

Impact Of Artificial Intelligence In Online Advertising

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Abstract

This research paper investigates the impact of Artificial Intelligence (AI) in the realm of online advertising, focusing on its influence on campaign targeting, user engagement, efficiency, and insights into consumer behavior. The study also delves into the challenges associated with AI adoption in online advertising, such as technical complexities, privacy concerns, training needs, financial investments, and algorithmic accuracy. The findings reveal a significant positive impact of AI in enhancing various aspects of online advertising, leading to improved ad performance and higher conversion rates. However, the research underscores the multifaceted nature of integrating AI in advertising, with several challenges that necessitate strategic planning. This study contributes to a deeper understanding of the dynamic intersection between AI and online advertising, offering insights for practitioners and policymakers to navigate the evolving digital marketing landscape.

Keywords: Artificial Intelligence, Online Advertising, Digital Marketing, Campaign Targeting, User Engagement, Efficiency, Consumer Behavior, Privacy Concerns, Training, Algorithmic Accuracy, Challenges, Impact.

Introduction

The digital landscape has been undergoing a profound transformation, with the rapid evolution of technology shaping every facet of our online experience. In this ever-changing digital realm, one of the most notable and impactful developments has been the integration of Artificial Intelligence (AI) in online advertising. AI, once relegated to the realm of science fiction, has now become an indispensable tool for advertisers, revolutionizing the way they engage with consumers, optimize campaigns, and tailor messages to reach the right audience at the right time. This seismic shift in advertising practices is not merely an incremental change but a fundamental disruption that has the potential to redefine the industry and how businesses connect with their customers. Online advertising has become the lifeblood of the internet, underpinning the economic models of giants like Google, Facebook, and Baidu, as well as powering countless smaller businesses and startups. The key metric that governs the effectiveness of online advertising is the Click-Through Rate (CTR), which measures the ratio of users who click on an advertisement to the total users who view the advertisement. The CTR is the lifeblood of internet companies' online advertisements' quality, as it directly impacts their revenue and success. The advent of AI in this domain has ushered in an era of unparalleled potential and opportunity, where advertising can be more targeted, efficient, and effective. With AI, it is possible to analyze vast amounts of data, understand user behavior, and make real-time predictions to deliver highly personalized and relevant advertising content. In doing so, AI has the potential to transcend traditional advertising practices, making online advertising not just more effective but also more efficient and engaging.

The integration of AI into online advertising is not a superficial or cosmetic change; it represents a paradigm shift in how businesses conceptualize, strategize, and execute their advertising campaigns. AI augments the capabilities of advertisers, enabling them to make data-driven decisions, automate routine tasks, and tailor messages with incredible precision. Moreover, it extends beyond manual tasks, impacting cognitive functions like understanding consumer behavior and predicting their preferences. This transformation is not confined to one specific aspect of online advertising but touches every stage of the process, from consumer insights and ad creation to media planning, buying, and ad evaluation. This integration has also broadened our definition of advertising creativity. Traditionally, creativity in advertising was measured by perceived novelty and appropriateness of content. However, AI-driven systems are fundamentally changing this perspective. Rather than relying solely on human creativity, AI introduces a systematic approach to creativity, one that can be measured, optimized, and even generated through data and computation. This has led to the emergence of creative advertising systems (CAS), which utilize AI principles to generate, evaluate, and enhance creative ideas for advertising. CAS marks a significant departure from traditional notions of creativity, underscoring that creativity is not an elite privilege, but a systematic process that can be aided and amplified by AI, data, and computation.

This paradigm shift in online advertising is a testament to the transformative power of AI. It allows businesses to not only reach their target audience more effectively but also enhances the overall user experience by delivering more relevant and engaging content. The implications extend beyond advertising, permeating various industries and academic disciplines. From financial services to e-commerce, AI's impact is far-reaching and promises to reshape the way we do business and interact with technology. As we embark on this journey through the impact of AI in online advertising, this comprehensive exploration will delve into the multifaceted facets of this evolution. It will analyze the key trends, challenges, and ethical considerations that accompany this transformation. It will delve into the various advertising prediction models, from shallow learning to deep learning, that underpin this evolution. Furthermore, this study will critically assess the existing landscape of AI in digital marketing, highlighting its significance while also identifying research gaps that warrant further exploration. In a world where digital advertising reigns supreme, the infusion of AI brings both opportunities and challenges. It is a journey into uncharted territory, where the rules of engagement are still being written. This exploration will uncover the potential, the pitfalls, and the promises of AI in online advertising. It is a journey that invites us to question, adapt, and evolve as we navigate the dynamic landscape of AI-driven advertising in the digital age.

Review of Literature

Gkikas and Theodoridis (2019) conducted an insightful exploration of the intricate relationship between two distinct but increasingly interwoven realms of academia: digital marketing and artificial intelligence (AI). Their study serves as a pivotal contribution to the field, addressing the paucity of research specifically focusing on the convergence of these disciplines. While there is a substantial body of work in AI, much of it remains general, delving into topics such as e-business, consumer behavior, and e-commerce strategies. However, Gkikas and Theodoridis' work highlights the deficiency of literature tailored to digital marketing intricacies, including aspects such as consumer behavior on social media, targeted advertising, social media marketing, conversion optimization, predictive models in online purchases, and chatbots. The authors' meticulous mapping of the current state of AI applications in digital marketing research identifies critical publications, underscores areas where research is lacking, and offers valuable insights into potential reasons for these gaps. Moreover, they introduce a machine learning model with versatile applicability across various facets of digital marketing, thereby contributing significantly to the advancement of knowledge in this increasingly vital interdisciplinary intersection.

Van Esch and Stewart Black (2021) shed light on the transformative impact of artificial intelligence (AI) in the realm of digital marketing, where its influence resonates across various facets of organizational operations. AI's role encompasses content creation for campaigns, lead generation, cost-effective customer acquisition, customer experience management, recruitment marketing, and engagement with the social media consumer base. Notably, real-world examples, such as Red Balloon and Harley Davidson, have harnessed AI to automate their digital advertising efforts, signifying the practical adoption of AI within organizations. However, the authors emphasize that we are still in the nascent stages of applying AI broadly and, more specifically, in marketing functions, with ongoing research needed to conceptualize and understand its full impact. Ethical considerations come to the fore, as the automation of tasks traditionally performed by marketing professionals raises questions about AI's role in enhancing or potentially replacing human labor. Given the evolving nature of AI research in marketing, this special edition serves as a valuable contribution by illuminating existing knowledge and charting the course for further exploration of AI's capabilities and limitations within the marketing landscape.

Mogaji, Soetan, and Kieu (2020) contribute to the evolving landscape of digital marketing with a focus on the transformative role of artificial intelligence (AI), particularly in the context of financial services. While existing literature extensively covers the broad advantages of AI in marketing, this study discerns a significant research gap in the realm of AI's potential negative impact on financially vulnerable customers, who often face limited access to financial systems and services. The authors delve into the complexities faced by businesses striving to integrate AI into their digital marketing strategies for financial services, emphasizing that AI-driven marketing goes beyond the simple accumulation of big data and analytical algorithms. Rather, it necessitates a nuanced understanding of the ethical implications, data challenges, and modeling complexities. This study underscores the importance of human connection for an optimal customer experience and engagement with financial service providers, offering a theoretical framework for stakeholders, including financial services providers, AI developers, marketers, policymakers, and academics. It aims to enhance comprehension of the challenges faced by vulnerable customers and proposes strategies to more effectively reach and serve this segment of the population within the evolving landscape of AI-enabled digital marketing in financial services.

Lee and Cho (2020) provide a comprehensive exploration of the evolving landscape of digital advertising in the context of the rapidly advancing digital era. The article addresses critical questions concerning the future of advertising in this digital paradigm, emphasizing the need for scholarly research to enhance understanding and the optimization of returns for firms and agencies. The authors define digital advertising and identify key trends that are shaping its trajectory, including the shift towards data-driven marketing communication, the impact of artificial intelligence on advertisement production, and the influence of big data on advertisement execution. Within this dynamic context, the article puts forth six propositions related to the management of future digital advertising and the methods and systems for delivering

targeted advertisements to consumers. Furthermore, it highlights the potential for future research in the realm of digital advertising, offering a range of topics that can be broadly applied to guide further exploration in this dynamic and evolving field.

Qin and Jiang (2019) delve into the transformative impact of artificial intelligence (AI) on advertising, particularly within the context of the burgeoning e-commerce market. The authors underscore that the increasing demand for advertising in this dynamic landscape necessitates a departure from traditional advertising models. They examine the Chinese advertising market, drawing from observations spanning five years, to gain insights into the application of AI technologies in advertising processes. Their findings propose a novel advertising framework, facilitated by AI, consisting of four integral steps: consumer insight discovery, ad creation, media planning and buying, and ad impact evaluation. This new advertising process, underpinned by a data-centric platform with core algorithms, emerges as a tool-based, synchronized, and notably efficient approach. While AI has revamped and enhanced the conventional advertising process, it is noteworthy that this novel framework retains elements of its traditional roots, indicating that it is an evolution rather than a complete reengineering of the advertising process.

Tahoun and Taher (2023) conduct an exploratory study aimed at assessing the role and impact of artificial intelligence (AI) in the online advertising process across five key stages: consumer insights, ad creation, media planning, buying, and ad evaluation. The study endeavors to determine if there exists a correlation between the integration of AI in each of these stages and their subsequent ones, as well as to examine the overall perceived effectiveness of AI-enhanced advertising. The authors introduce a conceptual framework, the "Process Model of AI Utilization in Online Advertising," and employ an online survey involving a sample of 60 digital advertisers globally, representing both agency and client perspectives. The findings reveal a progressive and distinct adoption of AI in the four stages of the online advertising process, indicating a noteworthy relationship between the utilization of AI in each stage and its impact on the subsequent one. Notably, the study underscores that AI deployment enhances the perceived effectiveness of the overall online advertising process, emphasizing the transformative potential of AI in shaping the future of online advertising.

Ribeiro and Reis (2020) present a qualitative research study that delves into the transformative influence of Artificial Intelligence (AI) within the realm of Digital Marketing, founded on the premise that AI can supplant both manual and cognitive tasks. Drawing upon interviews with 15 experts spanning various industries connected to Marketing and AI, the study illuminates the evolving impact of AI on marketing processes, with a clear trajectory towards increased significance in the future. The findings affirm that AI is already demonstrating its capability to automate many manual and repetitive aspects of marketers' responsibilities, emphasizing the potential for synergistic collaboration between machines and humans to optimize marketing outcomes. The study also confronts the challenges and ethical considerations associated with the gradual or hindered adoption of AI, highlighting a notable apprehension among individuals toward embracing this technological shift. In light of these insights, the authors stress the imperative for business decision-makers and managers to prepare their organizations and workforce for the forthcoming integration of AI in Marketing, recognizing it as a pivotal element in shaping the marketing landscape.

Zhao, Lyu, and Luo (2022) present a research study that addresses the limitations of traditional online marketing methods by introducing an innovative approach underpinned by multimodel fusion and artificial intelligence algorithms, all within the context of big data. The paper recognizes the shortcomings of using a single model for predicting advertising conversion rates, which often results in inaccuracies and dissatisfactory user recommendations. To overcome these challenges, the authors incorporate big data technology and analyze the characteristics of network advertising marketing models, specifically Real-Time Bidding (RTB). They leverage multitask learning and fusion technology to enhance the prediction accuracy of advertising conversion rates, ultimately refining the recommendation results. Artificial intelligence techniques, including TF-IDF technology, are employed to assess the significance of advertising keywords in online marketing and calculate their contribution levels. The study further employs XGBoost technology to classify the multitask fusion model's impact on online marketing effectiveness. The experimental results confirm that this proposed approach significantly enhances the accuracy of advertising conversion rate predictions and positively impacts online sales of goods, underscoring the potential of multimodel fusion and AI algorithms in revolutionizing the online marketing landscape.

Wang (2020) conducts a comprehensive survey of online advertising click-through rate (CTR) prediction models, recognizing the pivotal role CTR plays in evaluating the quality of online advertisements for internet companies like Google, Facebook, Snap, Pinterest, and Baidu. The study highlights the multifaceted nature of CTR, influenced by factors such as user demographics, advertisement type, and timely prediction, with particular focus on advertisement text. It is noted that CTR prediction models can be broadly categorized into shallow learning and deep learning models. The paper critically assesses the current landscape of CTR prediction models, delineating the existing challenges within this domain. In doing so, it identifies potential avenues for future research in this dynamic and evolving field, reflecting the growing significance of CTR prediction in both industry and academia, especially as it pertains to enhancing online advertising effectiveness.

Vakratsas and Wang (2020) present an innovative approach through their proposal of a Creative Advertising System (CAS) that leverages artificial intelligence (AI) principles to generate and evaluate advertising creative ideas. This novel system is conceptualized within a broader framework that reconceptualizes advertising creativity as a search process, emphasizing

the importance of evaluating outcomes based on predefined rules rather than solely relying on traditional measures like perceived novelty and appropriateness. This expanded perspective provides a generative viewpoint and accommodates existing advertising concepts, shedding light on the inconsistent effectiveness of executional advertising elements across different advertisements. The CAS serves as both a reflection and generation tool for advertising creators, offering interdisciplinary research prospects. Importantly, it reinforces that creativity is not an exclusive domain but a systematic process that can be enhanced through the integration of data and computation, promising a paradigm shift in the understanding and application of creativity within advertising.

In conclusion, the reviewed literature provides a comprehensive overview of the dynamic intersection between digital marketing and artificial intelligence, shedding light on its transformative potential within various domains, including online advertising and financial services. The studies collectively underscore the pivotal role of AI in reshaping conventional practices and the need for interdisciplinary research to explore the implications of these changes. While the existing research offers valuable insights, a notable research gap becomes apparent. Despite the increasing recognition of the significance of AI in marketing and advertising, there is a need for more comprehensive studies that delve into the ethical, societal, and practical implications of this integration. These implications range from consumer privacy and data security concerns to the evolving role of marketing professionals in an AI-augmented landscape. Furthermore, there is a need for more in-depth investigations into the unique challenges faced by financially vulnerable customers in the context of AI-driven marketing. Bridging these gaps will be crucial in ensuring the responsible and effective implementation of AI in marketing and advertising, ultimately guiding businesses and policymakers in navigating this evolving landscape.

Objectives of the study

1. To assess the impact of Artificial Intelligence on online advertising.
2. To assess the challenges in using Artificial Intelligence in online advertising.

Hypothesis

- H1: AI has a positive impact on online advertising.
H2: There are several challenges while using AI in online advertising.

Research Methodology

In this study, a quantitative research approach was employed to assess the impact of Artificial Intelligence (AI) on online advertising and to evaluate the challenges associated with the utilization of AI in online advertising.

Data Collection: Data collection for this research was conducted using a structured questionnaire. The questionnaire was distributed to a sample of 288 marketing managers working in various organizations across Pune City. The questionnaire comprised two sections. The first section collected data related to the impact of AI on online advertising, while the second section focused on the challenges encountered when utilizing AI in online advertising. Respondents were required to provide responses on a Likert scale, ranging from strongly disagree to strongly agree.

Data Analysis: The collected data were analyzed using statistical software (SPSS). Descriptive statistics, including mean, standard deviation, and frequency distributions, were computed to summarize the data and provide an overview of the respondents' perceptions regarding the impact of AI on online advertising and the challenges associated with AI implementation. Inferential statistical techniques, such as t-tests were applied to test the research hypotheses.

Data Analysis

Table 1. Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18 to 25 years	38	13.2	13.2	13.2
	26 to 35 years	92	31.9	31.9	45.1
	36 to 45 years	102	35.4	35.4	80.6
	46 to 55 years	35	12.2	12.2	92.7
	Above 55 years	21	7.3	7.3	100.0
	Total	288	100.0	100.0	

In Table 1, the distribution of respondents' ages is presented. It shows that the majority of the participants fell within the age range of 26 to 35 years, accounting for 31.9% of the total sample. The second-largest group consisted of individuals aged 36 to 45 years, representing 35.4% of the respondents. The age categories of 18 to 25 years, 46 to 55 years, and above 55 years made up 13.2%, 12.2%, and 7.3% of the sample, respectively. The cumulative percentage reveals that

80.6% of the participants were aged between 26 and 45 years. This distribution indicates that the study's respondents were predominantly in their late twenties to mid-forties, reflecting a relatively balanced representation of different age groups within the sample of 288 participants.

Table 2. Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	250	86.8	86.8	86.8
	Female	38	13.2	13.2	100.0
	Total	288	100.0	100.0	

In Table 2, the distribution of respondents' gender is displayed. The data indicates that the majority of participants identified as male, with 86.8% of the total sample falling into this category. In contrast, the female participants constituted a smaller proportion, accounting for 13.2% of the respondents. The cumulative percentage demonstrates that the vast majority, or 86.8%, of the respondents were male, while the remaining 13.2% identified as female. This gender distribution suggests a noticeable gender imbalance within the sample of 288 participants, with a significantly higher representation of males compared to females.

Table 3. AI-driven tools and algorithms have improved the targeting and personalization of our online advertising campaigns.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	20	6.9	6.9	6.9
	Disagree	12	4.2	4.2	11.1
	Neutral	30	10.4	10.4	21.5
	Agree	131	45.5	45.5	67.0
	Strongly Agree	95	33.0	33.0	100.0
	Total	288	100.0	100.0	

Table 3 presents data regarding respondents' perceptions of how AI-driven tools and algorithms have impacted the targeting and personalization of their online advertising campaigns. The majority of participants, accounting for 78.5% of the total sample, indicated a positive impact. Specifically, 45.5% of respondents agreed that AI has improved targeting and personalization, and an additional 33.0% strongly agreed with this statement. On the other hand, 6.9% strongly disagreed with the statement, and 4.2% disagreed. A relatively significant portion, 10.4%, expressed a neutral stance on the matter. The cumulative percentage reveals that 78.5% of the participants held positive views (either agreeing or strongly agreeing) regarding the impact of AI on targeting and personalization in online advertising. This suggests that a substantial portion of the sample perceives AI as beneficial in improving these aspects of their advertising campaigns.

Table 4. The use of AI in online advertising has led to increased user engagement and interaction with our advertisements.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	22	7.6	7.6	7.6
	Disagree	26	9.0	9.0	16.7
	Neutral	12	4.2	4.2	20.8
	Agree	127	44.1	44.1	64.9
	Strongly Agree	101	35.1	35.1	100.0
	Total	288	100.0	100.0	

Table 4 presents data on respondents' perceptions of whether the use of AI in online advertising has resulted in increased user engagement and interaction with their advertisements. The majority of participants, making up 79.2% of the total sample, viewed AI positively in this context. Specifically, 44.1% of respondents agreed that AI has led to increased user engagement and interaction, and an additional 35.1% strongly agreed with this statement. On the other hand, 7.6% strongly disagreed with the statement, and 9.0% disagreed. A smaller portion, 4.2%, expressed a neutral stance on the matter. The cumulative percentage reveals that 79.2% of the participants held positive views (either agreeing or strongly agreeing) regarding the impact of AI on user engagement and interaction with their online advertisements. This suggests that a substantial portion of the sample perceives AI as contributing to increased user engagement and interaction with their advertising content.

Table 5. AI technologies have enhanced the efficiency and effectiveness of our online advertising efforts.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	14	4.9	4.9	4.9
	Disagree	22	7.6	7.6	12.5
	Neutral	20	6.9	6.9	19.4
	Agree	134	46.5	46.5	66.0
	Strongly Agree	98	34.0	34.0	100.0
	Total	288	100.0	100.0	

Table 5 presents data related to respondents' perspectives on whether AI technologies have improved the efficiency and effectiveness of their online advertising efforts. The majority of participants, accounting for 80.5% of the total sample, held positive views in this regard. Specifically, 46.5% of respondents agreed that AI has enhanced the efficiency and effectiveness of their online advertising, and an additional 34.0% strongly agreed with this statement. On the other hand, 4.9% strongly disagreed with the statement, and 7.6% disagreed. A smaller portion, 6.9%, expressed a neutral stance on the matter. The cumulative percentage reveals that 80.5% of the participants held positive views (either agreeing or strongly agreeing) concerning the impact of AI on the efficiency and effectiveness of their online advertising efforts. This indicates that a significant portion of the sample perceives AI as contributing to the improvement of these crucial aspects in their advertising campaigns.

Table 6. AI-driven analytics have provided valuable insights into consumer behavior, improving our ad strategies.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	20	6.9	6.9	6.9
	Disagree	26	9.0	9.0	16.0
	Neutral	14	4.9	4.9	20.8
	Agree	133	46.2	46.2	67.0
	Strongly Agree	95	33.0	33.0	100.0
	Total	288	100.0	100.0	

In Table 6, the data represents respondents' perceptions regarding the impact of AI-driven analytics on providing valuable insights into consumer behavior and improving their advertising strategies. A significant majority of the participants, constituting 79.2% of the total sample, expressed positive views on this matter. Specifically, 46.2% of respondents agreed that AI-driven analytics have provided valuable insights into consumer behavior, and an additional 33.0% strongly agreed with this statement. On the contrary, 6.9% strongly disagreed with the statement, and 9.0% disagreed. A smaller portion, 4.9%, maintained a neutral stance. The cumulative percentage shows that 79.2% of the participants held positive views (either agreeing or strongly agreeing) regarding the impact of AI-driven analytics on consumer behavior insights and ad strategy improvement. This suggests that a substantial portion of the sample perceives AI as a valuable tool for enhancing their understanding of consumer behavior and refining their advertising strategies.

Table 7. Overall, our experience with AI in online advertising has resulted in improved ad performance and higher conversion rates.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	24	8.3	8.3	8.3
	Disagree	32	11.1	11.1	19.4
	Neutral	18	6.3	6.3	25.7
	Agree	129	44.8	44.8	70.5
	Strongly Agree	85	29.5	29.5	100.0
	Total	288	100.0	100.0	

Table 7 displays data on respondents' overall experience with AI in online advertising and its impact on ad performance and conversion rates. A significant majority of participants, comprising 74.3% of the total sample, viewed AI positively in this context. Specifically, 44.8% of respondents agreed that their experience with AI in online advertising resulted in improved ad performance and higher conversion rates, and an additional 29.5% strongly agreed with this statement. On the other hand, 8.3% strongly disagreed with the statement, and 11.1% disagreed. A smaller portion, 6.3%, expressed a neutral stance on the matter. The cumulative percentage reveals that 74.3% of the participants held positive views (either

agreeing or strongly agreeing) regarding the overall impact of AI on their advertising performance and conversion rates. This indicates that a significant portion of the sample perceives AI as contributing to improved ad performance and higher conversion rates in their online advertising campaigns.

Table 8. Integrating AI into our online advertising processes has presented technical complexities.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	12	4.2	4.2	4.2
	Disagree	12	4.2	4.2	8.3
	Neutral	14	4.9	4.9	13.2
	Agree	147	51.0	51.0	64.2
	Strongly Agree	103	35.8	35.8	100.0
	Total	288	100.0	100.0	

Table 8 outlines respondents' perceptions regarding the technical complexities of integrating AI into their online advertising processes. The data shows that the majority of participants, comprising 87.8% of the total sample, acknowledged the existence of technical complexities. Specifically, 35.8% strongly agreed that integrating AI presented technical complexities, and an additional 51.0% agreed with this statement. On the other hand, only a small percentage held more optimistic views, with 4.2% both strongly disagreeing and disagreeing with the statement, and 4.9% maintaining a neutral stance. The cumulative percentage indicates that 87.8% of the participants recognized the technical complexities associated with integrating AI into their online advertising processes. This suggests that a substantial portion of the sample encountered challenges related to the technical aspects of AI implementation in their advertising efforts.

Table 9. Privacy concerns related to AI data collection and usage have posed challenges in our online advertising practices.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	32	11.1	11.1	11.1
	Disagree	24	8.3	8.3	19.4
	Neutral	16	5.6	5.6	25.0
	Agree	129	44.8	44.8	69.8
	Strongly Agree	87	30.2	30.2	100.0
	Total	288	100.0	100.0	

Table 9 illustrates respondents' perspectives on privacy concerns associated with AI data collection and usage in their online advertising practices. The data reveals that a significant proportion of participants, constituting 74.0% of the total sample, expressed concerns about privacy issues related to AI data collection and usage. More specifically, 30.2% strongly agreed that privacy concerns posed challenges, and an additional 44.8% agreed with this statement. On the contrary, a smaller percentage held more optimistic views, with 11.1% strongly disagreeing and 8.3% disagreeing with the statement, while 5.6% maintained a neutral position. The cumulative percentage demonstrates that 74.0% of the participants acknowledged privacy concerns as a challenge in their online advertising practices when using AI. This suggests that a substantial portion of the sample encountered privacy-related challenges in the context of AI data collection and usage for their online advertising efforts.

Table 10. Training our marketing team to effectively utilize AI tools and technologies has been a significant hurdle.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	21	7.3	7.3	7.3
	Disagree	28	9.7	9.7	17.0
	Neutral	18	6.3	6.3	23.3
	Agree	133	46.2	46.2	69.4
	Strongly Agree	88	30.6	30.6	100.0
	Total	288	100.0	100.0	

Table 10 provides insights into the challenges faced in training the marketing team to effectively utilize AI tools and technologies. The data shows that a substantial portion of the respondents, totaling 76.8% of the sample, perceived training as a significant hurdle. Specifically, 30.6% strongly agreed that training their marketing team was challenging, while an additional 46.2% agreed with this statement. In contrast, 7.3% strongly disagreed, and 9.7% disagreed with the notion that training was a hurdle. A smaller percentage, 6.3%, maintained a neutral stance on the matter. The cumulative percentage

demonstrates that 76.8% of the participants acknowledged the challenges associated with training their marketing teams to effectively utilize AI tools and technologies. This indicates that a significant portion of the sample encountered obstacles when it came to training their marketing teams in the context of AI integration into their advertising practices.

Table 11. The financial investment required for implementing AI in online advertising has been a challenge for our organization.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	23	8.0	8.0	8.0
	Disagree	20	6.9	6.9	14.9
	Neutral	20	6.9	6.9	21.9
	Agree	135	46.9	46.9	68.8
	Strongly Agree	90	31.3	31.3	100.0
	Total	288	100.0	100.0	

Table 11 outlines the financial challenges associated with implementing AI in online advertising. The data reveals that a considerable proportion of the respondents, amounting to 78.2% of the sample, acknowledged the financial investment as a challenge for their organization. Among the participants, 31.3% strongly agreed that financial investment was a challenge, while an additional 46.9% agreed with this statement. In contrast, 8.0% strongly disagreed, and 6.9% disagreed with the notion that financial investment was a hurdle. Another 6.9% maintained a neutral stance on the matter. The cumulative percentage illustrates that 78.2% of the participants perceived financial investment as a challenge when it came to implementing AI in their online advertising efforts. This highlights that a substantial majority of the sample encountered financial hurdles in integrating AI into their advertising processes.

Table 12. We have encountered difficulties in ensuring that AI algorithms accurately predict user preferences in our online advertising campaigns.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	14	4.9	4.9	4.9
	Disagree	30	10.4	10.4	15.3
	Neutral	22	7.6	7.6	22.9
	Agree	139	48.3	48.3	71.2
	Strongly Agree	83	28.8	28.8	100.0
	Total	288	100.0	100.0	

Table 12 addresses the challenges encountered in ensuring the accuracy of AI algorithms in predicting user preferences within online advertising campaigns. The data reflects that a notable portion of the respondents, constituting 77.1% of the sample, acknowledged difficulties in this regard. Among the participants, 28.8% strongly agreed that they faced challenges in ensuring AI algorithms' accuracy, while an additional 48.3% agreed with this statement. In contrast, 4.9% strongly disagreed, and 10.4% disagreed with the notion that they faced difficulties in this aspect. Another 7.6% maintained a neutral stance on the matter. The cumulative percentage demonstrates that 77.1% of the participants experienced challenges in guaranteeing the accuracy of AI algorithms in predicting user preferences in their online advertising campaigns. This underscores that a significant majority of the sample grappled with these difficulties, emphasizing the complexities associated with AI algorithm prediction in the context of user preferences in online advertising.

H1: AI has a positive impact on online advertising.

Table 13. One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
AI-driven tools and algorithms have improved the targeting and personalization of our online advertising campaigns.	14.318	287	.000	.93403	.8056	1.0624
The use of AI in online advertising has led to increased user engagement and interaction with our advertisements.	12.737	287	.000	.89931	.7603	1.0383

AI technologies have enhanced the efficiency and effectiveness of our online advertising efforts.	15.345	287	.000	.97222	.8475	1.0969
AI-driven analytics have provided valuable insights into consumer behavior, improving our ad strategies.	12.997	287	.000	.89236	.7572	1.0275
Overall, our experience with AI in online advertising has resulted in improved ad performance and higher conversion rates.	10.537	287	.000	.76042	.6184	.9025

The results of the one-sample t-tests for the hypothesis H1, which posits that AI has a positive impact on online advertising, indicate a statistically significant positive impact across various aspects of online advertising. The first statement, "AI-driven tools and algorithms have improved the targeting and personalization of our online advertising campaigns," yielded a t-value of 14.318 and a p-value of 0.000. This means that respondents, on average, expressed a significantly positive opinion regarding the impact of AI on improving the targeting and personalization of online advertising campaigns. The mean difference of 0.93403 suggests a substantial positive influence, with a 95% confidence interval for the difference between 0.8056 and 1.0624. The second statement, "The use of AI in online advertising has led to increased user engagement and interaction with our advertisements," produced a t-value of 12.737 and a p-value of 0.000. This signifies that respondents, on average, strongly agreed that AI has positively affected user engagement and interaction with their advertisements. The mean difference of 0.89931 indicates a considerable positive impact, with a 95% confidence interval for the difference ranging from 0.7603 to 1.0383. The third statement, "AI technologies have enhanced the efficiency and effectiveness of our online advertising efforts," resulted in a t-value of 15.345 and a p-value of 0.000. This indicates that, on average, participants perceived a substantial positive influence of AI on the efficiency and effectiveness of online advertising efforts. The mean difference of 0.97222 underscores the strength of this impact, with a 95% confidence interval for the difference between 0.8475 and 1.0969. The fourth statement, "AI-driven analytics have provided valuable insights into consumer behavior, improving our ad strategies," yielded a t-value of 12.997 and a p-value of 0.000. This suggests that respondents, on average, agreed with the positive impact of AI in providing valuable insights into consumer behavior and enhancing ad strategies. The mean difference of 0.89236 indicates a noteworthy positive effect, with a 95% confidence interval for the difference spanning from 0.7572 to 1.0275. The fifth statement, "Overall, our experience with AI in online advertising has resulted in improved ad performance and higher conversion rates," produced a t-value of 10.537 and a p-value of 0.000. This implies that, on average, respondents agreed that their experience with AI in online advertising has led to improved ad performance and higher conversion rates. The mean difference of 0.76042 reflects a substantial positive impact, with a 95% confidence interval for the difference ranging from 0.6184 to 0.9025. In summary, the findings from the one-sample t-tests provide robust evidence that AI has a significantly positive impact on various facets of online advertising, including targeting, user engagement, efficiency, consumer insights, and overall ad performance, aligning with the hypothesis H1. These results affirm the value of AI in enhancing the online advertising landscape.

H2: There are several challenges while using AI in online advertising.

One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Integrating AI into our online advertising processes has presented technical complexities.	19.256	287	.000	1.10069	.9882	1.2132
Privacy concerns related to AI data collection and usage have posed challenges in our online advertising practices.	9.916	287	.000	.74653	.5983	.8947
Training our marketing team to effectively utilize AI tools and technologies has been a significant hurdle.	11.949	287	.000	.82986	.6932	.9666
The financial investment required for implementing AI in online advertising has been a challenge for our organization.	12.559	287	.000	.86458	.7291	1.0001
We have encountered difficulties in ensuring that AI algorithms accurately predict user preferences in our online advertising campaigns.	13.272	287	.000	.85764	.7304	.9848

The results of the one-sample t-tests for hypothesis H2, which suggests that there are several challenges when using AI in online advertising, reveal that respondents perceive significant challenges in various aspects of AI implementation in online advertising. The first statement, "Integrating AI into our online advertising processes has presented technical complexities," generated a high t-value of 19.256 with a p-value of 0.000. This indicates that, on average, respondents strongly agreed that technical complexities are a significant challenge when integrating AI into their online advertising processes. The mean difference of 1.10069 underscores the substantial nature of this challenge, with a 95% confidence interval for the difference between 0.9882 and 1.2132. The second statement, "Privacy concerns related to AI data collection and usage have posed challenges in our online advertising practices," yielded a t-value of 9.916 and a p-value of 0.000. This suggests that, on average, respondents agreed that privacy concerns related to AI data collection and usage represent a notable challenge in their online advertising practices. The mean difference of 0.74653 signifies a substantial challenge, with a 95% confidence interval for the difference spanning from 0.5983 to 0.8947. The third statement, "Training our marketing team to effectively utilize AI tools and technologies has been a significant hurdle," resulted in a t-value of 11.949 with a p-value of 0.000. This implies that, on average, respondents agreed that training their marketing team to effectively use AI tools and technologies has been a substantial challenge. The mean difference of 0.82986 highlights the significance of this hurdle, with a 95% confidence interval for the difference between 0.6932 and 0.9666. The fourth statement, "The financial investment required for implementing AI in online advertising has been a challenge for our organization," produced a t-value of 12.559 with a p-value of 0.000. This indicates that, on average, respondents agreed that the financial investment required for implementing AI in online advertising represents a significant challenge for their organization. The mean difference of 0.86458 underscores the notable nature of this challenge, with a 95% confidence interval for the difference ranging from 0.7291 to 1.0001. The fifth statement, "We have encountered difficulties in ensuring that AI algorithms accurately predict user preferences in our online advertising campaigns," yielded a t-value of 13.272 and a p-value of 0.000. This suggests that, on average, respondents agreed that ensuring the accurate prediction of user preferences by AI algorithms is a significant challenge in their online advertising campaigns. The mean difference of 0.85764 emphasizes the substantial nature of this challenge, with a 95% confidence interval for the difference between 0.7304 and 0.9848. In summary, the results of the one-sample t-tests provide compelling evidence that there are significant challenges associated with the use of AI in online advertising, aligning with hypothesis H2. These challenges encompass technical complexities, privacy concerns, training requirements, financial investments, and algorithmic accuracy, highlighting the multifaceted nature of implementing AI in the online advertising domain.

Findings

The findings of the study suggest that the integration of Artificial Intelligence (AI) in online advertising has a significantly positive impact, supporting hypothesis H1. Respondents strongly agreed that AI-driven tools and algorithms have improved the targeting and personalization of online advertising campaigns, as well as increased user engagement and interaction with advertisements. Furthermore, they acknowledged that AI technologies have enhanced the efficiency and effectiveness of online advertising efforts. AI-driven analytics were reported to provide valuable insights into consumer behavior, thereby improving advertising strategies. Overall, the experience with AI in online advertising was found to result in improved ad performance and higher conversion rates. These findings highlight the promising potential of AI in enhancing various aspects of online advertising. However, the study also revealed substantial challenges in using AI in online advertising, confirming hypothesis H2. Respondents agreed that integrating AI into online advertising processes presented technical complexities, and privacy concerns related to AI data collection and usage posed challenges in advertising practices. Training marketing teams to effectively utilize AI tools and technologies was considered a significant hurdle, as was the financial investment required for AI implementation in online advertising. Difficulties were encountered in ensuring that AI algorithms accurately predict user preferences in advertising campaigns. These findings emphasize the multifaceted challenges and complexities associated with the adoption of AI in online advertising. In summary, while AI holds great promise for improving online advertising, its implementation is not without hurdles. Successful integration requires addressing technical complexities, privacy concerns, training needs, financial investments, and algorithmic accuracy. These findings provide valuable insights for marketers and organizations seeking to harness the potential of AI in the dynamic landscape of online advertising.

Conclusion

The study's findings underscore the significant and positive impact of Artificial Intelligence (AI) on online advertising, with AI-driven tools and algorithms enhancing various aspects of advertising campaigns. This includes improved targeting and personalization, increased user engagement, enhanced efficiency and effectiveness, and valuable insights into consumer behavior. Furthermore, the experience with AI in online advertising was found to result in improved ad performance and higher conversion rates. However, the study also reveals substantial challenges associated with the use

of AI in online advertising, including technical complexities, privacy concerns, training needs, financial investments, and algorithmic accuracy. These challenges underscore the multifaceted nature of implementing AI in advertising.

The implications of this research are significant for both practitioners and policymakers in the field of digital marketing and advertising. The positive impact of AI on online advertising highlights the potential for marketers to improve their targeting, engagement, and efficiency. This can lead to more effective advertising campaigns and better returns on investment. However, the challenges associated with AI implementation necessitate careful consideration and strategic planning. Addressing technical complexities, ensuring data privacy, and investing in training and technology are essential for successful AI adoption in advertising.

Future research in this area should delve deeper into addressing the challenges posed by AI in online advertising, such as developing strategies to mitigate privacy concerns and developing more accurate AI algorithms. Additionally, examining the long-term effects of AI adoption in advertising, including its impact on consumer behavior and brand perception, can provide valuable insights. Research can also explore the evolving role of AI in emerging advertising platforms and technologies, such as augmented reality and virtual reality. Lastly, investigations into the ethical implications of AI in advertising, including issues of transparency, bias, and fairness, will be essential as AI continues to shape the digital advertising landscape.

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