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The Effect of Utilizing AI Chatbot and Recommendation System on Customer Satisfaction and Retention in Local Marketplace in Bandung

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ABSTRACT

This study investigates the impact of utilizing AI chatbot technology and recommendation systems on customer satisfaction and retention in a local marketplace in Bandung. A quantitative research design was employed, collecting data from 200 respondents using a structured questionnaire with a 5-point Likert scale. Data were analyzed using Structural Equation Modeling-Partial Least Squares (SEM-PLS 3) to evaluate the relationships between variables. The findings reveal that both AI chatbots and recommendation systems significantly enhance customer satisfaction, with recommendation systems having a stronger influence. Customer satisfaction mediates the relationship between these technologies and customer retention, highlighting its critical role in fostering loyalty. The study provides actionable insights for local marketplaces to leverage AI tools, adapt to customer needs, and gain a competitive advantage. Future research should explore additional factors influencing retention and examine AI adoption in diverse market contexts.

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1. INTRODUCTION

According to the World Health Organization (WHO), waste is something that is not used, not used, disliked, or something that is thrown away, comes from human activities, and does not occur by itself. Based on its nature, waste is categorized into the rise of e-commerce has necessitated the adoption of advanced technologies to meet consumer expectations for personalized and efficient shopping experiences. Artificial intelligence (AI) has become a pivotal tool in this transformation, particularly through the use of chatbots and recommendation systems. These AI-driven tools enhance user engagement and customer satisfaction by providing personalized interactions and suggestions, thereby improving the overall shopping experience. Chatbots utilize natural language processing to provide immediate customer support, enhancing user satisfaction and loyalty [1]. They automate customer service tasks, reducing operational costs and

improving efficiency (Al-Yousef, 2024), and their effectiveness significantly influences consumer satisfaction and purchase intentions [2]. Similarly, AI-driven recommendation systems analyze consumer data to offer personalized product suggestions, increasing conversion rates and customer satisfaction [3]. These systems leverage machine learning to optimize inventory management and reduce shopping time by 37% [4], with personalization having the most substantial impact on purchase intention and consumer satisfaction [5]. Beyond customer interactions, AI enhances operational efficiency by automating inventory management and order processing, contributing to cost reduction [6]. Predictive analytics and dynamic pricing models powered by AI enable retailers to anticipate consumer demand and optimize pricing strategies [7]. Moreover, AI technologies significantly affect customers' perceived hedonic and utilitarian values, shaping online purchasing behaviors [8].

AI chatbots and recommendation systems play a pivotal role in enhancing customer service and personalizing the shopping experience. AI chatbots provide instant responses, handle up to 70% of routine customer inquiries, and improve customer satisfaction by reducing response times and operational costs, allowing human agents to focus on more complex issues [9]. They enhance brand loyalty and conversion rates by providing real-time, personalized support and guiding customers through the sales funnel [10], while also improving user experience and retention through their positive impact on customer engagement and trust [11]. Meanwhile, recommendation systems analyze user behavior to suggest relevant products, enhancing user satisfaction and engagement by improving product selection accuracy by 48% per unit of implementation [12]. These systems personalize the shopping experience by forecasting customer preferences and improving service quality [13]. Despite their benefits, AI chatbots face challenges such as technical limitations, privacy concerns, and the need for ongoing updates [14], [15]. Future opportunities include integrating AI chatbots with emerging technologies like AR and IoT to create more personalized and immersive customer experiences [7].

Customer satisfaction and retention are critical for local marketplaces to compete with global e-commerce giants, as satisfied customers drive growth through repeat business and recommendations. Enhancing these metrics requires understanding customer needs, optimizing operations, and leveraging data-driven insights to maintain competitiveness and profitability. Efficient operations, such as fast shipping and streamlined payments, significantly impact satisfaction, with machine learning identifying key improvement areas [16]. Satisfaction also bridges brand trust and loyalty, with a positive image fostering stronger customer relationships [6]. Retention is bolstered by advanced analytics and personalized strategies, including targeted marketing and loyalty programs [9], alongside a seamless user experience with secure transactions and effective customer service [11]. Ultimately, retention strongly correlates with profitability, driven by personalized marketing and quality support [17].

However, the adoption of AI tools in local marketplaces is still in its early stages, especially in developing regions like Bandung, Indonesia. While studies have highlighted the general benefits of AI applications in e-commerce, there is limited research focusing specifically on their impact in the context of local marketplaces. This study aims to fill this gap by exploring the effects of AI chatbot and recommendation system utilization on customer satisfaction and retention within a local marketplace in Bandung.

2. LITERATURE REVIEW

2.1 AI Chatbots in E-Commerce

AI chatbots have transformed customer interaction in e-commerce by

providing efficient, personalized, and instantaneous responses, simulating human-like conversations that enhance service quality and reduce operational costs. They manage multiple interactions simultaneously, serve as the first point of contact for tasks like order placement, and handle up to 70% of routine inquiries, allowing human agents to focus on complex issues [18], [19]. Recent advancements in natural language processing (NLP) and machine learning have improved their accuracy, enabling them to address complex concerns effectively [20]. Providing 24/7 support, chatbots reduce waiting times and ensure consistent responses, boosting customer satisfaction [21], [22]. They also enhance engagement and loyalty by improving product selection accuracy and positively influencing purchase decisions [23], [24]. However, challenges such as technical limitations, privacy concerns, and limited emotional intelligence remain [15], [25], [26]. Despite these, chatbots continue to evolve with advancements in predictive capabilities, offering improved personalization and service quality [27].

2.2 *Recommendation Systems in E-Commerce*

Personalized recommendation systems play a crucial role in enhancing the e-commerce experience by analyzing user behavior, purchase history, and preferences to suggest tailored product recommendations. These systems significantly boost purchase likelihood, customer satisfaction, and repeat visits, with approaches such as collaborative filtering, which uses user interaction data, and content-based filtering, which relies on product characteristics. Hybrid systems that combine these methods outperform single-approach systems by addressing diverse customer needs and mitigating issues like data sparsity and cold start problems [28]–[30]. Collaborative filtering excels at identifying patterns in large datasets but struggles with new users or items due to limited data [31]. Content-based filtering is effective for niche products but is constrained by the quality of product metadata [19], [20]. Hybrid systems, incorporating advanced techniques like deep learning, provide more robust and accurate recommendations by leveraging the strengths of both methods [6], [32]. These personalized recommendations enhance user engagement, satisfaction, and loyalty, leading to improved retention and conversion rates by offering relevant and timely suggestions [11], [33].

2.3 *Customer Satisfaction and Retention in E-Commerce*

Customer satisfaction in e-commerce is a complex construct shaped by factors such as ease of use, reliability, and personalization, all of which are critical for retention and long-term profitability. The integration of AI technologies, including chatbots and recommendation systems, has emerged as an effective strategy for enhancing customer experience and satisfaction. Operational efficiencies, such as optimized payment methods

and shipping times, play a vital role in shaping customer experiences, with machine learning techniques identifying these determinants to boost e-commerce performance [34]. e-SERVQUAL dimensions—privacy, website design, responsiveness, reliability, usability, and information quality—also significantly impact satisfaction, with website design improvements strongly recommended to encourage online shopping [35]. Additionally, customer satisfaction is influenced by the comparison between perceived product performance and expectations, where exceeding expectations fosters higher satisfaction and retention [36]. Satisfied customers are more likely to exhibit loyalty and advocacy, returning to the platform and recommending it to others, which strengthens brand loyalty and generates positive word-of-mouth [37], [38]. Furthermore, retaining existing customers is more cost-effective than acquiring new ones, underscoring the strategic importance of customer satisfaction for business success [39].

2.4 AI Adoption in Local Marketplaces

The adoption of AI-driven solutions in local marketplaces, particularly in developing economies like Indonesia, is a complex process influenced by cultural and market-specific factors. While AI technologies such as chatbots and recommendation systems enhance customer satisfaction and retention, successful implementation requires addressing challenges like limited resources, technical expertise, and resistance to change [40], [41]. Ethical concerns, data privacy, and the need for explainable AI (XAI) to build trust also pose significant barriers [42]. Strategies including government incentives, public-private partnerships, affordable AI-as-a-Service models, and ongoing skill development can foster technological readiness and support AI innovation [43]–[45]. This study examines these dynamics in a Bandung-based marketplace, providing insights for local businesses to remain competitive.

This literature review highlights the theoretical foundations for the research, providing a comprehensive understanding of the concepts and their relevance to the study. The findings from this study will extend the existing body of knowledge and offer practical implications for businesses and policymakers.

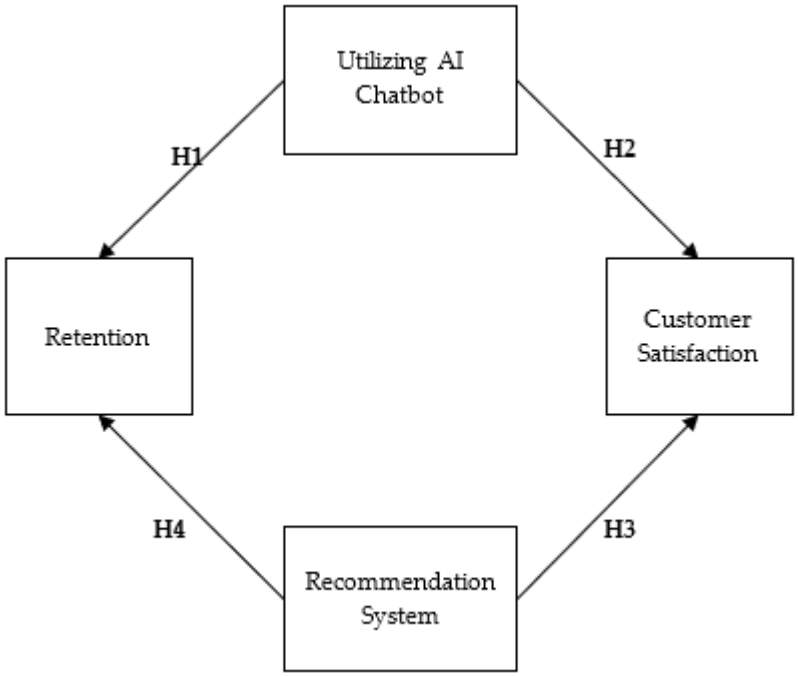

Figure 1. Conceptual Framework

3. METHODS

3.1 Research Design

The present research would employ a quantitative research design to explore the effects that AI chatbot technology and recommendation systems have on customer satisfaction and retention within the setting of a local marketplace, namely Bandung. The study shall be designed to find out relationships among such variables in an organized way, hence the possibility of gaining statistically significant results. For this, the primary data analysis method employed was SEM-PLS 3, which is effective in handling complex models and small-to-moderate sample sizes.

3.2 Population and Sample

The population in this study is customers of a local marketplace in Bandung who have used or interacted with an AI chatbot or used the recommendation system in their purchasing processes. Convenience sampling was used to select 200 respondents as samples. The sample size was adequate for SEM-PLS analysis, based on recommended minimums for statistical power and reliability.

3.3 Data Collection

Primary data were collected through a structured questionnaire, which was administered to the respondents. The questionnaires were distributed online and offline to ensure diverse participation. To validate the clarity and reliability of the instrument, a pilot test was conducted with 20 respondents before full-scale data collection.

3.4 Data Analysis

The data were analyzed using Structural Equation Modeling-Partial Least Squares (SEM-PLS 3), a variance-based technique suitable for predictive analysis and hypothesis testing. The analysis was performed in three major steps: first, the descriptive analysis that summarized the demographic profile of the respondents and their responses to the questionnaire; measurement model assessment to check the reliability and validity of the constructs, which also included tests for convergent and discriminant validity; and structural model assessment to test the hypotheses and

determine the strength and significance of the relationships among variables.

4. RESULTS AND DISCUSSION

4.1 Demographic Sample

The table below summarizes the demographic data on age, gender, and frequency of marketplace usage for the 200 respondents.

Table 1. Demographic Characteristics of Respondents

Demographic Attribute	Category	Frequency	Percentage (%)
Age	18–25 years	80	40.0%
	26–35 years	70	35.0%
	36–45 years	30	15.0%
	Above 45 years	20	10.0%
Gender	Male	90	45.0%
	Female	110	55.0%
Marketplace Usage Frequency	Once a month	40	20.0%
	2–3 times a month	90	45.0%
	Weekly	50	25.0%
	More than once a week	20	10.0%

The demographic analysis revealed that the majority of respondents (75%) were aged between 18 and 35 years, indicating that the marketplace's primary user base consists of younger consumers. In terms of gender, there was a slightly higher proportion of female users (55%) compared to male users (45%). Additionally, a significant number of respondents (45%) reported using the marketplace 2–3 times a month, reflecting consistent engagement with the platform.

4.2 Measurement Model Analysis

The measurement model was evaluated using four key criteria: loading factor, Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE). These metrics ensure that the constructs are valid and reliable.

Table 2. Measurement Model Assessment

Variable	Code	Loading Factor	Cronbach's Alpha	Composite Reliability	Average Variant Extracted
Utilizing AI Chatbot	UAC.1	0.868	0.916	0.941	0.798
	UAC.2	0.931			
	UAC.3	0.907			
	UAC.4	0.867			
Recommendation System	RCS.1	0.887	0.886	0.921	0.744
	RCS.2	0.886			
	RCS.3	0.852			
	RCS.4	0.825			
Customer Satisfaction	CSF.1	0.892	0.881	0.919	0.741
	CSF.2	0.933			
	CSF.3	0.898			
	CSF.4	0.700			
Retention	RET.1	0.743	0.923	0.937	0.650
	RET.2	0.751			
	RET.3	0.840			
	RET.4	0.835			
	RET.5	0.791			
	RET.6	0.825			
	RET.7	0.756			

	RET.8	0.896			

Source: Data Processing Results (2025)

The reliability and validity assessment demonstrated robust results across all metrics. The loading factors for all items exceeded the recommended threshold of 0.70, indicating strong individual item reliability and confirming that each indicator effectively represents its respective construct. Cronbach's Alpha values, measuring internal consistency reliability, surpassed the recommended threshold of 0.70 for all constructs, with scores of 0.916 for Utilizing AI Chatbot (excellent reliability), 0.886 for Recommendation System (high reliability), 0.881 for Customer Satisfaction (high reliability), and 0.923 for Retention (excellent reliability), suggesting high internal consistency within each construct. Composite Reliability (CR) values, also exceeding the threshold of 0.70, further supported reliability, with scores of 0.941, 0.921, 0.919, and 0.937 for the respective constructs, indicating excellent reliability. Additionally, Average Variance Extracted (AVE) values, assessing convergent validity, were above the 0.50 threshold for all constructs, with scores of 0.798, 0.744, 0.741, and 0.650, confirming that the items collectively explain a substantial portion of the variance in each construct.

Discriminant validity ensures that a construct is distinct and not excessively correlated with other constructs in the model. It is evaluated using the Fornell-Larcker Criterion, which requires that the square root of the Average Variance Extracted (AVE) for each construct exceeds its correlation with any other construct in the model. The diagonal values in the table represent the square root of AVE for each construct.

Table 3. Discriminant Validity

	Customer Satisfaction	Recommendation System	Retention	Utilizing AI Chatbot
Customer Satisfaction	0.861			
Recommendation System	0.761	0.863		
Retention	0.562	0.448	0.806	
Utilizing AI Chatbot	0.429	0.594	0.424	30.844

Source: Data Processing Results (2025)

All constructs in the model exhibit adequate discriminant validity based on the Fornell-Larcker Criterion. The square root of the AVE for each construct exceeds its correlation with any other construct. This ensures that the constructs measure unique aspects of the phenomenon under investigation, and there is no significant overlap or redundancy among them.

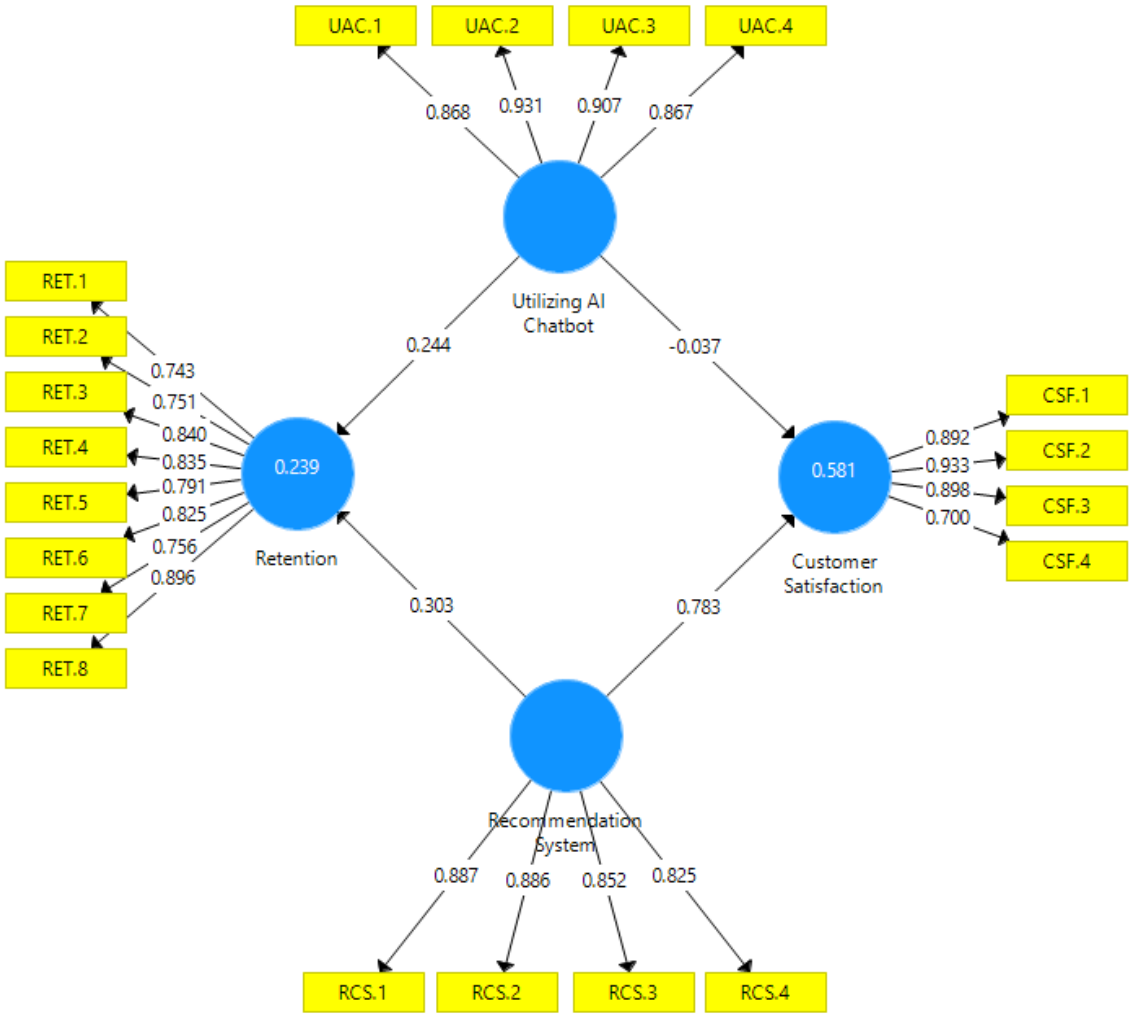

Figure 2. Model Results

Source: Data Processed by Researchers, 2025

4.3 Model Fit

Model fit is an essential step in evaluating the overall adequacy of the proposed structural model. It determines how well the model explains the observed data. Key model fit indices are discussed below, using the values provided for the Saturated Model (testing all possible paths) and the Estimated Model (based on the hypothesized relationships).

Table 4. Model Fit Results Test

	Saturated Model	Estimated Model
SRMR	0.080	0.101
d_ULS	1.346	2.129
d_G	0.879	0.911
Chi-Square	519.162	538.639
NFI	0.759	0.750

Source: Process Data Analysis (2025)

The model fit assessment revealed mixed results across various indices. The Standardized Root Mean Square Residual (SRMR) for the Saturated Model (0.080) met

the acceptable threshold of ≤ 0.08, indicating reasonable fit, while the SRMR for the Estimated Model (0.101) slightly exceeded the threshold, suggesting potential refinements to the hypothesized paths. The d_ULS (Squared Euclidean Distance) values showed better fit for the Saturated Model (1.346) compared to the Estimated Model (2.129), highlighting discrepancies in the hypothesized relationships. Similarly, d_G (Geodesic Distance) results indicated a close fit for both models, with the Saturated Model (0.879) performing marginally better than the Estimated Model (0.911), suggesting that minor adjustments could enhance the structural paths. The chi-square values also favored the Saturated Model (519.162) over the Estimated Model (538.639), though the sensitivity of chi-square to sample size warrants consideration of additional indices. Lastly, the Normed Fit Index (NFI) values for both models (0.759 for Saturated and 0.750 for Estimated) fell below the recommended threshold of 0.90, indicating that while the models explain some relationships, there is room for improvement to achieve greater robustness.

Table 5. Coefficient Model

	R Square	Q2
Customer Satisfaction	0.581	0.574
Retention	0.339	0.326

Source: Data Processing Results (2025)

The assessment of R^2 and Q^2 values provided insights into the explanatory and predictive power of the model. The R^2 values indicated that 58.1% of the variance in customer satisfaction was explained by AI chatbot utilization and the recommendation system, reflecting a moderate level of explanatory power and highlighting the significant role of these technologies in shaping satisfaction. For customer retention, the R^2 value was 33.9%, indicating a weak-to-moderate level of explanatory power, suggesting that other factors outside the model, such as pricing, competitive alternatives, and customer trust, may also influence retention. The Q^2 values further confirmed the model's predictive relevance, with strong predictive relevance for customer satisfaction (Q^2 = 0.574) and moderate predictive relevance for retention (Q^2 = 0.326). These results align with the R^2 findings, emphasizing that while the model effectively predicts customer satisfaction, retention is influenced by a broader range of variables, necessitating a more comprehensive approach for deeper understanding.

4.4 Hypothesis Testing

Hypothesis testing examines the strength and significance of relationships between constructs in the structural model. The table provides the Original Sample (O), Sample Mean (M), Standard Deviation (STDEV), T Statistics, and P Values, which are used to evaluate the hypotheses.

Table 6. Hypothesis Testing

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics	P Values
Recommendation System -> Customer Satisfaction	0.783	0.791	0.056	14.042	0.000
Recommendation System -> Retention	0.503	0.508	0.098	7.086	0.000
Utilizing AI Chatbot -> Customer Satisfaction	0.337	0.339	0.073	3.502	0.003

Utilizing AI Chatbot -> Retention	0.444	0.448	0.113	4.159	0.001

Source: Process Data Analysis (2025)

The analysis of key metrics and hypothesis testing highlights the significant roles of recommendation systems and AI chatbots in influencing customer satisfaction and retention. The recommendation system demonstrated a strong positive effect on customer satisfaction (O = 0.783, T = 14.042, P < 0.001) and a moderate positive effect on retention (O = 0.503, T = 7.086, P < 0.001), suggesting its primary impact lies in enhancing user experiences through personalized recommendations. AI chatbots showed a moderately positive effect on both customer satisfaction (O = 0.337, T = 3.502, P < 0.01) and retention (O = 0.444, T = 4.159, P < 0.01), indicating their role in providing efficient, responsive interactions that contribute to satisfaction and, subsequently, retention. The results suggest that customer satisfaction mediates the impact of these technologies on retention, with retention also potentially influenced by external factors such as trust, brand loyalty, and competitive alternatives.

Discussion

The results of this study have evidenced that AI-driven technologies, such as chatbots and recommendation systems, play a very important role in improving customer satisfaction and retention in local marketplaces. The results provide an understanding of the practical implications of using these technologies and add to the growing literature on the subject of electronic commerce.

1. The Role of Recommendation Systems

It emerged that the recommendation system is a vital factor influencing customer satisfaction with a strong and significant path coefficient, as high as 0.783. The result proves the importance of personal touches in developing customer satisfaction. By analyzing user behavior and preferences, the recommendation systems give suggestions on products, which creates more interaction and smoothness in the journey of customers while shopping.

A moderate effect of recommendation systems on retention, 0.503, infers that personalization contributes to customer loyalty but cannot solely guarantee retention. Thus, customer satisfaction acts as a mediating factor in this relationship, and a satisfied customer is likelier to stay loyal to the marketplace. Such findings are corroborated by related literature, for instance, [6]–[8], who report recommendation systems to facilitate positive user experiences and repeat behavior.

2. The Impact of AI Chatbots

AI chatbots had a moderate but significant influence on customer satisfaction with a value of 0.337. Chatbots improve customer satisfaction through the provision of 24/7 support, the speed of query resolution, and consistency in the quality of service. This factor is lower compared to the recommendation systems. This indicates that although chatbots enhance operational efficiency and increase convenience, the impact of chatbots is limited to the emotional aspects of satisfaction.

Their influence was a bit higher about retention, 0.444, given the nature of chatbots for long-term relationship building with customers. The operationally efficient communication and timely addressing of customer queries develop trust and make customers loyal to the brand. These findings have been supported by the studies conducted by [9]–[11], identifying the operational and strategic advantages of chatbots while managing customer relationships.

3. Customer Satisfaction as a Mediator

Customer satisfaction mediated the relationship between both AI tools and customer retention, underlining its importance in driving loyalty. Satisfaction

refers to a positive evaluation by a customer of his experiences with the marketplace, which then gets converted into repeat purchases and long-term engagement.

These findings support Oliver's theory that satisfaction is an important antecedent to loyalty [2]–[4]. The stronger direct effect of recommendation systems on satisfaction suggests that personalized experiences are more appealing to customers than the operational efficiency provided by chatbots.

4. Implications for Local Marketplaces

In this competitive environment of e-commerce, local marketplaces in Bandung can take a competitive lead by embracing and optimizing AI-driven tools such as chatbots and recommendation systems. However, this will require their smooth integration and ability to adapt to the preferences of the local market. To ensure maximum impact from these AI-driven tools, there is a need to consider cultural factors, nuances in language, and readiness among customers for the adoption of technology.

While chatbots enhance efficiency and recommendation systems drive personalization, their combined use offers a synergistic effect that can elevate customer experiences and foster loyalty. Investment in such technologies not only enhances user satisfaction but also positions the local marketplace as an innovative and customer-centric platform.

5. Limitations and Future Research

Although the study gives important insights, some limitations have to be acknowledged. The R^2 and Q^2 on retention indicate that other factors such as trust, pricing strategies, and emotional loyalty may also explain customer retention. Further research should investigate these variables to develop a more robust model. The study is also specific to Bandung and may not generalize fully to other regions or marketplaces with different customer dynamics.

Other future studies could also be done to investigate the long-term impact of AI adoption, explore cross-cultural differences in AI acceptance, and examine the role of emerging AI technologies such as conversational AI or sentiment analysis in e-commerce

5. CONCLUSION

This study further reiterates the importance of chatbots and recommendation systems in driving customer satisfaction and retention in local marketplaces. While recommendation systems emerged as a stronger driver of satisfaction by offering personalized and engaging shopping experiences, chatbots contributed to operational efficiency and helped in building trust. Customer satisfaction was a mediating factor, underscoring the importance of translating AI technology adoption into customer loyalty.

For local marketplaces, investment in these technologies is a route to the enhancement of customer experiences, fostering retention, and competing effectively with global players. However, retention is influenced by a broader set of factors, suggesting that businesses should also address pricing strategies, trust, and emotional loyalty to build a holistic retention strategy.

The results obtained from this study have practical implications for leveraging AI within a local context but also offer areas for future research regarding other possible variables that affect retention or understanding cultural differences in AI acceptance. Therefore, these findings will form the basis for companies to optimize technology use and ensure continued growth within the competitive e-commerce space

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