

TRANSPARENCY AND FAIRNESS IN AI ADVERTISING ALGORITHMS: A STUDY ON CONSUMER TRUST AND ENGAGEMENT

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Abstract

AI-driven advertisements analyse the consumer data such as browsing history, Consumer online behaviour to create a advertising strategies based on their consumer needs. Nowadays AI helps to create more personalised advertisement to consumers. These advertisement strategies enhance consumer engagement but meanwhile it creates concerns to consumer about their data privacy, fairness in the way of advertisements delivered to users. This study aims on consumer perceptions towards transparency and fairness in AI-driven advertising algorithms and their influence on consumer trust and engagement with digital advertisements The study adopts a quantitative research design using a structured questionnaire distributed to users of digital platforms.

Keywords

Artificial Intelligence, AI Advertising Algorithms, Transparency, Consumer Trust, Digital Marketing

1. Introduction

Artificial intelligence (AI) has created a revolution in the field of digital marketing. AI uses advertising algorithms to deliver more customised advertisements by using consumer data, browsing history, online behaviour and preferences. This technological enhancement makes marketing more efficient and improve customer experience by ensuring the relevant content reaches the right audience. Every aspects of technology advancements come along with few drawbacks, the increasing reliance on AI in advertising has raised critical concerns related to transparency and fairness. Consumers are often unaware of how their data is collected, processed, and used by these algorithms. Additionally, issues such as algorithmic bias and unequal ad distribution can influence consumer perceptions negatively. These concerns highlight the need to examine how transparency and fairness in AI advertising

algorithms impact consumer trust and engagement, making it an important area of research in the evolving digital economy.

2. Review of Literature

AI-powered personalisation has been pivotal in shaping e-commerce strategies, as it allows marketers to tailor their approaches based on extensive consumer data analysis. Raji et al. (2024) highlight that while AI can enhance engagement, the necessity for transparency in algorithm operations is paramount. The ethical implications of data usage, such as privacy concerns and algorithmic bias, directly influence consumer perceptions of trustworthiness. Similarly, Babatunde et al. (2024) discuss the ethical challenges associated with AI in marketing, proposing that transparent practices are

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essential for fostering deeper connections between consumers and brands.

A significant body of research emphasizes the critical role of transparency in AI systems to cultivate consumer trust. Baek et al. (2024) demonstrate that disclosure of AI-generated content positively influences consumer attitudes, indicating that perceived ad credibility acts as a mediator in this relationship. This suggests that transparent communication about AI's role in advertising can enhance consumer trust. Additionally, Ienca (2023) addresses the manipulation potential of AI in advertising, arguing that a lack of transparency can lead to distrust and disengagement. This aligns with Lopes et al. (2024), who found that transparency anxiety negatively affects consumers' perceptions of AI evaluations, underscoring the need for clear communication regarding AI decision-making processes.

The ethical implications of AI in advertising extend beyond transparency, encompassing algorithmic bias and data privacy. Ajiga et al. (2024) stress the importance of responsible data usage to build consumer trust, indicating that addressing ethical challenges is crucial for enhancing customer satisfaction and loyalty. Kumar and Suthar (2024) further explore these ethical concerns, highlighting how algorithmic discrimination can erode consumer confidence in AI advertising. These findings emphasize that ensuring fairness in AI operations is essential to maintaining consumer trust and engagement.

3. Conceptual Background

The conceptual foundation of this study is based on key ideas such as AI advertising algorithms, transparency, fairness, consumer trust, and engagement. AI advertising algorithms are automated systems that analyse consumer data to deliver more relevant and targeted advertisements. These systems help businesses reach the right audience more effectively.

Transparency refers to how clearly companies inform consumers about the way their personal data is collected and used for advertising. Fairness, on

the other hand, relates to ensuring that advertisements are delivered in an unbiased and equitable manner, without favouring or excluding any particular group of users.

Consumer trust plays a vital role in determining the success of digital marketing strategies. When consumers feel that AI systems are transparent and fair, they are more likely to trust them. This trust directly influences consumer engagement, which includes actions such as clicking on ads, viewing content, or responding to advertisements.

In this study, transparency and fairness are considered important factors that influence consumer trust and engagement, forming the basis of the conceptual framework for analysis.

4. Research Problem

Even though AI is widely used in digital advertising today, many consumers still do not fully understand how these algorithms work. They often lack clarity about how personal data is collected and used, which can create confusion and uncertainty among users. Certain consumer concerns such as data theft due to biased algorithms and unfair digital marketing practices may lead to negative effect on consumer interest by AI-driven advertisements.

When consumers feel unsure or perceive these systems as unfair, their trust tends to decrease, which can reduce their willingness to engage with digital ads. While earlier studies have examined the role of AI in marketing, only a few have specifically focused on how transparency and fairness influence consumer trust and engagement. This gap highlights the need for the present study.

5. Research Objectives

- To examine consumer awareness of AI-based advertising algorithms in digital marketing.
- To analyse the impact of transparency in AI advertising on consumer trust.
- To evaluate how the perceived fairness of AI-driven advertisements influences consumer engagement.

6. Scope of the Study

This study aims to understand how consumer take AI driven advertising with reference to digital marketing and analyse the factors such as transparency and fairness impacts consumer trust and their level of engagement with these AI-dirven advertisements. This study focuses on individual who are actively interact with digital advertisements and users of online platforms. The findings will throw some light on these perceptions to marketers, advertisers and platform developers in creating more ethical and responsile AI-driven advertisements and this study tried to add existing academic knowledge by addressing growing concerns about the responsible use of AI in marketing.

7. Limitations of the Study

The study is based on a relatively small sample size of 77 respondents, which may limit the generalizability of the findings.

Convenience sampling was used, which may introduce sampling bias and may not fully represent the entire population.

Data was collected through self-reported questionnaires, so responses may be influenced by personal bias or perceptions.

The study focuses only on selected variables such as transparency, fairness, trust, and engagement,

9. Data Analysis

and does not include other possible influencing factors.

The geographic and demographic diversity of respondents is limited, which may affect the wider applicability of the results.

8. Research Methodology

The study adopts a descriptive and analytical research design to examine consumer perceptions of AI advertising algorithms.

- Type of Data: Primary data
- Data Collection Method: Structured questionnaire using Google Forms
- Sampling Method: Convenience sampling
- Sample Size: 77 respondents
- Measurement Scale: 5-point Likert scale
- Statistical Tools Used
 - Descriptive Statistics
 - Reliability Analysis (Cronbach's Alpha)
 - Pearson Correlation
 - Regression Analysis
- Software Used: SPSS

This methodology enables the study to quantitatively analyse the relationships between transparency, fairness, consumer trust, and engagement.

Table 1: Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Awareness of AI Advertising	77	1.00	5.00	3.8247	0.92930
Transparency of AI Advertising	77	1.00	5.00	3.4838	0.83542
Perceived Fairness of AI Advertising	77	1.00	5.00	3.2760	0.78282
Consumer Trust	77	1.00	5.00	3.3052	0.77653
Consumer Engagement	77	1.00	5.00	3.3344	0.77969

The Descriptive Statistics show that the respondents reported relatively high awareness of AI advertising (M=3.82). Transparency, fairness, trust, and engagement show moderate mean scores, indicating moderate consumer perceptions and interactions with AI-driven advertising.

Table 2: Reliability Statistics

Cronbach's Alpha	Number of Items
0.933	18

The reliability of the measurement instrument was assessed using Cronbach's Alpha, which yielded a value of 0.933. This value exceeds the commonly accepted threshold of 0.70, indicating excellent internal consistency among the questionnaire items. It demonstrates that the items used to measure the constructs (awareness, transparency, fairness, trust, and engagement) are highly reliable

and consistently reflect the intended variables.

A high reliability score also implies that the data collected is dependable and suitable for further statistical analyses such as correlation and regression. It confirms that the scale used in the study produces stable and consistent results across different respondents.

H₀₁: There is no significant relationship between transparency of AI advertising and consumer trust.

H₁: There is a significant relationship between transparency of AI advertising and consumer trust.

Table 3: Pearson Correlation (Transparency and Consumer Trust)

Variable	Transparency of AI Advertising	Consumer Trust
Transparency of AI Advertising	1	0.567**
Consumer Trust	0.567**	1

**Correlation is significant at the 0.01 level (2-tailed).

The correlation analysis shows a moderate positive relationship between transparency and consumer trust ($r = 0.567$, $p < 0.01$). Since the p-value is less than 0.01, the result is statistically significant. Therefore, H₀₁ is rejected and H₁ is accepted.

Higher transparency in AI advertising increases consumer trust. This suggests that when consumers clearly understand how their data is used, they are more likely to trust digital advertising systems.

H₀₂: Perceived fairness of AI advertising has no significant impact on consumer engagement.

H₂: Perceived fairness of AI advertising has a significant impact on consumer engagement.

Table 4: Regression Model Summary (Fairness → Engagement)

R	R Square	Adjusted R Square	Std. Error
0.740	0.548	0.542	0.52782

Table 5: ANOVA (Fairness → Engagement)

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	25.307	1	25.307	90.840	0.000
Residual	20.894	75	0.279		
Total	46.201	76			

Table 6: Coefficients (Fairness → Engagement)

Variable	B	Std. Error	Beta	t	Sig.
Constant	0.920	0.260		3.531	0.001
Perceived Fairness of AI Advertising	0.737	0.077	0.740	9.531	0.000

Interpretation: Regression analysis indicates that perceived fairness significantly influences engagement ($\beta = 0.740$, $p < 0.05$) with a strong model fit ($R^2 = 0.548$). Therefore, H_{02} is rejected, and H_2 is accepted. Fair and unbiased advertising practices

lead to higher consumer interaction and engagement. Consumers are more likely to respond positively when they perceive ads as equitable and non-discriminatory.

H_{03} : Consumer awareness of AI-driven advertising does not significantly influence their attitude towards digital advertisements.

H_3 : Consumer awareness of AI-driven advertising significantly influences their attitude towards digital advertisements.

Table 7: Regression Model Summary (Awareness → Engagement)

R	R Square	Adjusted Square	R	Std. Error
0.568	0.322	0.313		0.64610

Table 8: ANOVA (Awareness → Engagement)

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	14.893	1	14.893	35.677	0.000
Residual	31.308	75	0.417		
Total	46.201	76			

Table 9: Coefficients (Awareness → Engagement)

Variable	B	Std. Error	Beta	t	Sig.
Constant	1.513	0.314		4.820	0.000
Awareness of AI Advertising	0.476	0.080	0.568	5.973	0.000

Regression results show that awareness significantly affects engagement ($\beta = 0.568$, $p < 0.05$) with moderate explanatory power ($R^2 = 0.322$). Therefore, H_{03} is rejected and H_3 is accepted. Increased awareness of AI-driven advertising enhances

consumer engagement. When users understand AI mechanisms, they interact more confidently with advertisements.

The study confirms that transparency, fairness, and awareness are key determinants of consumer

trust and engagement in AI-driven advertising. All three alternative hypotheses are supported, indicating that ethical AI practices significantly improve consumer perception and interaction with digital advertisements.

10. Results and Findings

- Respondents show high awareness of AI-driven advertising (Mean = 3.82). Transparency of AI advertising shows a moderate perception among consumers (Mean = 3.48). So enhance Transparency in AI Advertising. Using simple features such as “Why am I seeing this ad?” will directly strengthen consumer trust.
- Perceived fairness of AI advertising has a moderate score (Mean = 3.27). Improve Fairness in Algorithmic Targeting Regularly audit AI algorithms for fairness ensure inclusive and ethical ad delivery. Fairness improvements will boost user engagement.
- Correlation analysis shows a significant positive relationship between transparency and consumer trust ($r = 0.567$, $p < 0.01$). Build Trust-Centric Advertising Strategies like Continuous Monitoring and Feedback Mechanism, which helps to maintain relevance and consumer satisfaction.
- Regression results show perceived fairness significantly influences consumer engagement ($R^2 = 0.548$). Balance Personalization and Privacy. Maintaining a balance between relevance and privacy prevents negative perception despite high awareness.
- Awareness of AI advertising also significantly influences consumer engagement ($R^2 = 0.322$). Highlight ethical AI practices in marketing communication this can convert awareness into positive engagement
- Overall, transparency and fairness in AI advertising improve consumer trust and engagement.

11. Conclusion

The study highlights the important role of transparency and fairness in shaping consumer trust and

engagement in AI-driven advertising. When consumers perceive advertising algorithms as clear and unbiased, their level of trust increases, which in turn leads to higher engagement with digital advertisements. As AI continues to evolve in the marketing field, businesses need to focus on ethical practices such as clearly communicating how consumer data is used and ensuring fair decision-making processes. Enhancing transparency and fairness not only helps build trust but also improves the effectiveness and long-term sustainability of digital marketing strategies. Overall, the study emphasizes the need for responsible use of AI to create a more trustworthy and consumer-centric digital advertising environment.

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