

Impact of AI-Driven Personalized Advertising on Consumer Purchase Intention in E-Commerce Platforms: The Mediating Role of Trust and Engagement

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Abstract. Artificial intelligence (AI) allows e-commerce platforms to serve tailored advertisements and product recommendations based on user preferences, browsing history, and other online behavior. This study explored the influence of AI-driven personalized advertising on consumer purchase intention in e-commerce, with attention to personalization, trust, engagement, and the relevance of recommendations. Primary data were collected through a questionnaire from 250 active users of e-commerce platforms selected by convenience sampling. The data were analyzed with descriptive and inferential statistics, including Cronbach's alpha, correlation analysis, independent samples t-tests, and analysis of variance (ANOVA), in Microsoft Excel and JASP software. The reliability analysis showed high internal consistency. AI-driven personalized advertising was positively correlated with purchase intention ($r = 0.724, p < 0.001$), and trust and engagement were also strongly correlated with purchase intention. These results suggest that trust and engagement play a key role in consumers' willingness to buy products recommended by AI-based systems, while privacy, data use, and perceived intrusiveness still shape consumer perceptions and trust. The study concludes that AI-driven advertising is associated with stronger purchase intention when it is supported by high trust and engagement. Marketers should balance personalization and transparency with privacy protection to build lasting customer relationships.

Keywords. Artificial intelligence; personalized advertising; e-commerce; consumer purchase intention; trust; consumer engagement; digital marketing; online shopping behavior

I. INTRODUCTION

Artificial intelligence (AI) has become a significant part of the digital marketing strategies of e-marketers. Over the past decade, AI has been applied rapidly and creatively to contextual advertising. It allows contextual advertising to reach higher levels of personalization that respond to the needs of individual consumers, delivering the right message to the right audience at the right time and place. AI achieves this through techniques such as deep learning, machine learning, and computer vision.

In recent years, marketing has moved online, and AI is changing the e-commerce sector. Organizations now hold large volumes of consumer data and can analyze them in real time, so they can serve advertisements and product recommendations to individual customers based on previous behavior and choices. Existing studies have analyzed the positive effects of AI-based personalization on click and purchase intention [1]-[7], but few have examined the combined role of trust and engagement, and empirical evidence from developing countries such as India remains limited. This study offers an integrated framework that combines AI-enabled personalization, trust, and consumer engagement to explain purchase intention among Indian consumers, using primary data from 250 respondents.

II. LITERATURE REVIEW

A. Technology Acceptance Model

The technology acceptance model (TAM), introduced by Fred D. Davis in 1989 [8], describes how users adopt new technologies (Fig. 1). It emphasizes two factors: the perceived usefulness of a technology and its perceived ease of use. These factors shape users' attitude toward the technology, which in turn affects whether they are willing to use it. TAM has since been used widely in information systems and digital marketing studies of how users adopt new and emerging technologies.

TAM also explains how users respond to AI-based personalized advertising on e-commerce platforms. When individuals find advertisements useful, relevant, and easy to follow, they develop a more positive disposition toward the technology, which makes them more willing to consider a purchase. AI-based personalized recommendations thus affect consumers' willingness to buy through perceived usefulness, perceived ease of use, and the attitudes these form [2].

B. AI Personalization, Engagement, and Trust

Digital platforms have become central to marketing, as a review of the Indonesian market shows [9]. Businesses use

them not only to communicate with customers but also to understand their needs. E-commerce is also combining AI with augmented reality, for example in AI-powered virtual try-on [10]. Personalized recommendations make shopping more useful and engaging, and users tend to stay with a platform that makes them feel comfortable.

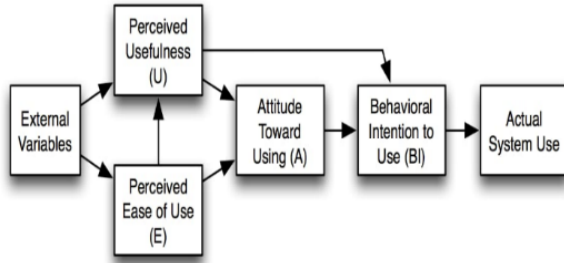


Fig. 1. The technology acceptance model (TAM), after Davis [8].

AI personalization also influences buying behavior through engagement. Users spend more time on a platform when advertisements are relevant, and this increased interaction makes them more likely to buy. AI that predicts user preferences more accurately makes information easier to find and raises platform profitability. Predictive modeling is a key factor in personalizing the user experience, because it helps users find content faster and gives e-commerce companies a competitive edge.

AI architectures that integrate different forms of data, such as the social connections between users, can make personalized recommendations more accurate [11]. Irrelevant suggestions, by contrast, can reduce interest in purchasing and may even lead consumers to avoid a purchase, so companies must balance personalization and consumer comfort. AI tools help e-commerce platforms match potential buyers with products and gain a competitive advantage [1].

Personalization can backfire when it takes away anonymity, which places user experience at the center of decision making. Yin, Qiu, and Wang [1] found that perceived infringement of information privacy weakens the positive effect of AI-personalized recommendations on clicking intention, so usefulness has to be balanced against privacy. Used in this way, AI personalization can raise consumer trust and purchase intention on e-commerce sites. A human-centric approach to AI governance can also help build trust and support long-term legal compliance in the data-intensive e-commerce ecosystem.

III. RESEARCH GAP, PROBLEM, AND SCOPE

A. Research Gap

Earlier studies have recognized AI-driven personalization as significant in e-commerce, but few have assessed trust and consumer engagement together, and empirical evidence from India is scarce. This study addresses these gaps by developing an integrated framework and examining it with primary data collected from Indian consumers.

B. Problem Statement

Organizations have quickly adopted AI to customize advertisements on online shopping sites, but the effect on purchases is not yet clear. Personalized advertisements are more relevant and convenient, and people are more inclined

to interact with them. They also raise concerns about privacy and data misuse, and some consumers already feel overwhelmed by them. These concerns may erode consumer confidence, which is central to purchase behavior. How personalization, trust, engagement, and the feeling of being intruded upon combine to affect what people buy is not fully understood. Research also concentrates on online behavior in high-income countries, with little attention to lower-income countries, where people may use the internet differently, so it is unclear whether AI advertising delivers results there.

C. Scope of the Study

The study analyzes the effect of AI-driven personalized advertising on consumer purchase intention in e-commerce, covering the level of personalization, the relevance of recommendations, consumer satisfaction, engagement, and trust. It focuses on active users of e-commerce sites such as Amazon, Flipkart, and Myntra who have encountered personalized advertisements while shopping online, and on how they perceive these advertisements and how the advertisements affect their buying.

IV. OBJECTIVES AND HYPOTHESES

The study had three objectives: to examine the influence of AI-based personalization on consumer purchase intention; to analyze the effect of the perceived relevance of AI-personalized recommendations on purchase intention; and to investigate the relationship among trust, engagement, and purchase intention. Two null hypotheses were formulated.

H₀₁: There is no significant relationship between the perceived relevance of AI-personalized recommendations and consumer purchase intention.

H₀₂: Consumer trust and perception toward AI-driven personalized advertising do not significantly influence online purchasing behavior.

In this study, AI-powered personalized advertising refers to advertising tailored to each user's preferences through analysis of browsing behavior and previous use, so that the same advertisement is not shown to everyone. Purchase intention refers to the consumer's willingness to buy an item after exposure to personalized advertisements. It reflects the outcome of the decision-making process and the effectiveness of advertising in influencing purchases.

V. RESEARCH METHODOLOGY

The research was quantitative and descriptive and examined the effect of AI-based personalized advertisements on consumer purchase intention in e-commerce. The descriptive design supported the analysis of numerical data on consumers' perceptions of, and behavior toward, AI-based personalized advertisements. The target population was active users of e-commerce platforms who had received personalized advertisements and product recommendations generated by AI. A total of 250 respondents were selected by non-probability convenience sampling, which suited the accessible population of online buyers.

Primary data were collected through a structured questionnaire, and secondary material was drawn from journals and research articles. The data were analyzed with descriptive and inferential techniques, including Cronbach's

alpha, correlation analysis, independent samples t-tests, and ANOVA. Data processing and statistical analysis were performed in Microsoft Excel and JASP software.

VI. DATA ANALYSIS AND RESULTS

A. Reliability

Table 1 reports Cronbach's alpha for the four scales: AI-driven personalized advertising (ADA), engagement with personalized advertising (EPA), intention to purchase (IPA), and trust and perception (TP). Alpha ranged from 0.912 to 0.956, well above the accepted threshold of 0.70, with every estimate above 0.90. The coefficients for ADA, EPA, and IPA were almost identical (0.956, 0.954, and 0.950), and TP (0.912) was also in the excellent range.

TABLE 1. RELIABILITY STATISTICS FOR THE MAIN CONSTRUCTS

Scale	α	SE	95% CI lower	95% CI upper
ADA	0.956	0.006	0.943	0.968
EPA	0.954	0.007	0.941	0.967
IPA	0.950	0.008	0.935	0.965
TP	0.912	0.015	0.882	0.941

Note: α = Cronbach's alpha estimate; SE = standard error; CI = confidence interval.

B. Correlation Analysis

All the relationships showed strong positive Pearson correlations, from 0.72 to 0.84, all with $p < 0.001$ (Table 2). Purchase intention and trust both rise with ADA. Higher trust goes with higher engagement and higher purchase intention, and higher engagement goes strongly with higher purchase intention. The strongest relationship is between engagement and purchase intention ($r = 0.839$, $p < 0.001$), which suggests that high engagement supports consumers' purchase intention.

TABLE 2. PEARSON CORRELATIONS BETWEEN THE CONSTRUCTS

Variable 1	Variable 2	r	p
ADA	IPA	0.724	< 0.001
ADA	TP	0.721	< 0.001
TP	EPA	0.780	< 0.001
TP	IPA	0.789	< 0.001
IPA	EPA	0.839	< 0.001

Note: Scale averages; $n = 250$.

C. Independent Samples t-Tests

Table 3 compares male and female respondents on the four scales. The differences were statistically significant for all four scales ($p < 0.05$), so the two groups perceived these constructs differently. The Student and Welch tests gave similar results, which supports the findings.

D. Analysis of Variance

A one-way ANOVA tested the effects of gender and occupation on ADA (Table 4). Gender had a significant effect ($F = 17.92$, $p < 0.001$), so male and female respondents differed in their responses. Occupation had no significant effect ($F = 2.407$, $p = 0.068$), so respondents from different occupations responded consistently. Gender therefore shapes responses to AI-driven personalized advertising, while occupation does not.

TABLE 3. INDEPENDENT SAMPLES T-TESTS BY GENDER

Scale	Test	t	df	p
ADA	Student	-4.233	248.0	< 0.001
	Welch	-3.963	115.2	< 0.001
EPA	Student	-4.135	248.0	< 0.001
	Welch	-3.804	111.6	< 0.001
IPA	Student	-3.632	248.0	< 0.001
	Welch	-3.236	105.6	0.002
TP	Student	-3.625	248.0	< 0.001
	Welch	-3.251	106.7	0.002

TABLE 4. ONE-WAY ANOVA FOR GENDER AND OCCUPATION ON ADA

Factor	Sum of squares	df	Mean square	F	p
Gender	28.17	1	28.17	17.92	< 0.001
Occupation	11.92	3	3.973	2.407	0.068

VII. FINDINGS

The results suggest that AI-driven personalized advertising is strongly associated with purchase intention, together with trust and engagement. Customers welcome personalized suggestions, but excessive use of data and privacy concerns can undermine trust. Occupation had no significant effect on perceptions, while gender differences were significant.

VIII. FUTURE RESEARCH DIRECTIONS

Future studies could examine other age groups or regions to test for local variation, and could study emotional outcomes such as satisfaction or loyalty. Another area is comparing types of AI tools, such as chatbots and recommendation systems, to see which has the greater effect. Longitudinal data would show how user perceptions change over time and give a fuller picture of AI-driven advertising in e-commerce.

IX. CONCLUSION

Among 250 e-commerce users, AI-driven personalized advertising was strongly correlated with purchase intention ($r = 0.724$), and engagement showed the strongest link with purchase intention ($r = 0.839$). The results extend the technology acceptance model by indicating that trust and engagement link personalization and purchase intention. The study shows e-commerce companies why they need to balance personalization and transparency with privacy protection.

AUTHOR CONTRIBUTIONS

All authors contributed to the conception and preparation of this work and approved the final version of the manuscript.

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DECLARATION OF GENERATIVE AI USE

The authors declare that no generative artificial intelligence tools were used in the preparation of this manuscript. The authors take full responsibility for the content of the publication.

DATA AVAILABILITY

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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