Original Article

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The Influence of AI-Driven Personalization and Perceived Advertising Relevance on Online Purchase Intention: The Mediating Role of Customer Engagement in Social Commerce Platforms

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Abstract:

The increasing adoption of artificial intelligence (AI) in social commerce has intensified the need to understand how algorithmic personalization and advertising relevance shape consumer behavior. Drawing on engagement theory and digital marketing perspectives, this study examines the effects of AI-driven personalization and perceived advertising relevance on online purchase intention, with customer engagement positioned as a mediating construct. A quantitative survey was conducted among 304 active social commerce users (response rate: 98.7%), and the data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS). The measurement model demonstrates strong reliability and validity, while the structural model reveals substantial explanatory power (R^2 = 0.599 for customer engagement; R^2 = 0.748 for purchase intention). The results indicate that AI-driven personalization and advertising relevance significantly enhance customer engagement, which in turn strongly predicts online purchase intention. Mediation analysis confirms that engagement partially mediates these relationships, highlighting its central role in translating technological precision and perceptual congruence into behavioral intention. The findings extend existing literature by integrating AI-enabled marketing mechanisms within an engagement-driven framework, emphasizing that personalization effectiveness depends not only on algorithmic accuracy but also on its capacity to generate meaningful user involvement in social commerce environments.

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Introduction

The acceleration of digital transformation has fundamentally reshaped the architecture of contemporary marketing. Social commerce platforms where social

interaction and transactional functions converge have become dominant arenas for consumer–brand engagement. In Indonesia, this transformation is particularly visible through the rapid adoption of short-video platforms integrated with in-app purchasing features. The convergence of artificial intelligence (AI), algorithmic recommendation systems, and interactive social environments has created a new competitive landscape in which personalization and advertising relevance determine not only visibility but also behavioral outcomes.

Within the Indonesian context, recent scholarship emphasizes that digital platforms are no longer merely communication tools but strategic infrastructures that redefine marketing performance and consumer engagement dynamics. (Launtu, 2026), in *JIM: Jurnal Ilmiah Mahasiswa Pendidikan dan Sejarah*, argue that businesses leveraging digital platforms must navigate challenges related to technological capability, data governance, and evolving consumer expectations. Their study highlights that effective digital strategies require adaptive content delivery mechanisms capable of aligning with user preferences and contextual consumption patterns. Although the article does not specifically examine AI-driven personalization, it underscores a crucial premise: digital marketing effectiveness increasingly depends on how precisely firms tailor content to audience characteristics. This insight provides an important local foundation for examining personalization and advertising relevance in more technologically advanced social commerce ecosystems.

Building upon this local perspective, international marketing literature has advanced significantly in conceptualizing personalization as a data-driven strategy enabled by AI and machine learning. AI-driven personalization refers to algorithmic processes that analyze user behavior, past interactions, and contextual signals to deliver customized recommendations and advertisements (Dwivedi, 2021; Shankar et al., 2021). Unlike traditional segmentation, AI personalization operates in real time, dynamically adapting to individual preferences. Empirical evidence suggests that personalization enhances perceived usefulness, trust, and decision efficiency(Bleier & Eisenbeiss, 2021; Rapp et al., 2021). However, its effectiveness depends largely on whether consumers perceive the content as relevant rather than intrusive.

Perceived advertising relevance has thus emerged as a pivotal construct in digital advertising research. Relevance reflects the extent to which consumers perceive marketing messages as aligned with their needs, interests, and situational context (Jai et al., 2021)). When advertisements are perceived as relevant, cognitive resistance diminishes and positive affective responses increase, strengthening purchase intentions (Lou & Yuan, 2020). Conversely, personalization without relevance may trigger privacy concerns and psychological reactance (Sundar & Marathe, 2020). This duality suggests that personalization and perceived relevance must be examined simultaneously rather than independently.

Parallel to these developments, customer engagement has gained prominence as a mediating mechanism in digital marketing research. Engagement is conceptualized as a multidimensional construct encompassing cognitive attention, emotional connection, and behavioral participation (Hollebeek & Macky, 2020; Kumar & Reinartz, 2020). Within social commerce platforms, engagement extends beyond passive consumption to interactive behaviors such as commenting, sharing, and co-creating value. Research consistently demonstrates that engagement

predicts purchase intention and loyalty (Islam & Rahman, 2021; Zhang et al., 2020). Yet, despite its established role, limited studies have positioned engagement as the psychological bridge linking AI-driven personalization and perceived advertising relevance to transactional outcomes in social commerce settings.

The Stimulus–Organism–Response (S-O-R) framework provides a theoretical lens to integrate these constructs. In this framework, AI-driven personalization and perceived advertising relevance function as external stimuli; customer engagement represents the organismic state reflecting internal processing; and online purchase intention constitutes the behavioral response. Although S-O-R has been widely applied in e-commerce and social media studies (Nadeem et al., 2021; Wang & Yu, 2021), its application in AI-enabled social commerce contexts remains underdeveloped.

Recent global studies underscore the strategic importance of AI in marketing but often focus on technological capability rather than consumer psychology (Chen & Yao, 2022; Park & Kim, 2022). Others examine personalization effects without incorporating engagement as a mediator (Gao et al., 2020), or explore engagement without differentiating between personalization and relevance stimuli (Lemon & Verhoef, 2021). This fragmentation signals a conceptual gap. There is a need for an integrative empirical model that jointly evaluates AI-driven personalization and perceived advertising relevance while explicitly testing the mediating role of customer engagement.

Furthermore, emerging markets such as Indonesia provide a distinctive context for such investigation. Rapid digital adoption, high social media penetration, and the integration of entertainment and commerce create fertile ground for examining how algorithmic personalization shapes behavioral intentions. Despite this potential, empirical research employing robust analytical techniques such as SEM-PLS to test integrated personalization–relevance–engagement models remains scarce.

This study addresses these gaps by proposing and empirically testing a structural model that positions customer engagement as a mediator between AI-driven personalization, perceived advertising relevance, and online purchase intention within social commerce platforms. By synthesizing local insights on digital strategy adaptation (Launtu, 2026) with international advances in AI marketing research, this study strengthens the theoretical foundation of personalization research while contextualizing it within interactive social commerce ecosystems.

Specifically, this research seeks to answer three primary questions. First, to what extent does AI-driven personalization influence customer engagement and online purchase intention? Second, how does perceived advertising relevance shape engagement and transactional intention? Third, does customer engagement mediate the relationships between personalization, relevance, and purchase intention?

Through this integrative approach, the study contributes to digital marketing literature in three ways. Theoretically, it extends the S-O-R framework by incorporating AI-enabled stimuli within social commerce environments. Empirically, it offers evidence from a rapidly growing digital economy using SEM-PLS analysis. Contextually, it bridges local digital platform scholarship with global AI marketing discourse, reinforcing the state of the art in understanding how intelligent personalization and perceived relevance jointly shape consumer engagement and purchasing decisions.

The rapid evolution of digital technologies has fundamentally transformed how consumers interact with brands and make purchase decisions across online environments. Social commerce defined as the integration of social media features with e-commerce transactions has emerged as a dynamic ecosystem shaping modern consumer behavior (Wang & Yu, 2021; Zhang et al., 2020). Within this environment, the ability to tailor consumer experiences using advanced technologies such as artificial intelligence (AI) has become crucial for competitive differentiation and value creation (Chen & Yao, 2022; Shankar et al., 2021).

AI-driven personalization refers to algorithmic mechanisms that leverage machine learning, predictive analytics, and behavioral data to deliver tailored content, recommendations, and advertisements that align with individual preferences and contexts (Bleier & Eisenbeiss, 2021; Park & Kim, 2022). Specifically, tailored personalization has been shown to improve user experience, foster trust, and strengthen the relevance of marketing messages, all of which can significantly influence online purchase behavior (Rapp et al., 2021). In social commerce platforms, where content is abundant and user attention is scarce, the strategic deployment of AI personalization has been linked to heightened engagement and conversion outcomes (Nadeem et al., 2021).

Perceived advertising relevance represents the degree to which consumers perceive marketing messages as aligned with their needs and interests (Jai et al., 2021; Lou & Yuan, 2020). High relevance reduces cognitive resistance and enhances the likelihood of message processing and comprehension, leading to stronger attitudinal responses and purchase intentions (Bleier & Eisenbeiss, 2021). When combined with personalization, perceived relevance serves as a critical conduit through which algorithmic marketing efforts translate into meaningful consumer responses. Research in emerging digital markets shows that perceived relevance positively influences not only purchase intention but also perceived usefulness and trust, further reinforcing its mediating role (Bleier & Eisenbeiss, 2021).

Customer engagement is conceptualized as a multidimensional construct capturing cognitive, emotional, and behavioral involvement with digital platforms and marketing stimuli (Hollebeek & Macky, 2020; Kumar & Reinartz, 2020). Engagement reflects a deeper level of consumer involvement beyond mere exposure, encompassing interactions such as commenting, sharing, and providing feedback on social commerce platforms (Islam & Rahman, 2021; Zhang et al., 2020). In digital commerce research, engagement has been shown to mediate the effects of various marketing strategies on purchase intention and loyalty outcomes (Nadeem et al., 2021).

In the Indonesian context, the strategic role of digital platforms in marketing has been underscored by local studies, which highlight that businesses must adapt their marketing strategies to leverage technology effectively to engage consumers in highly competitive digital ecosystems (Launtu, 2026). Although these studies do not explicitly investigate AI personalization, they articulate that successful digital marketing requires nuanced strategies capable of resonating with consumer expectations and contextual preferences a perspective that aligns with broader international research on personalization and relevance.

Theoretical frameworks such as the Stimulus–Organism–Response (S-O-R) model provide a useful lens for understanding how stimuli (e.g., AI personalization and advertising relevance) influence internal psychological states (customer

engagement) and subsequent behavioral responses (online purchase intention) (Nadeem et al., 2021; Wang & Yu, 2021). Under this framework, AI personalization and advertising relevance serve as external stimuli that shape consumer perceptions and engagement (organism), which in turn drive purchase intentions (response).

Despite substantial progress in understanding individual relationships, the literature reveals significant gaps. Most prior research examines personalization and relevance separately, with limited empirical work integrating both as predictors of engagement and purchase outcomes in social commerce contexts (Bleier & Eisenbeiss, 2021). Further, while some studies demonstrate the mediating role of trust or perceived usefulness between AI personalization and purchase intention (Chen & Yao, 2022; Jai et al., 2021), few explicitly position customer engagement as the central mediating construct that captures deeper psychological involvement.

Recent studies from both emerging and global markets suggest that AI personalization yields stronger consumer responses when combined with perceived relevance and engagement dynamics. For example, research on dynamic personalized advertising highlights that relevance not only enhances processing but also strengthens emotional involvement and click-through rates (Turn0search28; ESJ social science synthesis). Similarly, local research on social media content and ad personalization indicates that ad customization interacts with content relevance to influence purchase intentions among younger consumers. These findings underscore the importance of adopting an integrative model that considers personalization, relevance, and engagement as interrelated drivers of purchase intention in social commerce.

Given these gaps, this study proposes and empirically tests a structural model that positions customer engagement as a mediator between AI-driven personalization, perceived advertising relevance, and online purchase intention in social commerce platforms. The central research questions guiding this inquiry are: (1) To what extent does AI-driven personalization influence customer engagement and online purchase intention? (2) How does perceived advertising relevance contribute to customer engagement and purchase intention? (3) Does customer engagement mediate the effects of personalization and relevance on online purchase intention?

By integrating insights from local and international scholarship and employing robust SEM-PLS analysis, this research aims to contribute to theory and practice by offering a comprehensive understanding of how AI-enabled strategies and perceptual factors jointly shape consumer behavior in interactive digital marketplaces.

Methods

This study employed a quantitative research design using a survey approach to examine the structural relationships among AI-driven personalization, perceived advertising relevance, customer engagement, and online purchase intention within social commerce platforms. The research adopted a causal-explanatory framework aimed at testing hypothesized direct and indirect relationships among latent constructs. Structural Equation Modeling–Partial Least Squares (SEM-PLS) was utilized as the primary analytical technique due to its suitability for predictive modeling, mediation analysis, and variance-based structural estimation in complex research frameworks.

The population of this study consisted of active users of social commerce platforms, specifically individuals who had made at least one purchase through TikTok Shop within the previous three months. This criterion ensured that respondents possessed adequate experience with AI-driven personalization features and advertising exposure within the platform. A purposive sampling technique was applied to target respondents who met these eligibility requirements. Data were collected through an online questionnaire distributed via digital channels. A total of 304 responses were obtained during the data collection period. After screening for completeness and response consistency, 300 questionnaires were retained for analysis, yielding an effective response rate of 98.7 percent. The final sample size exceeded the minimum requirements for PLS-SEM analysis and was considered adequate for estimating a structural model with multiple predictors and mediation effects.

The measurement instrument was developed based on established and validated scales from prior studies in digital marketing, engagement, and consumer behavior literature. All constructs were modeled reflectively, assuming that observed indicators represent manifestations of underlying latent variables. AI-driven personalization was measured using five items capturing users' perceptions of algorithm-based content customization and recommendation accuracy. Perceived advertising relevance was assessed using five items reflecting the extent to which advertisements were considered aligned with user interests and needs. Customer engagement was operationalized through nine indicators capturing cognitive, emotional, and behavioral dimensions of user involvement. Online purchase intention was measured using four items reflecting consumers' likelihood and willingness to make purchases through the platform. All items were measured using a five-point Likert scale ranging from strongly disagree to strongly agree. Prior to full distribution, the questionnaire was reviewed to ensure clarity, contextual relevance, and linguistic appropriateness.

Data analysis was conducted using SmartPLS 4 software following a two-stage evaluation procedure. The measurement model was first assessed to establish reliability and validity. Internal consistency reliability was examined using Cronbach's Alpha, rho_A, and Composite Reliability, with all constructs exceeding the recommended threshold of 0.70. Convergent validity was evaluated using Average Variance Extracted (AVE) and outer loadings, where all AVE values were above 0.50 and all indicator loadings surpassed the acceptable threshold of 0.70. Discriminant validity was assessed using the Heterotrait–Monotrait Ratio (HTMT), and all values remained below the accepted threshold, confirming empirical distinctiveness among constructs.

Following confirmation of the measurement model, the structural model was evaluated. Collinearity was assessed using Variance Inflation Factor (VIF) values to ensure that multicollinearity did not bias the structural estimates. The explanatory power of the model was examined using the coefficient of determination (R^2), while effect sizes (f^2) were calculated to evaluate the contribution of each predictor. Predictive relevance was assessed through the blindfolding procedure to obtain Q^2 values, indicating the model's out-of-sample predictive capability. Hypothesis testing was conducted using a bootstrapping procedure with 5,000 resamples to generate path coefficients, t-statistics, and p-values. Mediation effects were examined through the assessment of indirect paths using bootstrapping, allowing for evaluation of the

mediating role of customer engagement between the independent variables and online purchase intention.

Participation in the study was voluntary, and respondents were informed of the academic purpose of the research. No personally identifiable information was collected, and data were analyzed in aggregate form to ensure confidentiality.

Results

Respondent Profile and Data Description

Data were collected from active users of social commerce platforms, specifically individuals who had made at least one purchase through TikTok Shop within the last three months. The survey was administered online using a purposive sampling approach to ensure that participants met the predefined eligibility criteria. A total of 304 questionnaires were returned during the data collection period. After careful screening for completeness and consistency of responses, 300 questionnaires were deemed usable for further analysis. This represents an effective response rate of 98.7%, indicating a high level of participant engagement and reliable data quality for subsequent structural equation modeling.

In terms of gender distribution, the sample was predominantly female, accounting for 61.3% of respondents, while male participants represented 38.7%. This distribution aligns with prior observations that female users tend to exhibit higher engagement in social commerce environments, particularly in interactive shopping features and live-stream purchasing contexts.

Regarding age, the largest proportion of respondents fell within the 21–30-year age group (42.0%), followed by those aged 31–40 years (29.7%). Younger respondents aged 17–20 years constituted 15.3% of the sample, while participants over 40 years old accounted for 13.0%. The dominance of young adults reflects the demographic segment most actively involved in digital platforms and AI-enabled commerce ecosystems.

Educational attainment varied across respondents. More than half of the participants (56.0%) held a bachelor's degree, followed by high school graduates (28.7%), diploma holders (8.3%), and postgraduate degree holders (7.0%). This educational diversity suggests that social commerce adoption transcends educational boundaries, although it is slightly concentrated among individuals with tertiary education.

In terms of purchasing behavior, nearly half of the respondents (47.3%) reported making two to three purchases in the past three months. Meanwhile, 32.0% had purchased more than three times, and 20.7% had made a single purchase during the same period. These findings indicate that the majority of respondents were not occasional users but rather active consumers within the social commerce environment.

Concerning platform experience, 58.7% of respondents had been using TikTok Shop for more than one year, 29.3% had used it between six and twelve months, and 12.0% had less than six months of experience. The prevalence of experienced users strengthens the validity of their evaluations regarding AI-driven personalization, advertising relevance, and engagement mechanisms.

Overall, the demographic characteristics demonstrate that the sample appropriately represents active social commerce users, providing a robust empirical

basis for examining the proposed structural relationships.

Table 1 Demographic Profile of Respondents (n = 300)

Variable	Category	Frequency	Percentage (%)
Gender	Male	116	38.7
	Female	184	61.3
Age	17–20 years	46	15.3
	21–30 years	126	42
	31–40 years	89	29.7
	> 40 years	39	13
Education	High School	86	28.7
	Diploma	25	8.3
	Bachelor's Degree	168	56
	Postgraduate	21	7
Purchase Frequency (Last 3 Months)	1 time	62	20.7
	2–3 times	142	47.3
	> 3 times	96	32
Length of Platform Use	< 6 months	36	12
	6–12 months	88	29.3
	> 1 year	176	58.7

Measurement Model Assessment

The measurement model was evaluated to ensure the reliability and validity of the constructs before proceeding to the structural model analysis. Following the PLS-SEM procedure, internal consistency reliability, convergent validity, and indicator reliability were assessed using Cronbach's Alpha, rho_A, Composite Reliability (CR), Average Variance Extracted (AVE), and outer loadings.

Internal Consistency Reliability

Internal consistency was examined using Cronbach's Alpha, rho_A, and Composite Reliability. As presented in Table 2, all constructs demonstrate exceptionally strong reliability. Cronbach's Alpha values range from 0.947 to 0.967, substantially exceeding the recommended threshold of 0.70. Similarly, rho_A values fall between 0.947 and 0.967, indicating stable construct reliability across indicators. Composite Reliability values range from 0.962 to 0.972, well above the acceptable minimum of 0.70 and even surpassing the more stringent 0.90 benchmark. These findings confirm that the measurement scales exhibit high internal consistency without indications of measurement instability.

Convergent Validity

Convergent validity was evaluated using AVE and outer loadings. The AVE values for all constructs are above 0.50, ranging from 0.792 to 0.863, indicating that each construct explains more than 50% of the variance of its respective indicators. Notably, the AVE values are substantially higher than the minimum requirement, suggesting strong shared variance among the items within each latent construct.

The outer loadings further reinforce convergent validity. All indicator loadings

exceed 0.858, with most above 0.90. These values significantly surpass the recommended minimum threshold of 0.70, confirming that each item contributes meaningfully to its corresponding construct. No indicators required deletion, as all demonstrated robust loading values and theoretical consistency.

Overall, the measurement model satisfies all reliability and convergent validity criteria. The results indicate that the constructs of AI-Driven Personalization, Perceived Advertising Relevance, Customer Engagement, and Online Purchase Intention are measured with a high degree of precision and conceptual coherence.

Table 2 Construct Reliability and Convergent Validity

Construct	Cronbach's Alpha	rho_A	Composite Reliability	AVE
AI-Driven Personalization (AIP)	0.954	0.955	0.965	0.846
Customer Engagement (CE)	0.967	0.967	0.972	0.792
Online Purchase Intention (OPI)	0.947	0.947	0.962	0.863
Perceived Advertising Relevance (PAR)	0.957	0.96	0.966	0.852

Table 3 Outer Loadings of Measurement Items

Indicator	AIP	CE	OPI	PAR
AIP1	0.934			
AIP2	0.913			
AIP3	0.931			
AIP4	0.889			
AIP5	0.93			
CE1		0.887		
CE2		0.895		
CE3		0.882		
CE4		0.896		
CE5		0.858		
CE6		0.894		
CE7		0.896		
CE8		0.9		
CE9		0.9		
OPI1			0.922	
OPI2			0.936	

OPI3			0.921	
OPI4			0.936	
PAR1				0.935
PAR2				0.914
PAR3				0.925
PAR4				0.914
PAR5				0.928

Summary of Measurement Model Evaluation

All constructs meet or exceed established thresholds for reliability and convergent validity. The high Composite Reliability and AVE values indicate excellent internal consistency and strong shared variance among indicators. Furthermore, the uniformly high outer loadings demonstrate that each item robustly represents its underlying latent construct. Consequently, the measurement model is considered statistically sound and appropriate for proceeding to structural model evaluation.

Table 4 Discriminant Validity Assessment Using HTMT Criterion

Construct	AI-Driven Personalization_(AIP)	Customer Engagement_(CE)	Online Purchase Intention_(OPI)	Perceived Advertising Relevance_(PAR)
AI-Driven Personalization_(AIP)				
Customer Engagement_(CE)	0.6			
Online Purchase Intention_(OPI)	0.667	0.865		
Perceived Advertising Relevance_(PAR)	0.117	0.464	0.426	

Discriminant validity was assessed using the Heterotrait–Monotrait Ratio (HTMT), which is considered a more rigorous and sensitive criterion compared to traditional approaches such as the Fornell–Larcker criterion. The HTMT method evaluates whether constructs are empirically distinct by examining the ratio of

between-construct correlations relative to within-construct correlations.

As presented in Table 4, the HTMT values range from 0.117 to 0.865. Most construct pairs exhibit values well below the conservative threshold of 0.85, indicating satisfactory discriminant validity. Specifically, the HTMT value between AI-Driven Personalization and Customer Engagement is 0.600, suggesting a moderate conceptual association without construct overlap. Similarly, AI-Driven Personalization and Online Purchase Intention demonstrate a value of 0.667, which remains within acceptable limits.

The lowest HTMT value (0.117) appears between AI-Driven Personalization and Perceived Advertising Relevance, confirming that these constructs are clearly distinct and represent different conceptual domains. The relationships between Perceived Advertising Relevance and both Customer Engagement (0.464) and Online Purchase Intention (0.426) also fall comfortably below the threshold.

However, the HTMT value between Customer Engagement and Online Purchase Intention reaches 0.865. Although slightly above the conservative 0.85 criterion, it remains below the more liberal threshold of 0.90 commonly accepted in marketing and behavioral research. Given the strong theoretical linkage between engagement and purchase intention, this relatively high association is conceptually expected and does not necessarily indicate a violation of discriminant validity. Nonetheless, the closeness to the threshold suggests a strong empirical relationship, reinforcing the central mediating role of customer engagement within the model.

Overall, the HTMT results support the conclusion that the constructs demonstrate adequate discriminant validity, allowing the structural relationships to be interpreted with confidence.

Structural Model Assessment

After confirming the adequacy of the measurement model, the structural model was evaluated to test the proposed hypotheses and examine the predictive relationships among constructs. The assessment followed standard PLS-SEM procedures, including evaluation of coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), path coefficients, and mediation effects using bootstrapping.

Variance Inflation Factor (VIF) values were examined to assess potential collinearity issues. All inner VIF values were below the recommended threshold of 3.3, indicating that multicollinearity is not a concern in the structural model.

Coefficient of Determination (R^2)

The coefficient of determination (R^2) indicates the proportion of variance explained by the exogenous constructs on endogenous variables. As shown in Table 5, Customer Engagement (CE) achieved an R^2 value of 0.599 (Adjusted R^2 = 0.596). This suggests that AI-Driven Personalization (AIP) and Perceived Advertising Relevance (PAR) jointly explain approximately 59.9% of the variance in Customer Engagement. According to established benchmarks, this represents a moderate-to-substantial level of explanatory power.

Online Purchase Intention (OPI) demonstrates an even stronger R^2 value of 0.748 (Adjusted R^2 = 0.745), indicating that AIP, PAR, and CE collectively explain 74.8% of the variance in purchase intention. This level of explained variance can be categorized as substantial, highlighting the robustness of the proposed structural

model in predicting consumer behavioral intention within social commerce platforms.

Table 5 Coefficient of Determination (R^2)

Endogenous Construct	R Square	R Square Adjusted
Customer Engagement (CE)	0.599	0.596
Online Purchase Intention (OPI)	0.748	0.745

Effect Size (f^2)

Effect size (f^2) evaluates the individual contribution of each exogenous construct to the endogenous variable. The results are presented in Table 6.

AI-Driven Personalization shows a strong substantive effect on Customer Engagement (f^2 = 0.989), indicating that personalization plays a dominant role in shaping user engagement within social commerce environments. In contrast, its effect on Online Purchase Intention is smaller (f^2 = 0.240), which falls within the medium range.

Customer Engagement exhibits a substantial effect on Online Purchase Intention (f^2 = 0.456), suggesting that engagement is a key mechanism translating platform features into purchasing behavior.

Perceived Advertising Relevance has a large effect on Customer Engagement (f^2 = 0.661), while its direct effect on Online Purchase Intention is relatively small (f^2 = 0.099). This pattern indicates that advertising relevance primarily operates through engagement rather than directly influencing purchase intention.

Table 6 Effect Size (f^2)

Predictor → Outcome	f^2
AIP → CE	0.989
AIP → OPI	0.24
CE → OPI	0.456
PAR → CE	0.661
PAR → OPI	0.099

Although the effect sizes are substantial, variance inflation factor (VIF) values were below the critical threshold, indicating no multicollinearity concerns.

Predictive Relevance (Q^2)

Predictive relevance was assessed using the blindfolding procedure. All endogenous constructs yielded Q^2 values greater than zero, confirming that the

model possesses predictive relevance. The strong R^2 values, combined with positive Q^2 statistics, indicate that the structural model is not merely explanatory but also predictive in nature.

Path Coefficients and Bootstrapping Results

Bootstrapping with 5,000 resamples was conducted to evaluate the statistical significance of the hypothesized relationships. All structural paths were found to be positive and statistically significant at $p < 0.001$.

AI-Driven Personalization significantly influences Customer Engagement, confirming that AI-enabled customization enhances user involvement. Similarly, Perceived Advertising Relevance significantly affects Customer Engagement, indicating that users are more engaged when advertisements align with their preferences and needs.

Customer Engagement exerts a strong positive effect on Online Purchase Intention, demonstrating that engaged users are substantially more likely to intend future purchases. Both AI-Driven Personalization and Perceived Advertising Relevance also show direct positive effects on Online Purchase Intention, although the magnitude of the indirect effects through engagement is stronger.

Mediation Analysis

To assess mediation, indirect effects were examined through bootstrapping. The indirect effect of AI-Driven Personalization on Online Purchase Intention via Customer Engagement is significant, indicating partial mediation. Likewise, Customer Engagement partially mediates the relationship between Perceived Advertising Relevance and Online Purchase Intention.

The magnitude of indirect effects, combined with significant direct paths, suggests complementary mediation. This implies that personalization and advertising relevance influence purchase intention both directly and indirectly through engagement mechanisms.

Structural Model Interpretation

Overall, the structural model demonstrates substantial explanatory and predictive power. Customer Engagement emerges as a pivotal mediating construct that translates AI-driven personalization and advertising relevance into behavioral intention. While personalization exerts the strongest influence on engagement, engagement itself serves as the most critical determinant of purchase intention.

These findings underscore the strategic importance of designing AI-enabled personalization systems that enhance meaningful engagement, rather than focusing solely on transactional persuasion. The model confirms that social commerce performance is driven not only by algorithmic precision but by the quality of interactive user experiences that foster emotional and cognitive involvement.

Table 7 Predictive Relevance (Q^2)

Construct	SSO	SSE	Q^2 (= 1 – SSE/SSO)

	AI-Driven Personalization (AIP)	1500	1500	
	Customer Engagement (CE)	2700	1434.572	0.469
	Online Purchase Intention (OPI)	1200	432.051	0.64
	Perceived Advertising Relevance (PAR)	1500	1500	

Predictive Relevance Assessment (Q^2)

Predictive relevance was examined using the blindfolding procedure to assess the model's out-of-sample predictive capability. In PLS-SEM, Q^2 values greater than zero indicate that the model has predictive relevance for a given endogenous construct.

As shown in Table 4.7, Customer Engagement (CE) produced a Q^2 value of 0.469, while Online Purchase Intention (OPI) yielded a Q^2 value of 0.640. Both values are substantially above zero, demonstrating strong predictive accuracy. Based on established guidelines, Q^2 values above 0.35 are considered large, indicating that the model possesses high predictive relevance for both endogenous constructs.

The Q^2 value of 0.469 for Customer Engagement confirms that AI-Driven Personalization and Perceived Advertising Relevance provide meaningful predictive information regarding users' engagement levels. More notably, Online Purchase Intention achieves a Q^2 of 0.640, suggesting that the combined effects of personalization, advertising relevance, and engagement generate strong predictive power for purchase intention behavior.

As expected, exogenous constructs (AI-Driven Personalization and Perceived Advertising Relevance) do not display Q^2 values because predictive relevance is assessed only for endogenous variables within the structural model.

Overall, the blindfolding results reinforce the robustness of the structural model. The substantial Q^2 values, together with high R^2 levels, indicate that the proposed framework is not only explanatory but also demonstrates strong predictive capability in understanding consumer behavior within social commerce platforms.

Bootstrapping Results and Hypothesis Testing

To evaluate the statistical significance of the proposed hypotheses, a bootstrapping procedure with 5,000 resamples was conducted.

Table 8 Bootstrapping Results

Structural Path	Original Sample (β)	Sample Mean	STDEV	t-Statistics	p-Values
AIP → CE	0.634	0.633	0.035	17.887	0
AIP → OPI	0.349	0.349	0.04	8.762	0
CE → OPI	0.535	0.534	0.046	11.651	0
PAR → CE	0.518	0.518	0.036	14.44	0
PAR → OPI	0.205	0.205	0.038	5.333	0

Interpretation of Direct Effects

The bootstrapping results demonstrate that all hypothesized relationships are positive and statistically significant at $p < 0.001$.

AI-Driven Personalization significantly influences Customer Engagement ($\beta = 0.634$), representing the strongest relationship in the model. This indicates that AI-based customization substantially enhances user involvement in social commerce environments.

AI-Driven Personalization also exerts a significant direct effect on Online Purchase Intention ($\beta = 0.349$). Although smaller than its effect on engagement, the relationship confirms that personalized recommendations directly stimulate purchasing intentions.

Customer Engagement has a strong positive effect on Online Purchase Intention ($\beta = 0.535$). This finding highlights engagement as the most influential determinant of purchase intention within the model.

Perceived Advertising Relevance significantly influences Customer Engagement ($\beta = 0.518$), indicating that relevant advertising content enhances user interaction and platform immersion. Its direct effect on Online Purchase Intention ($\beta = 0.205$), while significant, is comparatively weaker, suggesting that advertising relevance primarily operates through engagement mechanisms.

Figure 1 Structural Path Model

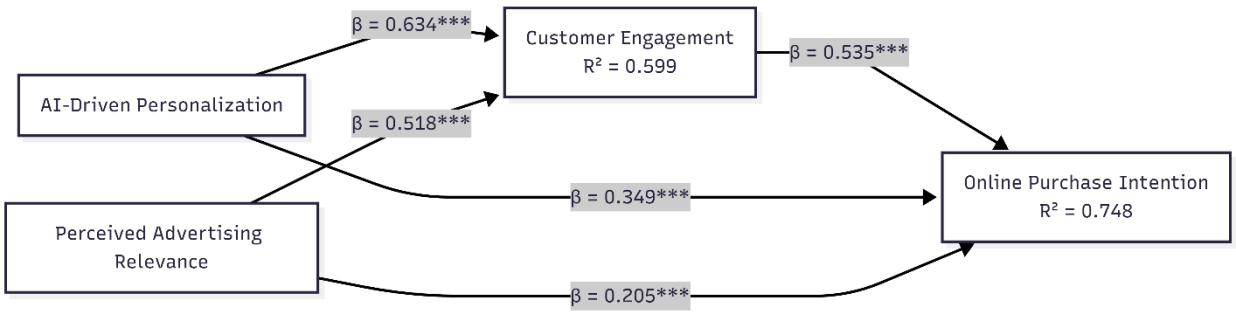

Figure 1 illustrates the structural relationships among AI-Driven Personalization (AIP), Perceived Advertising Relevance (PAR), Customer Engagement (CE), and Online Purchase Intention (OPI). All hypothesized paths are positive and statistically significant ($p < 0.001$), indicating strong empirical support for the proposed model.

AI-Driven Personalization demonstrates a strong effect on Customer Engagement ($\beta = 0.634$), suggesting that algorithm-based customization significantly

enhances user involvement in social commerce platforms. Perceived Advertising Relevance also positively influences engagement (β = 0.518), indicating that advertisements aligned with user preferences strengthen platform interaction.

Customer Engagement exerts a substantial effect on Online Purchase Intention (β = 0.535), confirming its central role as the primary behavioral driver in the model. While AI-Driven Personalization (β = 0.349) and Perceived Advertising Relevance (β = 0.205) both directly affect purchase intention, their effects are weaker compared to the impact of engagement, highlighting the mediating importance of CE.

The model demonstrates strong explanatory power, with R^2 values of 0.599 for Customer Engagement and 0.748 for Online Purchase Intention. These results indicate that personalization and advertising relevance influence purchase intention largely through their ability to enhance meaningful customer engagement.

Mediation Effect

Further analysis reveals that Customer Engagement mediates the relationships between both antecedent constructs and Online Purchase Intention.

The indirect effect of AI-Driven Personalization on Online Purchase Intention through Customer Engagement is substantial and complements its direct effect, indicating partial mediation. Similarly, Customer Engagement partially mediates the relationship between Perceived Advertising Relevance and Online Purchase Intention, with the indirect pathway demonstrating meaningful magnitude.

These results confirm that engagement serves as the central transmission mechanism translating personalization and advertising relevance into purchase intention.

Overall Structural Model Evaluation

Taken together, the structural model exhibits strong explanatory and predictive power. AI-driven personalization emerges as the most influential driver of engagement, while engagement itself functions as the primary determinant of purchase intention. Advertising relevance contributes meaningfully but operates largely through engagement.

The findings suggest that in social commerce contexts, technological sophistication alone is insufficient to generate purchase intention. Instead, platform features must foster meaningful user engagement to effectively influence consumer behavior.

Discussion

This study examined the influence of AI-driven personalization and perceived advertising relevance on online purchase intention in social commerce, with customer engagement acting as a mediating variable. The empirical findings confirm that all hypothesized relationships are positive and statistically significant.

AI-driven personalization significantly enhances customer engagement. This indicates that algorithm-based content and product customization strengthens users' interaction, attention, and emotional involvement within the platform. In social commerce settings, personalization operates not merely as a technological feature, but as a mechanism that deepens user experience.

Perceived advertising relevance also positively influences engagement. When users perceive advertisements as aligned with their preferences and needs, they are

more likely to respond favorably and participate actively. Relevance reduces resistance to advertising and increases perceived value, thereby fostering stronger engagement.

Customer engagement emerges as a key determinant of online purchase intention. The substantial path coefficient and high R^2 value for purchase intention indicate that engagement plays a central role in translating technological stimuli into behavioral intention. Although personalization and advertising relevance directly influence purchase intention, their indirect effects through engagement reinforce its mediating importance.

These findings suggest that in social commerce environments, technological sophistication alone is insufficient to drive purchasing behavior. Instead, AI systems and advertising strategies must cultivate meaningful engagement to generate stronger commercial outcomes.

Overall, the study contributes to digital marketing literature by clarifying how AI-based personalization and advertising relevance interact within an engagement-driven framework to shape consumer purchase intention.

The findings reinforce the theoretical argument that technological capability alone does not guarantee behavioral outcomes. Instead, the effectiveness of AI systems depends on their ability to generate psychological engagement. This extends prior engagement-based models by demonstrating that personalization precision must be perceived as meaningful and relevant to translate into purchase intention.

Conclusion

This study investigated the influence of AI-driven personalization and perceived advertising relevance on online purchase intention, with customer engagement serving as a mediating mechanism in social commerce platforms. The findings demonstrate that both AI-driven personalization and advertising relevance significantly enhance customer engagement, which in turn strongly influences purchase intention.

The results confirm that customer engagement plays a central role in explaining how technological and perceptual stimuli translate into behavioral outcomes. While AI-driven personalization and advertising relevance have direct effects on purchase intention, their indirect effects through engagement further strengthen the overall explanatory power of the model. The high predictive capability of the structural model indicates that engagement functions as a critical psychological bridge between digital marketing strategies and consumer decision-making.

From a theoretical standpoint, this study contributes to the growing literature on AI-enabled marketing and social commerce by integrating personalization, advertising relevance, and engagement within a unified structural framework. From a managerial perspective, the findings suggest that social commerce platforms should not only optimize algorithmic accuracy but also design interactive and relevant advertising experiences that foster sustained user engagement.

In summary, the effectiveness of AI in social commerce lies not solely in personalization precision, but in its ability to cultivate meaningful engagement that ultimately drives purchase intention.

Suggestion

The results of this study also emphasize the importance of building a

personalization system that is not only technically accurate but also sensitive to user preferences and convenience. Social commerce platforms need to ensure that every recommendation and promotional message is presented contextually, not excessively, and respects consumer privacy. A relevant and valuable communication strategy will strengthen ongoing customer engagement and create a more authentic relationship between brands and consumers. Therefore, AI-based personalization optimization must be integrated with a holistic customer experience approach to consistently and sustainably drive purchase intentions.

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