

Building Customer Engagement through Trust in AI-Based Retail Services

Juvanto Armando Lempoy, Risca Kurnia Sari, *IEEE*

Abstract— Artificial intelligence (AI) is reshaping retail services through responsive interactions, tailored recommendations, and automated customer support. Yet, limited research explains how distinct AI service attributes strengthen customer engagement through trust-based mechanisms. This study examines the effects of AI service quality and personalization capability on customer engagement, with trust in AI as a mediating construct. The novelty of this study lies in showing that AI service quality and personalization capability operate through different engagement pathways. Using survey data from 120 consumers of AI-based retail services and PLS-SEM analysis, the findings reveal that AI service quality positively affects both trust in AI and customer engagement, while personalization capability improves trust but does not directly enhance engagement. Trust in AI positively influences customer engagement and functions as a critical psychological mechanism. This study contributes to AI-enabled retail research by positioning trust as the key condition that converts personalized AI interactions into customer engagement.

Keywords: artificial intelligence, AI-based retail services, customer engagement, personalization capability, trust in AI

I. INTRODUCTION

Artificial intelligence (AI) is being used more and more in retail service encounters as a customer-facing system to facilitate product search, recommendations, service enquiries, and purchase decisions via chatbots, recommendation engines, virtual assistants, and AI-enabled customer support. The interactions affect customers' evaluation of retail services because they evaluate not only products or platforms, but also the accuracy, responsiveness and relevance of the AI system [1], [2]. Customer engagement is a critical outcome in digital retail as it reflects customers' willingness to engage with brands, revisit platforms, provide feedback, share experiences and maintain ongoing relationships with service providers [3], [4]. However, AI-based features do not automatically create engagement, as customers can still question the accuracy, reliability, transparency and use of personal data by the system. Therefore, customer engagement in AI-based retail should be explored through the psychological mechanism of Trust in AI.

Prior studies have explored AI service quality, personalization, trust and customer engagement as critical but often separate streams of research. Most studies on AI service quality have focused on service efficiency, user experience, and the acceptance of technology, while studies on personalization have focused on recommendation relevance, satisfaction, and purchase intention [5], [6]. Meanwhile, Trust

in AI has often been seen as an antecedent of adoption rather than a mechanism linking AI-based service attributes and customer engagement. Trust matters since customers are more likely to engage with AI if they perceive the system as reliable, competent, secure and useful [7], [8]. Therefore, this study investigates the effect of AI Service Quality and Personalization Capability on Customer Engagement, both directly and indirectly via Trust in AI. The study tests whether Trust in AI explains different engagement pathways by differentiating between these two AI service attributes [9], [10]. Her findings will contribute to the literature of AI-enabled retail marketing and practical insights into retailers to build stronger customer relationships through the use of trustworthy AI service systems.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

A. AI Service Quality

The development of digital technology has driven retail organizations to introduce Artificial Intelligence (AI)-based services to improve customer engagement. Huang Ming-Hui and Roland T. Rust define AI service quality as the capability of AI-based systems to provide accurate, responsive, and efficient services through digital interactions. In modern retail these services include chatbots, recommendation engines and AI-based product search systems that help customers to find products faster and more relevantly [11], [12].

Theoretically, this relationship can be explained by the Stimulus–Organism–Response Model, in which service quality is the stimulus that influences the psychological evaluation of customers. Studies have shown that AI-based service quality can build customer trust as customers perceive the system to be more accurate and reliable [13], [14]. But most previous research has focused on satisfaction or intention to use, while research on how AI service quality builds Trust in AI in retail is still limited. Thus, this study hypothesizes that AI Service Quality has a positive effect on Trust in AI (H1).

B. Personalization Capability

One of the key advantages of AI technology in digital retail is Personalization Capability. This allows systems to personalize services, product recommendations, and promotions based on customer preferences. According to Bleier and Eisenbeiss (2015), personalization increases the relevance of the shopping experience by making the services more aligned to customer needs [15], [16].

In terms of relationship marketing, personalization allows companies to create deeper customer relationships, as customers feel personally understood. Furthermore, recent studies show that AI-based recommendations and purchase history data can improve perceived value and boost trust in digital systems [17]. However, previous research has mainly concentrated on the effect of personalization on satisfaction or purchase intention, and its role in developing Trust in AI in omnichannel retail is largely unexplored. Thus, this study argues that Personalization Capability has a positive impact on Trust in AI (H2).

C. Trust in AI

Successful implementation of AI in customer service is also an important factor for confidence in technology. Trust in AI refers to customers' confidence that AI Systems can provide accurate, secure and reliable information. In the literature on technology, this concept is frequently linked to Human-Computer Interaction, highlighting the significance of user trust in digital systems. Customer behavior, like engagement and participation in digital platforms has been found to be affected by trust in digital technology [18]. Trust in AI systems increases the likelihood that customers will use digital services, interact with companies online, write reviews, share experiences and recommend products to others. Thus, this study proposes Trust in AI positively affects Customer Engagement (H3).

D. Customer Engagement

Customer engagement is a significant notion in modern marketing, meaning active participation of customers in interactions with a company. Brodie et al. (2019) define customer engagement to include the sharing of experiences, providing reviews and interacting with brands on digital platforms. In digital retail, customer engagement is not only determined by the shopping experience but also by the quality of the technology used by the company [19]. AI-based services that can provide effective, relevant and enjoyable shopping experiences can encourage customers to engage actively with brands [20].

However, the direct relationship between AI Service Quality and Customer Engagement in AI-based retail is still limited. Thus, in this study, it is proposed that AI Service Quality has a positive effect on Customer Engagement (H4). 2.3. AI Service Quality and Customer Satisfaction In addition, Personalization Capability can also improve engagement as customers find the service more relevant to their needs. When customers get recommendations that suit their preferences, they are more likely to interact with the brand. Therefore, this study proposes that Personalization Capability has positive effect on Customer Engagement (H5).

The Role of Trust Mediation in AI

The Stimulus-Organism-Response Model is used to consider AI Service Quality and Personalization Capability as stimuli that impact customers' psychological response (Trust in AI),

which then impacts Customer Engagement. Thus, Trust in AI can explain in which ways AI-based services stimulate customer engagement. Prior research has identified trust in technology as an important psychological mechanism, mediating the relationship between system quality and user behavior [7]. However, the studies on the mediating role of Trust in AI in the relationships among AI Service Quality, Personalization Capability, and Customer Engagement are still scarce. Thus, this study suggests that Trust in AI mediates the relationship between AI Service Quality and Customer Engagement (H6), and Trust in AI mediates the relationship between Personalization Capability and Customer Engagement (H7).

Research Conceptual Framework

Variables used:

Independent Variables (X)

1. AI Service Quality
2. Personalization Capability

Mediating Variable (M)

3. Trust in AI

Dependent Variable (Y)

4. Customer Engagement

Variable relationships:

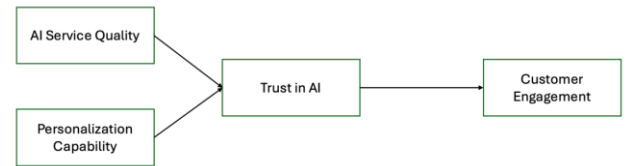


Fig 1. Research Framework

The research framework illustrates the relationships of the variables studied in this research. AI Service Quality & Personalization Capability are proposed as the independent variables affecting Customer Engagement. Additionally, Trust in AI is a mediating variable that explains the effect of AI-based service features on customer engagement. AI Service Quality The perceived quality of AI-enabled services, such as responsiveness, accuracy and reliability in serving customers. Personalization Ability: The ability of AI systems to offer personalized recommendations and tailored interactions based on user preferences. Trust in AI is the degree to which users believe in the reliability and performance of AI technologies. Finally, Customer Engagement is the degree of customers' cognitive, emotional and behavioral involvement with AI-enabled retail services. The framework implies that higher quality of AI services and better personalization capabilities can increase users' trust in AI, encouraging greater customer engagement.

Hypothesis:

H1: AI Service Quality $\rightarrow$ Trust in AI

H2: Personalization Capability $\rightarrow$ Trust in AI

H3: Trust in AI $\rightarrow$ Customer Engagement

H4: AI Service Quality $\rightarrow$ Customer Engagement

H5: Personalization Capability $\rightarrow$ Customer Engagement

H6: Trust in AI relationship mediation AI Service Quality → Customer Engagement

H7: Trust in AI relationship mediation Personalization Capability → Customer Engagement

III. RESEARCH METHODOLOGY

Types of Research

This study used a quantitative survey and analyzed the data using Partial Least Squares Structural Equation Modelling (PLS-SEM) to analyze the relations between AI Service Quality, Personalization Capability, Trust in AI, and Customer Engagement. The population consisted of consumers who used AI-based retail services such as chatbots, AI product recommendations, and virtual shopping assistants. The study required that the participants have had experience using an AI-based retail service, making purchases online, and be at least 17 years old. Hence, the respondents were selected through the purposive sampling method. The study managed to get a total of 120 respondents which was above the minimum sample size based on the 10 times rule by Hair et al. (2022). The model was assessed using outer and inner model assessments. Outer model tested convergent validity, construct reliability and discriminant validity by outer loading with the value more than 0.70, Average Variance Extracted (AVE) with the value more than 0.50, Cronbach's Alpha and composite reliability with the value more than 0.70, Fornell-Larcker criterion and HTMT with the value less than 0.90. The inner model was assessed through R-square values, path coefficients and bootstrapping results to check the explanatory power, strength of relationships and statistical significance. A t-statistic greater than 1.96 and p-value less than 0.05, indicates significant relationships at 5% significance level.

IV. RESULT

A. Convergent Validity Test (Outer Loading)

Table 1. Convergent Validity Test Results

Construct	Indicator	Outer Loading	Criteria	Remarks
AI Service Quality	AISQ1	0.823	> 0.70	Valid
	AISQ2	0.899	> 0.70	Valid
	AISQ4	0.851	> 0.70	Valid
Personalization Capability	PC5	1.000	> 0.70	Valid
Trust in AI	TRAI1	0.775	> 0.70	Valid
	TRAI2	0.848	> 0.70	Valid
	TRAI3	0.813	> 0.70	Valid
	TRAI4	0.866	> 0.70	Valid
	TRAI5	0.831	> 0.70	Valid
Customer Engagement	CE1	0.779	> 0.70	Valid
	CE3	0.814	> 0.70	Valid
	CE4	0.825	> 0.70	Valid
	CE6	0.783	> 0.70	Valid

Convergent validity test as shown in Table 1, all indicators have outer loading values above the minimum threshold of 0.70, it means that each indicator strongly represents its latent

construct and is valid for further analysis. AISQ1, AISQ2 and AISQ4 are indicators of the AI Service Quality construct with loading values ranging from 0.823 to 0.899. PC5 is an indicator of the Personalization Capability construct with a loading value of 1.000, which indicates a very strong relationship with its construct. Trust in AI also fulfils the validity criteria through five indicators with loading values between 0.775 and 0.866, and Customer Engagement is supported by four valid indicators, namely CE1, CE3, CE4, and CE6, with loading values ranging from 0.779 to 0.825. Thus, all indicators satisfy the requirement of convergent validity and are deemed appropriate for the subsequent analysis.

B. Construct Reliability Test

Table 2. Construct Reliability Evaluation

Construct	Number of Indicators	Reliability Criteria	Interpretation
AI Service Quality	3	Loading >0.70	Reliable
Personalization Capability	1	Loading >0.70	Reliable
Trust in AI	5	Loading >0.70	Reliable
Customer Engagement	4	Loading >0.70	Reliable

From the reliability evaluation of the construct in Table 2, all constructs in this study are classified as reliable because the indicators retained have met the minimum loading criterion of more than 0.70. For the AI Service Quality, three reliable indicators are used that consistently reflect users' perceptions of the AI-based service quality and for the Personalization Capability, one indicator is used that satisfies the required loading threshold. Trust in AI is measured by five reliable indicators which represent users' trust in AI technology. Customer Engagement is measured by four indicators which represent customer interaction, involvement and engagement. Thus, all constructs have sufficient reliability, and the measurement model is deemed suitable for further analysis.

C. Structural Model Evaluation (R-Square)

Table 3. R-Square Value

Variable endogenous	R Square	Category
Trust in AI	0.533	Moderate
Customer Engagement	0.657	Strong

The evaluation of the structural model based on the R-square values shows that the model has sufficient explanatory power to predict the endogenous variables. Trust in AI has an R-square value of 0.533, which is in the moderate category, this shows that AI Service Quality and Personalization Capability explain 53.3% of the variation in Trust in AI, while the remaining 46.7% is influenced by other variables outside the model. In the meantime, Customer Engagement has R-square value of 0.657 which is considered as strong, meaning that the variables in the model explain 65.7% of the variation of Customer Engagement, while the remaining 34.3% is explained

by other factors not included in this study. Thus, the structural model is found to be of moderate strength in explaining Trust in AI and strong in explaining Customer Engagement, indicating the proposed variables to have an important role to play in influencing users' trust, interaction, involvement and engagement with AI based retail services.

D. Hypothesis (Path Coefficient)

Table 4. Hypothesis Testing Results

Hypothesis	Variable Relationships	Path Coefficients	Verdict
H1	AI Service Quality → Trust in AI	0.450	Accepted
H2	Personalization Capability → Trust in AI	0.355	Accepted
H3	Trust in AI → Customer Engagement	0.304	Accepted
H4	AI Service Quality → Customer Engagement	0.422	Accepted
H5	Personalization Capability → Customer Engagement	0.189	Accepted
H6	AI Service Quality → Trust in AI → Customer Engagement	0.137	Accepted
H7	Personalization Capability → Trust in AI → Customer Engagement	0.128	Accepted

The structural model findings show that AI Service Quality positively affects Trust in AI ($\beta = 0.450$) and Customer Engagement ($\beta = 0.422$), indicating that trustworthy, useful, and user-friendly AI services can strengthen both user trust and engagement. Personalization Capability also positively influences Trust in AI ($\beta = 0.355$) and Customer Engagement ($\beta = 0.189$), suggesting that relevant and preference-based services encourage stronger user responses. Furthermore, Trust in AI positively affects Customer Engagement ($\beta = 0.304$) and mediates the effects of AI Service Quality (indirect effect = 0.137) and Personalization Capability (indirect effect = 0.128) on Customer Engagement. Thus, AI Service Quality and Personalization Capability enhance Customer Engagement both directly and indirectly through Trust in AI.

C. Evaluate the Fit Model

Table 5. Model Fit

Indicator	Value	Criteria	Interpretation
SRMR	0.085	< 0.10	Model Fit
NFI	0.718	Closer to 1 is better	Moderate

The model fit evaluation is presented in Table 5 which indicates that the proposed model has an acceptable fit in PLS-SEM analysis. The SRMR value of 0.085 is below the recommended value of 0.10, indicating that the difference between the observed correlation matrix and the model-implied correlation matrix is within an acceptable range. On the other

hand, the NFI value of 0.718 indicates a moderate level of model fit because the closer the NFI values are to 1, the better the model fit. Therefore, based on the SRMR and NFI results, the model can be considered as a fairly good fit and appropriate for further analysis of the relationships among the constructs in this study.

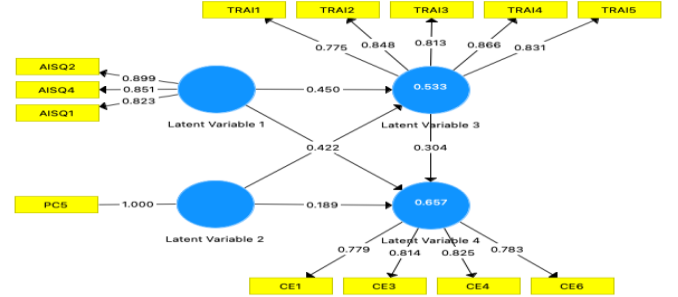


Fig 2. SEM PLS Result

Figure 2 presents the SEM-PLS structural model involving AI Service Quality, Personalization Capability, Trust in AI, and Customer Engagement. The measurement model confirms that all retained indicators have loading values above 0.70, indicating adequate validity and reliability. AI Service Quality is measured by three indicators, Personalization Capability by one indicator, Trust in AI by five indicators, and Customer Engagement by four indicators. The structural model shows positive relationships among the variables, particularly the effects of AI Service Quality and Personalization Capability on Trust in AI, as well as the effects of Trust in AI and Personalization Capability on Customer Engagement. The R-square values indicate moderate explanatory power for Trust in AI (0.533) and strong explanatory power for Customer Engagement (0.657), suggesting that the model is relevant in explaining users' trust and engagement in AI-based retail services.

Hypothesis Discussion

H1: AI Service Quality affects Trust in AI

H1 is accepted because AI Service Quality has a positive effect on Trust in AI, with a path coefficient of 0.450. This result indicates that higher perceived quality of AI-based services increases users' trust in AI technology. In digital retail, users are more likely to trust AI when the system provides accurate information, fast responses, reliable recommendations, and a convenient service experience. This finding is consistent with previous studies showing that AI-chatbot service quality, including reliability, responsiveness, interaction quality, and system performance, plays an important role in shaping user trust and positive customer responses toward AI-based services [7], [12], [14], [18]. Therefore, AI Service Quality is not only a technical attribute of digital retail systems but also a trust-building mechanism that strengthens users' confidence in AI-assisted service encounters.

H2: Personalization Capability affects Trust in AI

H2 is accepted because Personalization Capability has a positive effect on Trust in AI, with a path coefficient of 0.422.

This result indicates that AI systems that provide personalized recommendations, relevant product information, and services based on user preferences can strengthen users' trust in AI technology. In digital retail, personalization helps users perceive AI as more useful, relevant, and responsive to their individual needs. This finding is consistent with previous studies showing that AI-driven personalization, personalized recommendations, perceived relevance, usefulness, and consumer control contribute to stronger trust and more positive consumer responses in digital and e-commerce contexts [8], [11], [15], [16], [17]. Therefore, Personalization Capability does not only improve the convenience of the shopping experience but also functions as an important trust-building mechanism by making AI services appear more competent, relevant, and aligned with users' expectations.

H3: Trust in AI affects Customer Engagement

H3 is accepted because Trust in AI has a positive effect on Customer Engagement, with a path coefficient of 0.304. This result indicates that users who have stronger trust in AI technology are more likely to engage with AI-based retail services and the related brand. In digital retail, trust encourages users to interact with AI features, explore product recommendations, rely on chatbot assistance, and continue using AI-supported services. This finding is consistent with previous studies showing that customer engagement in digital and AI-enabled retail platforms is shaped by users' positive perceptions, trust, interaction quality, and confidence in technology-mediated service experiences [4], [6], [7], [9], [19], [20]. Therefore, Trust in AI functions as an important psychological mechanism that reduces perceived uncertainty and increases users' willingness to participate, interact, and maintain engagement with AI-based retail services.

H4: AI Service Quality Affects Customer Engagement

H4 is accepted because AI Service Quality has a positive effect on Customer Engagement, with a path coefficient of 0.422. This result indicates that high-quality AI services can directly encourage customers to interact more actively with the brand or digital retail platform. Customers are more likely to engage with the system, explore service features, follow recommendations, and continue using the platform when AI-based services are fast, accurate, responsive, useful, and easy to use. This finding is consistent with previous studies showing that AI service quality, AI-powered customer service, chatbot service quality, and digitalized retail platforms contribute to customer experience, interaction, continuance behavior, and engagement in retail and AI-mediated service contexts [6], [8], [9], [11], [16], [17], [20]. Therefore, AI Service Quality does not only strengthen trust but also directly enhances Customer Engagement by creating a more seamless, valuable, and satisfying digital service experience.

H5: Personalization Capability affects Customer Engagement

H5 is accepted because Personalization Capability has a positive effect on Customer Engagement, with a path coefficient of 0.189. This result indicates that personalized

recommendations, relevant offers, and services tailored to customer preferences can encourage users to interact with AI-based retail platforms. This finding is consistent with previous studies showing that AI-driven personalization, personalized recommendations, relevance, and usefulness can influence consumer responses, platform interaction, and engagement in digital retail contexts [4], [6], [7], [10], [12], [14], [19], [20]. However, the relatively lower coefficient suggests that personalization alone may not be the strongest direct driver of engagement, because it becomes more effective when users perceive it as accurate, useful, relevant, and trustworthy.

H6: Trust in AI relationship mediation AI Service Quality affect Customer Engagement

H6 is accepted because AI Service Quality has a positive indirect effect on Customer Engagement through Trust in AI, with an indirect effect of 0.137. This result shows that high-quality AI services can enhance customer engagement by first strengthening users' trust in AI. When AI services are perceived as accurate, responsive, reliable, useful, and easy to use, users are more likely to trust the system and engage more actively with the platform or brand. This finding is consistent with previous studies showing that AI service quality, chatbot quality, and AI-powered customer service influence user trust, customer experience, continuance behavior, and engagement in AI-mediated retail contexts [3], [4], [6], [7], [10], [12], [14], [18], [19], [20]. Therefore, Trust in AI acts as a partial mediator because AI Service Quality also directly affects Customer Engagement.

H7: Trust in AI relationship mediation Personalization Capability affect Customer Engagement

H7 is accepted because Personalization Capability has a positive indirect effect on Customer Engagement through Trust in AI, with an indirect effect of 0.128. This result indicates that personalized recommendations and customized services can enhance customer engagement by first strengthening users' trust in AI. When users perceive that AI understands their preferences, provides relevant recommendations, and delivers useful personalized experiences, they are more likely to trust the system and engage with the platform or brand. This finding is consistent with previous studies showing that AI-driven personalization, personalized recommendations, relevance, usefulness, and trust influence consumer responses and engagement in digital retail and AI-mediated contexts [8], [9], [11], [15], [16], [17], [20]. Therefore, Trust in AI acts as a partial mediator because Personalization Capability also directly affects Customer Engagement.

V. CONCLUSION

This study was conducted to examine the direct and indirect effects of AI Service Quality and Personalization Capability on Customer Engagement through Trust in AI in AI-based retail services, and the results answered this purpose by confirming all hypothesized relationships. The results suggest that AI Service Quality improved Trust in AI, and directly increased

Customer Engagement, confirming that accurate, responsive, reliable and easy-to-use AI services can motivate customers to engage more actively with retail platforms. Personalization Capability also got better Trust in AI had a positive direct effect on Customer Engagement, but its influence was weaker than that of AI Service Quality. This indicates that personalized recommendations are more valuable when customers believe them to be useful and trustworthy. Trust in AI had a positive effect on Customer Engagement and partially mediated the effects of both AI Service Quality and Personalization Capability, such that trust was a key psychological mechanism that translated AI-based service experiences into stronger customer engagement. Overall, the findings indicate that customer engagement in AI-based retail services is not only driven by technical service performance and personalization, but also by customers' confidence that AI systems are trustworthy, relevant, and advantageous in supporting their retail experience.

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Data Availability Statement:

The dataset generated and analyzed during the current study is publicly available in the open data repository at:

<https://docs.google.com/spreadsheets/d/1I47xEYWMmRamIGgJFHnZISkAd9ikljW/edit?usp=sharing&oid=110220365368433531928&rtpof=true&sd=true>

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