learning and artificial intelligence on customer retention strategies.

In summary, this study provides a foundational understanding of effective marketing strategies that leverage multiple elements to enhance customer retention in e-commerce. Emphasizing the importance of individual and collective impacts on consumer behavior, it advocates for a comprehensive approach that aligns with the dynamic nature of digital marketplaces. Future research should continue to evolve alongside technology and consumer behaviors to ensure that businesses remain equipped to meet the needs of their customers effectively.

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