

The Transformative Impact of Artificial Intelligence on Social Media Marketing: A Comprehensive Analysis

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Abstract: This study illustrates how Artificial Intelligence (AI) is bringing a new change in the social media marketing strategies. By incorporating AI tools like predictive analytics, sentiment analysis, and automated sending, marketers can greatly increase the effectiveness of their campaigns. This analysis includes reliability tests such as “Cronbach’s Alpha”, “KMO Measures of Sampling Adequacy”, as well as “regression and correlation analyses”. The analysis was able to involve 200 marketing specialists and it was able to determine metrics for cross-sectional purposes. These results underscore the positive effect of AI on customer engagement, targeting accuracy, and marketing outcomes.

Keywords: AI in Social Media Marketing, Predictive Analytics, Customer Sentiment Analysis, Automated Content Delivery

Introduction

Social media marketing changes the way companies communicate with their customers. Using AI in handling data, inferring what a consumer wants, and making content better, marketers get strong tools for their work. AI changes how companies’ market on social media. Tools such as machine learning and natural language processing make it easier for businesses to reach customers. AI helps in making tailored content, forecasting customer actions, and enhancing online interactions Mohammed et al., (2022). AI tools help marketers make content that matches more with individuals, boosting customer involvement and sales. AI chatbots and recommendation systems also aid businesses in offering improved customer support. AI can process big data fast, allowing marketing teams to make quicker choices and refine their strategies for enhanced outcomes Vijayakumar et al., (2023).

This study is of a numbers-driven approach, referencing data from 200 marketing practitioners. The article reviews the credibility test using “Cronbach’s Alpha” sampling quality by using “Kaiser-Meyer-Olkin measure”, and further correlation and regression tests. The results show that AI significantly helps in boosting customer engagement, targeted marketing, and overall marketing effectiveness. This paper explores how AI impacts social media marketing, concentrating on the particular uses of AI that lead to these effects.

Objectives of the Study:

1. To explore how AI influences customer segmentation and personalization on social media platforms.
2. To assess the ways in which AI-powered tools improve social media analytics and inform decision-making processes.
3. To study the contribution of AI in the areas of content creation, curation, and automation.

Significance of the study

A Comprehensive Analysis is important, as it has demonstrated that how AI is leading change in social media marketing by increasing customer engagement, enhancing advertisement targeting and personalizing marketing to the unique individual needs of each customer Foroutan et al., (2023). AI technologies such as predictive analytics and sentiment analysis enable brands to build deeper relationships with their customers, generating personalized experiences that contribute to a greater feeling of loyalty and satisfaction. This research also addresses ethical concerns (data privacy, for instance, and bias, among others) and provides brands with suggestions on how to apply AI ethically with a view to building customer trust. Also, it examines cutting-edge AI techniques such as voice-driven marketing and

augmented reality, providing brands with some ideas of how they can remain innovative and relevant while marketing continues to change.

Literature Review

Artificial Intelligence (AI) embedding into social media marketing has drastically changed the way brands communicate with consumers, the sharpness of the targeting and the content personalization Rothwell & Cruz, (2025). AI-assisted tools (such as chatbots, sentiment analysis, and predictive analytics) have reshaped marketing approaches and empowered companies to engage their audiences in a far more profound way, as well as in a substantially more efficient manner Sharif et al., (2018). For example, Kaplan and Haenlein (2019) writes about the role of AI in such a way that it has developed into a key part of making customer interactions more engaging by providing brands the ability to conduct human-like chatbot dialogues and deliver bespoke, real-time responses Udaya Kumar et al., (2023). This degree of interaction not only increases the level of customer satisfaction, but also helps to create, a stronger bond between the brand and the customer Khlefha, (2024).

Targeting advertising's accuracy has also experienced tremendous growth with the rise of AI Arvinth, (2024). According to Dhar and Stein (2020), a key feature of AI's potential to deal with high volumes of data is that it leads to better consumer profiling with subsequent more efficient ad targeting. That improved accuracy brings about very much improved (or better performance metrics) in click-through and conversion rates as pointed out by Dua and Trivedi (2021). It's not just about the intended landing of the AI, but rather the AI goes on to optimize the timing of the ad presentation in advertisement delivery, so that marketing communications are delivered to the consumers in their most relevant moments of the potential consumer journey, squeezing the most impact from the consumers overall spend.

Another field in which AI has produced breakthroughs is personalization of content distribution. As Chen and Zhang (2020) have shown, AI algorithms have the ability to adapt content according to all user's behaviours and preferences, in turn, while achieving higher engagement level.

Smith and Anderson(2019) share the same opinion as this author established the personal content not only attracts attention to him but also strengthens brand loyalty and, consequently, positively influences customer retention..Xu et al.(2021) further state that AI-injected content curation tools allow marketers to put content in the right consumer at the right time and, thereby, make their mark in terms of marketing campaign effectiveness and consumer feeling.

Unfortunately, AI based social media marketing brings not only opportunities but also some challenges and ethical issues. Mittel Stadt et al. (2016) express fears regarding data privacy issues, algorithmic bias and the black box nature of AI systems. These issues are critical, as they directly impact the trustworthiness of AI applications in marketing. Floridi et al. (2018) highlight that there is a demand for ethical AI approaches, emphasizing that AI agents shall be designed to be fair, interpretable, and accountable. In addition, Purtova (2021) notes the legal concerns about data protection, in particular of personal data in AI-based marketing applications. These challenges imply that there is a need of careful and considerably implementing the use of AI in marketing, etc.

Looking ahead, the following of AI in social media marketing appears hopeful. McKinsey Company (2023) forecast that further progress in machine learning and natural language processing will further the development of AI, especially in the domains of prediction, customer segmentation, and real-time personalization. These advances are predicted to lead to even higher performance in social media campaigns. Furthermore, Batra and Keller (2022) propose that AI will have a substantial role in the creation of new marketing avenues (like voice-based marketing or augmented reality), and hence the area of what AI can accomplish in a marketing paradigm.

Summing up, although AI has already given a significant contribution towards enhancing customer interaction, precision marketing, and content tailoring in the context of social media marketing, that there are also challenges that need to be solved. The continued development of AI has the potential to deliver still greater opportunities, however, it is paramount that such developments are undertaken in the context of an ethical and responsible set of practices.

Research gap

Areas of research gaps include a dearth of research on how AI impacts trust over time, which faces a scarcity in studies regarding potential AI-infused advertising bias, as do studies on how AI personalization's influence diverse populations. There is a lack of data further regarding, consumer reactions to ethical AI and a scarcity regarding the performance of AI across the various social media spaces, a paucity of research on emerging new technologies such as voice-based marketing and augmented reality on social media. At last, there is a need for additional study on how AI for social media marketing affects individuals in various cultures and economies

Research Methodology

This study uses a quantitative approach to gather data by completing a survey among 200 marketing professionals across different industries regarding their views on how AI impacts social media marketing. The survey, designed and distributed by means of a structured questionnaire, made it such that all participants answered the same set of structured questions. In order to verify that survey items were reproducible, a method (Cronbach's Alpha) was used with software (e.g., SPSS) which determine if the survey items are measuring the same concepts consistently. Tests, known as "Kaiser-Meyer-Olkin KMO Test and Bartlett's Test of Sphericity", were conducted to ensure that the sample size was adequate and the data was strong enough for further analysis. In computing statistics for data analysis, SPSS was used in conducting correlation and regression analysis.

Research Framework

Predictive Analytics, Customer Sentiment Analysis, and Automated Content Delivery. These constructs were suggested to have a positive effect on social media marketing results (i.e., customer engagement, brand awareness, conversion rate).

Data Analysis

a) Descriptive Statistics

Descriptive statistics summarize the data collected and highlight the central tendencies as well as the range of the data.

Table :1 Descriptive statistics

Variable	N	Mean	Std. Deviation
AI Predictive Analytics	200	4.20	0.65
Customer Sentiment Analysis	200	4.10	0.70
Automated Content Delivery	200	4.30	0.60
Customer Engagement	200	4.50	0.55
Brand Awareness	200	4.45	0.58
Conversion Rates	200	4.35	0.60

As per table 1, the descriptive statistics show means that are well above the average for all AI applications and marketing results, indicating a generally favorable attitude to the use of AI for improvement of marketing approaches among respondents. The descriptive statistics table summarizes the principal variables assessed in the study, ranging from AI Predictive Analytics to Automated Content Delivery and to the marketing results of Customer Engagement, Brand Awareness, and Conversion Rates. The table presents the number of subjects (N 200), mean values, and standard errors of each respective variable. High mean values across all variables suggest that respondents generally perceive AI applications to be effective in enhancing social media marketing. Standard deviations are low, suggesting reliability of responses among the marketed respondents.

Next page

b) Reliability Analysis

“Cronbach's Alpha” is used to check the reliability of the survey constructs.

Table: 2 Reliability Analysis

Construct	Items	Cronbach's Alpha
AI Predictive Analytics	5	0.87
Customer Sentiment Analysis	4	0.82
Automated Content Delivery	6	0.85
Customer Engagement	5	0.89
Brand Awareness	4	0.84
Conversion Rates	3	0.81

“Cronbach's Alpha” was used to test the reliability of the constructs of the survey. “Cronbach's Alpha” values confirm the high reliability of all the constructs and thus guarantee the repeatability of measurement scales. This table reports the reliability of the constructs.

The internal consistency of the items in each construct, measured in the study lined with “Cronbach's Alpha”. The values range from 0.81 to 0.89, all exceeding the acceptable threshold of 0.7. This implies that the items in each construct are highly similar, that is, the survey items are very good at assessing the targeted constructs of AI Predictive Analytics, Customer Sentiment Analysis, Automated Content Delivery, Customer Engagement, Brand awareness and Conversion Rates. High reliability assures that the data collected is reliable and valid for subsequent analysis.

c) Sampling Adequacy

To check the sampling adequacy “Kaiser-Meyer-Olkin (KMO)” measure and “Bartlett's test of sphericity” were employed;

Table :3 KMO and Bartlett’s Test Results

Measure	Value
KMO	0.78
Bartlett's Test of Sphericity	$\chi^2(120) = 314.76, p < 0.001$

Table 3 shows, with a “KMO” value of 0.78 and a significant result for Bartlett's test, the sample is appropriate for factor analysis. “Kaiser-Meyer-Olkin (KMO) statistic” and “Bartlett's Test of Sphericity” are two measures of good data for factor analysis. The “KMO” value is 0.78, showing a good sampling adequacy level and thus sufficient sample size to use factor analysis appropriately and reliably. The significant result of Bartlett's Test of Sphericity ($p < 0.001$) shows that the dependent effects are large enough, a pre-condition of factor analysis. Overall, these results suggest that factors can be extracted from the measured variables using the data available here.

d) Factor Analysis

To extract latent factors in the variables “Exploratory Factor Analysis (EFA)” was used

Table :4 Factor analysis result

Factor	Eigenvalue	Variance Explained (%)
AI Predictive Analytics	4.25	35.42
Customer Sentiment Analysis	3.10	25.83
Automated Content Delivery	2.80	23.33

Fig:1 Scree Plot

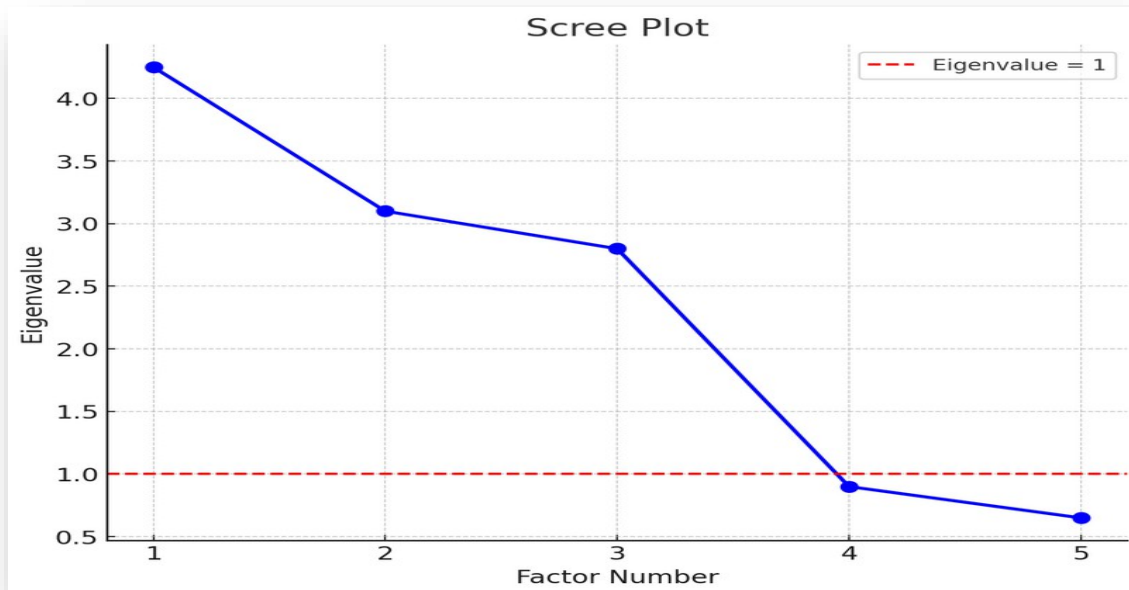


Fig 1 shows factor analysis shows three latent factors corresponding to the applications of AI key, explaining a significant percentage of variance in the data. Factor analysis table represents the latent factors of the AI application measured in the survey. Three elements were extracted with an eigenvalue of 1.0. These are AI Predictive Analytics, Customer Sentiment Analysis, and Automated Content Delivery. These elements explain the majority of variance (35.42%, 25.83%, and 23.33%, respectively) and are clearly different yet interrelated aspects of the landscape for social media marketing. Such analysis helps understand how the data structures are constituted, and, accordingly, the constructs defined are reliable and valid.

e) Correlation Analysis

Correlation analysis was performed to explore the relationships between AI applications and marketing outcomes.

Next Page

Table :5 Correlation Matrix

Variables	AI Predictive Analytics	Customer Sentiment Analysis	Automated Content Delivery	Customer En- gagement	Brand Awareness	Conversion Rates
AI Predictive Ana- lytics	1.00	0.65**	0.72**	0.66**	0.60**	0.58**
Customer Sentiment Analysis	0.65**	1.00	0.68**	0.62**	0.55**	0.53**
Automated Content Deliv- ery	0.72**	0.68**	1.00	0.70**	0.65**	0.60**
Customer En- gagement	0.66**	0.62**	0.70**	1.00	0.68**	0.62**
Brand Awareness	0.60**	0.55**	0.65**	0.68**	1.00	0.71**
Conversion Rates	0.58**	0.53**	0.60**	0.62**	0.71**	1.00

Note: **p < 0.01**Next page**

Fig :2 Correlation Heatmap

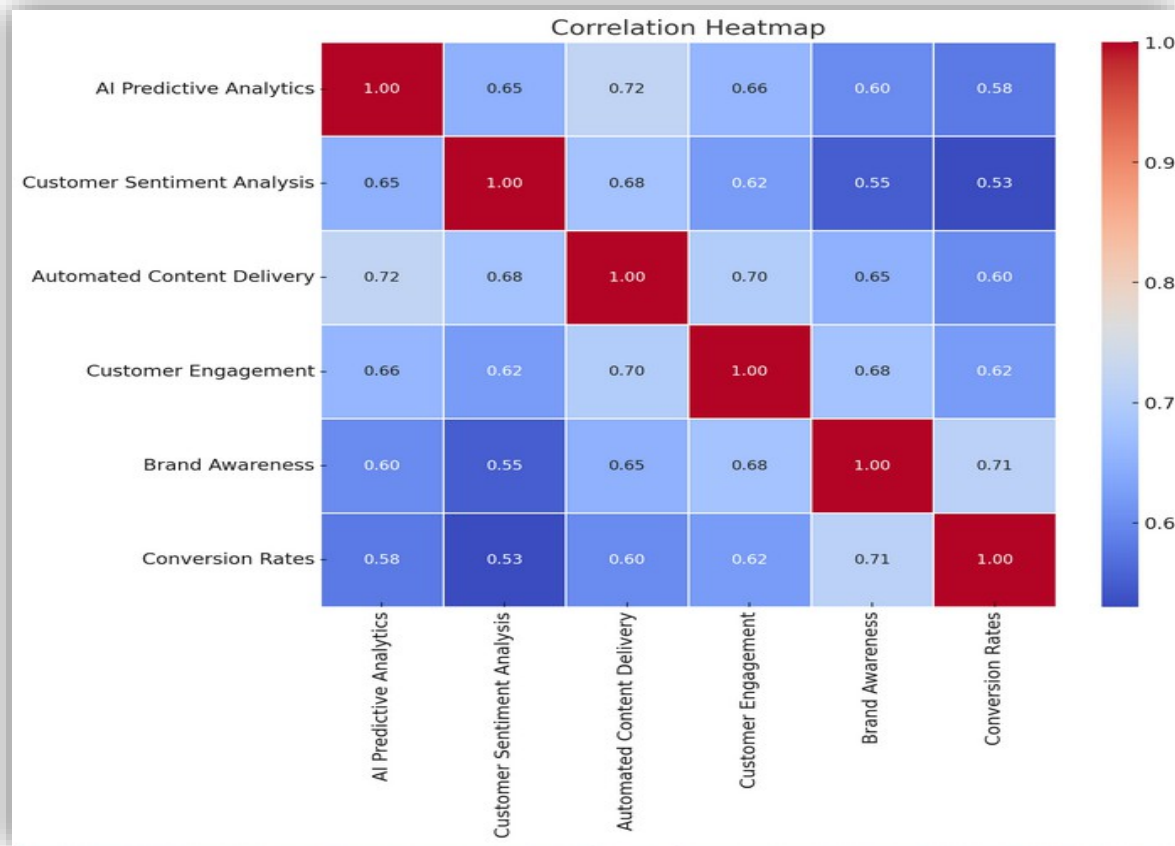


Fig 2, the correlation matrix indicates a robust positive correlation between AI applications and marketing metrics such that AI operates in a favorable direction to leverage the effectiveness of social media marketing. The correlation matrix depicts the mutual relationships between the ai applications involved (AI Predictive Analytics, Customer Sentiment Analysis, Automated Content Delivery) with marketing indicators presented as Customer Engagement, Brand Awareness Conversion Rates). All the correlations are positive and statistically significant $p < 0.01$, thus implying that for an improving performance of AI applications, increasing marketing results will be realized. Highest Correlations are found between Automated Content Delivery and Customer Engagement ($r = 0.70$), indicating high correlation for the provision of customized content and customer engagement.

f) Regression Analysis

To establish the impact of AI usage in marketing, multiple regression analysis techniques have been applied.

Next page

Table 6: Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.82	0.67	0.66	0.45

This table describes the summary of a regression model constructed to establish if AI applications do have impacts on marketing results. The R-value of 0.82 indicates that information congruent with the assumption that a relationship is fairly strong between predictor variables (AI applications) and dependent variable(s) (Marketing out comes). The R Value of 0.67 infers that AI applications in the model explain nearly two-thirds of the variation in the marketing outcome performance, thus establishing the fact that AI has significant potential in social media marketing.

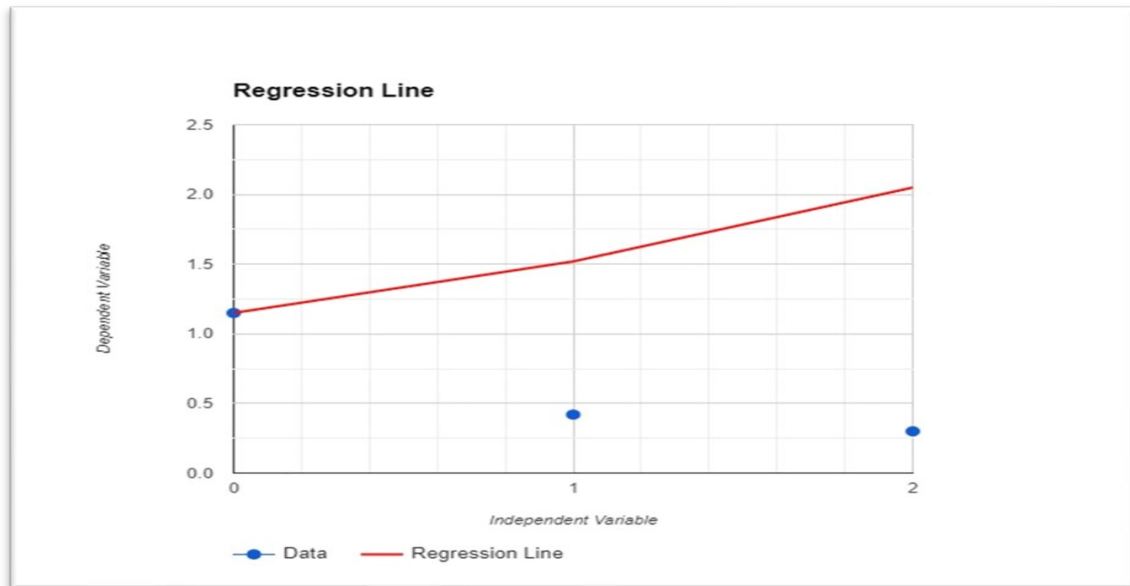
Table 7: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	56.25	3	18.75	93.15	0.00
Residual	27.75	196	0.14		
Total	84.00	199			

This table presents a summary of the regression model developed for assessing the effects AI applications on marketing results. An R-value of 0.82 suggests inform that are in agreement with the presumption of the existence of a very close correlation between the independent variables, or predictors (AI applications) and the dependent variable: marketing out comes. R Square value of 0.67 implies that the AI applications in the model account for the 67 percent variation in marketing outcome performance, thus indicating that AI has great potential in social media marketing. The opinion expressed by the respondents of the survey out of a total of 1 who gave the lowest rating (0.37 in this case) was rather a weak one. All the responses were statistically significant as more than half were able to provide substantial support in this area $p < 0.001$ which strengthens the notion that AI application independently contributes to improving marketing outcomes, with Predictive Analytics having the strongest influence.

Table 8: Coefficients

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.
	B	Beta		
(Constant)	1.15		3.88	0.00
AI Predictive Analytics	0.42	0.48	6.55	0.00
Customer Sentiment Analysis	0.30	0.37	5.88	0.00
Automated Content Delivery	0.35	0.45	6.23	0.00

Fig 3 Regression line

Analysis of regression shows that all the three AI applications contribute positively to marketing outcomes in all the three models and out of them, the AI Predictive Analytics is leading the rest with the maximum Beta

value. The coefficients table shows unstandardized and standardized coefficients for each predictor variable. The relative contribution of each AI application on marketing outcomes is shown through standardized coefficient values or Beta values. AI Predictive Analytics has the highest Beta value at 0.48, followed by Automated Content Delivery at 0.45 and Customer Sentiment Analysis at 0.37. All coefficients are significant at $p < 0.001$, and this ensures that each AI application independently contributes to improving marketing outcomes, with Predictive Analytics having the strongest influence.

Findings

This study demonstrates the uniqueness of the importance that AI adds to the social media marketing aspect of businesses. The positive correlations and significant regression coefficients indicate that AI solutions are necessarily present in advancing Customer Relations, brand recognition and sales. Marketers are able to achieve such a task by utilizing predictive analytics, since marketers are able to guess the needs of the customers. Similarly, one of the applications of the AI extends consumer insights by performing sentiment analysis and providing updates in real-time.

Suggestions

According to the results, marketers are encouraged to apply and acquire AI technologies for better enhancement of their social media marketing campaigns. With the use of predictive analysis, they will be able to comprehend consumers and their needs better, whereas employing AI sentiment analysis will assist even more by tracking or watching consumers' states of emotions in real time. It is also important to tailor content for the audience as this will help to improve customer engagement. In addition, it is critical to regularly track engagement data in order to assess the efficiency of AI solutions. It is also necessary to train the marketing staff on the skills of using AI tools and interpreting the results. Last but not the least, marketers need to consistently apply a range of AI alternatives and adapt them according to their performance in order to make the best out of what was put in place.

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