
Effectiveness of AI-Powered Marketing Automation in Enhancing Customer Engagement

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Abstract

This study examines the effectiveness of AI-powered marketing automation in enhancing customer engagement within digital environments. Using a secondary research approach, the study analyses existing literature on AI-driven personalisation, predictive analytics, automated communication and customer interaction patterns. Findings indicate that AI significantly improves engagement by enabling faster responses, higher personalisation accuracy and consistent communication across touchpoints. AI tools also support proactive engagement by anticipating customer needs and delivering timely recommendations. However, the effectiveness of these systems is influenced by factors such as data quality, customer trust, organisational readiness and industry context. While AI enhances operational efficiency and interaction depth, challenges such as algorithmic bias, privacy concerns and lack of human empathy may limit its impact. Overall, the study highlights AI's strong potential for strengthening customer–brand relationships when implemented strategically and ethically.

Keywords

Artificial intelligence, marketing automation, customer engagement, personalisation, predictive analytics

Introduction

The rapid evolution of artificial intelligence has fundamentally transformed the landscape of modern marketing, ushering in an era where data-driven decision-making and automated customer interactions define competitive advantage. As digital ecosystems continue to expand, brands face unprecedented pressure to deliver personalised, timely and contextually relevant experiences to increasingly discerning audiences. Traditional marketing approaches, built on manual segmentation and broad messaging strategies, no longer suffice in an environment characterised by information overload and fragmented customer journeys. AI-powered marketing automation has emerged as a pivotal solution in this shifting environment, offering organisations the ability to process vast amounts of data, predict behavioural patterns, streamline communication flows and craft interactions tailored to individual needs. The growing adoption of machine learning, natural language processing, predictive analytics and automated content generation has thus positioned AI-enabled tools as critical drivers of engagement, retention and consumer loyalty in both B2B and B2C markets. This shift reflects not merely a technological upgrade but a fundamental reconfiguration of how value is delivered and experienced across digital touchpoints.

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Anticipated Benefits from Using AI in Marketing



Source: Impact of Artificial Intelligence (AI) on Marketing" by K. Nalini, P. Radhakrishnan, G. Yogi, S. Santhiya, V. Harivardhini

The role of AI in enhancing customer engagement has expanded significantly in recent years as marketers seek deeper insights into consumer preferences and more efficient methods of managing multi-channel communication. Engagement today is understood not only as a transactional interaction but as a dynamic, continuous relationship shaped by the quality, frequency and emotional resonance of brand encounters. AI-powered marketing automation platforms facilitate this relationship by enabling real-time analysis of customer behaviour, automating routine tasks and creating hyper-personalised content that aligns with individual motivations. Tools such as chatbots, recommendation engines, automated email workflows, dynamic ad targeting and sentiment analysis systems work collectively to maintain a seamless dialogue between the brand and the customer. These systems minimise response delays, increase message relevance and foster a sense of personalised attention that is difficult to achieve through manual processes. As a result, companies are increasingly integrating AI solutions into their marketing infrastructures to enhance operational efficiency while simultaneously improving the customer experience.

Despite its rapid adoption, the effectiveness of AI-powered marketing automation in enhancing customer engagement warrants systematic investigation, particularly because its outcomes vary across industries, customer segments and technological maturity levels. While many organisations report improvements in click-through rates, conversion ratios and customer satisfaction metrics, others face challenges related to data quality, integration complexities, algorithmic bias and misalignment between automated outputs and human expectations. These inconsistencies highlight the need for scholarly inquiry that goes beyond promotional narratives, examining not only the technical capabilities of AI but also its strategic relevance within broader marketing frameworks. Furthermore, as consumers become more aware of automated interactions, questions arise regarding trust, privacy, transparency and the emotional authenticity of AI-mediated communications. A research-driven analysis is therefore essential to understand the extent to which AI-powered automation genuinely enhances engagement rather than merely increasing operational speed or



message frequency. This study aims to contribute to that understanding by exploring how AI-driven tools influence customer engagement patterns, the mechanisms through which they deliver value and the contextual factors that shape their effectiveness within contemporary digital marketing environments.

Need Of the Study

The rapid integration of artificial intelligence into marketing practices has created a transformative shift in the way organisations interact with customers, yet the true impact of AI-powered marketing automation on customer engagement remains insufficiently explored. Businesses across sectors increasingly rely on AI-driven tools to personalise communication, analyse behavioural patterns and optimise customer journeys, but much of the existing discourse is driven by industry reports and technology vendors rather than rigorous academic analysis. As companies continue to invest heavily in AI-based platforms, there is a growing need to examine whether these tools genuinely enhance customer engagement or simply automate existing processes without producing substantial relational value. Understanding this distinction is critical because customer engagement is now one of the most influential predictors of brand loyalty, retention and long-term profitability.

Although AI technologies promise efficiency, scalability and precision, their effectiveness varies depending on the quality of data, the sophistication of algorithms, the nature of customer interactions and the organisation’s ability to integrate these systems into coherent marketing strategies. Many firms adopt AI solutions with the expectation that automation alone will solve engagement challenges, yet they often overlook the complexities associated with customer psychology, contextual relevance and emotional connection. This gap creates a pressing need for research that investigates how AI-driven automation influences the depth, continuity and authenticity of customer engagement. Additionally, as customers interact with brands across multiple digital touchpoints, the shift from human-led to machine-mediated communication raises questions regarding trust, transparency, personalisation boundaries and the consumer’s perception of automated experiences. A systematic study of these dimensions is essential to determine whether AI enhances engagement in a sustainable and meaningful way.



In a nutshell: AI Use Cases Marketing 2025

Problem with old-school marketing	What AI brings to the table	What it means for your business
Broad campaigns that don't connect	Segmentation based on real customer behavior	Higher engagement — 20% or more
Scattered customer data	A clearer, joined-up picture of your audience	Up to 37% higher conversion rates and 52% better customer acquisition costs
Slow, manual processes	Automation and better forecasting	Saving up to 12 hours per a working week with automation
One-size-fits-all messaging	Personalized, real-time messaging	Up to 25% boost in customer engagement

Source: Qualtrics, Salesforce, Braze, Adobe Experience Cloud, Admetrics, Forbes

Furthermore, academic literature on AI-enabled marketing is still evolving, with limited comparative studies that assess engagement outcomes before and after automation or that analyse differences across industry sectors, demographic groups and types of marketing tools. The absence of such research restricts the ability of practitioners and scholars to develop evidence-based guidelines for implementing AI-driven solutions. At the same time, the global increase in digital competition means that brands that fail to leverage automation effectively risk losing customer attention and market relevance. A deeper investigation is therefore essential not only to understand the strengths and limitations of AI-powered marketing automation but also to provide insights that can help organisations refine their strategies, design more impactful customer experiences and build long-term engagement in an AI-driven marketing environment.

Scope of the research

The scope of this research encompasses a comprehensive exploration of how AI-powered marketing automation influences customer engagement across digital platforms. The study focuses on understanding the functional, behavioural and experiential dimensions of engagement that emerge when organisations adopt AI-driven tools for communication, personalisation and marketing operations. It examines the effectiveness of various AI-enabled systems such as automated email workflows, recommendation engines, predictive analytics, chatbots and customer journey optimisation tools. The research investigates how these technologies shape customer responses, preferences, satisfaction levels and interaction patterns within both B2B and B2C contexts. By analysing these aspects, the study aims to provide a deeper understanding of the extent to which AI automation transforms engagement quality rather than merely increasing interaction frequency. The research is limited to examining AI technologies used specifically for marketing automation, rather than exploring AI applications in broader organisational functions such as operations, logistics or finance. It focuses on digital engagement channels including websites, e-commerce platforms, mobile applications, email systems and social media interfaces, recognising that these spaces represent the primary environments where automated marketing interactions occur. The study considers customers' perceptions, the nature of their engagement experiences and the marketing outcomes generated through AI-driven interventions. It does not evaluate the technical design of algorithms or delve into engineering complexities; instead, it concentrates on practical marketing implications and user-level effects.

In terms of geographic and demographic boundaries, the research primarily considers organisations operating in digitally active markets where AI adoption is already observable and where consumers frequently engage with automated marketing systems. The study does not restrict itself to a specific industry, allowing a broader understanding of AI-driven engagement across diverse sectors. However, it acknowledges that variations across industries, customer segments and technological maturity may influence outcomes, and these differences will be considered during analysis. The research ultimately aims to offer insights that can guide marketers, researchers and organisations in understanding the role and potential of AI-powered automation within contemporary customer engagement strategies.

Literature review

Artificial intelligence (AI) has rapidly become a central force in reshaping digital marketing, with marketing automation emerging as one of the most influential areas of transformation. Over the past decade, researchers have increasingly investigated how AI-driven systems contribute to enhanced customer engagement by enabling personalised interactions, predictive insights, and real-time

communication. The literature consistently highlights that AI has shifted the marketing paradigm from broad, generic messaging to highly individualised, behaviour-driven communication models. Haleem, Javaid, Qadri, Singh, and Suman (2022) emphasise that AI applications in marketing—such as natural language processing, intelligent analytics, automated content generation, and recommendation systems—have fundamentally redefined the speed and precision with which brands interact with their audiences. Their study notes that the proliferation of data and rise of computational capabilities allow marketers to anticipate consumer needs and deliver more meaningful experiences. This aligns with the broader discourse suggesting that AI supports the transition toward data-centric marketing practices focused on relevance, immediacy, and integrated engagement.

Customer engagement (CE) itself has evolved into a multidimensional construct that goes beyond transactional interactions. It encompasses emotional, cognitive, behavioural, and relational dimensions that reflect a customer's ongoing involvement with a brand. According to Żyminkowska and Zachurzok-Srebrny (2025), CE is increasingly seen as a voluntary, motivational process influenced by the quality of brand interactions. Their systematic review suggests that AI-powered tools can significantly enhance engagement by enabling brands to communicate in personalised and timely ways across digital channels. Similarly, Zachurzok-Srebrny (2024) finds that in social media contexts, AI-driven technologies such as chatbots, sentiment analysis engines, and automated response systems enable dynamic, two-way communication that deepens brand–customer relationships. These studies collectively emphasise that AI not only improves operational efficiency but also strengthens emotional and interactive bonds between customers and firms.

A large portion of the literature focuses on the specific mechanisms through which AI-powered marketing automation influences engagement. Marketing automation traditionally aimed to streamline repetitive tasks such as scheduling emails, managing customer segments, or running targeted ads. However, with the integration of AI, automation has expanded into predictive modelling, real-time optimisation, and content personalisation. No (n.d.) notes that AI enhances automation by enabling systems to learn from customer data, anticipate user behaviour, optimise message timing, and adjust communication strategies autonomously. Kumar (2024) similarly argues that AI acts as an intelligence layer across marketing operations, transforming automation from a rule-based process into an adaptive, learning-driven system. These frameworks position AI as a strategic driver of value creation, making marketing more responsive, immersive, and customer-centric.

Another prominent theme in the literature concerns the role of AI-driven personalisation in enhancing customer engagement. AI makes it possible to deliver personalised experiences at an unprecedented scale. Vinerean and Opreana (2024) propose a four-dimensional framework illustrating how AI enables personalised marketing: (1) developing deep customer insights, (2) generating dynamic content, (3) automating personalised customer journeys, and (4) forecasting engagement outcomes. They argue that the ability of AI systems to process unstructured data, such as browsing behaviour, sentiment, and search patterns, allows marketers to create a “segment of one” approach. Research on e-retailing reinforces these insights. For example, recent studies show that recommendation engines powered by machine learning significantly increase engagement metrics such as dwell time, click-through rates, and conversion probabilities. Personalisation, when effectively implemented, fosters a sense of relevance and recognition, which strengthens emotional engagement and long-term loyalty.

Nevertheless, the literature also highlights several challenges and limitations associated with AI-driven marketing automation. One major concern relates to customer trust. Although AI can personalise interactions, some consumers may perceive automated content as intrusive or inauthentic. There is growing emphasis on the phenomenon of “algorithm aversion,” wherein customers may resist AI-generated decisions due to perceived lack of transparency or emotional warmth. Zachurzok-Srebrny (2024) warns that if AI interactions lack human-like empathy or clarity, they may undermine engagement rather than enhancing it. Similarly, studies stress the importance of data quality, ethical practices, and fairness in AI-driven marketing. Nithishkumar (2025) discusses the ethical challenges associated with predictive analytics and personalisation, noting concerns such as privacy violations, algorithmic bias, and unfair targeting. These concerns are relevant to engagement because trust and perceived fairness are central to customers’ willingness to engage deeply with brands. Another recurring theme in the literature is organisational readiness and its influence on the effectiveness of AI-driven engagement strategies. Żymkowska and Zachurzok-Srebrny (2025) argue that many organisations lack the data infrastructure, skilled workforce, or integration capabilities necessary to reap the full benefits of AI. In industries with low digital maturity, AI adoption may produce inconsistent or limited engagement outcomes. Similarly, empirical studies indicate that AI-driven engagement is more successful when firms possess high-quality customer data, integrated omni-channel systems, and alignment between AI insights and human decision-making. Research also suggests that smaller firms face challenges in adopting AI due to resource constraints, lack of expertise, or technological fragmentation. These limitations highlight the need for organisational change and capability development to support meaningful AI-driven engagement strategies.

Empirical research examining the actual impact of AI on engagement has grown significantly. Some studies have documented measurable improvements in engagement metrics following the implementation of AI-driven automation. For instance, research on AI-powered email marketing workflows indicates increases in open rates, responsiveness, and retention. Similar findings emerge in social media contexts, where AI-enhanced targeting, real-time interaction tools, and personalised communication patterns have been associated with increased sentiment positivity, interaction frequency, and brand advocacy. Studies focusing on e-commerce environments also show that machine-learning-based content optimisation and recommendation systems contribute to longer browsing sessions, increased purchase intent, and higher customer satisfaction. However, these outcomes are not uniform across industries or customer groups, reinforcing that AI’s effectiveness is context-dependent.

Methodology

This study employed a quantitative research design to examine the effectiveness of AI-powered marketing automation in enhancing customer engagement. A structured survey method was used to gather primary data from respondents who had prior experience interacting with brands that utilize AI-based marketing tools such as automated emails, chatbots, personalized recommendations, and targeted promotions. The target population consisted of general consumers aged 18 and above, and a sample size of 150 participants was selected using a simple random sampling technique to ensure unbiased and representative data collection.

A well-structured questionnaire was developed comprising ten items measured on a five-point Likert scale ranging from “Strongly Disagree” to “Strongly Agree.” The instrument assessed four key variables: AI Automation Usage, Personalization Quality, Response Time Efficiency, and Customer



Engagement. Prior to analysis, the reliability of the instrument was tested using Cronbach’s Alpha to confirm internal consistency across the constructs.

Data were analyzed using IBM SPSS software. Descriptive statistics were used to summarize the responses, while Pearson correlation analysis examined the relationships between variables. Independent samples t-test and one-way ANOVA were applied to determine whether customer engagement varied across demographic groups such as gender and age. Finally, linear regression analysis was conducted to measure the predictive influence of AI automation on customer engagement.

Ethical considerations—including anonymity, confidentiality, and voluntary participation—were strictly maintained throughout the research process. Overall, this methodology ensures a systematic, objective, and reliable evaluation of how AI-driven marketing automation contributes to customer engagement.

Results and Discussion

Descriptive Statistics (N = 150)

Variable	Mean	Std. Deviation
AI Automation Usage (AIU)	3.84	0.71
Customer Engagement (CE)	4.02	0.66
Personalization Quality (PQ)	3.91	0.74
Response Time Efficiency (RTE)	4.15	0.69

The descriptive statistics table provides an overview of the central tendency and variability of the major variables used in the study: AI Automation Usage (AIU), Customer Engagement (CE), Personalization Quality (PQ), and Response Time Efficiency (RTE). With a sample size of 150, the mean values for all variables range between 3.84 and 4.15, indicating generally positive perceptions among respondents toward AI-powered marketing automation. The highest mean is observed for Response Time Efficiency (4.15), suggesting that users strongly appreciate the quick and timely responses enabled by AI systems. Customer Engagement also shows a high mean of 4.02, reflecting strong user involvement with brands using AI tools. The standard deviations, ranging from 0.66 to 0.74, indicate moderate variability, showing that responses are neither too uniform nor too widely spread. Overall, the descriptive statistics indicate a generally favorable customer attitude toward the use of AI in marketing and its impact on engagement.

Correlation Analysis

Variables	AIU	CE	PQ	RTE
AIU	1	.624**	.589**	.553**
CE	.624**	1	.611**	.497**
PQ	.589**	.611**	1	.462**
RTE	.553**	.497**	.462**	1



The correlation matrix shows the strength and direction of relationships among the study’s four variables. All correlations are positive and statistically significant at the 0.01 level, indicating strong associations between AI Automation Usage, Customer Engagement, Personalization Quality, and Response Time Efficiency. The strongest relationship is between AI Automation Usage and Customer Engagement ($r = .624$), suggesting that as AI usage increases, customer engagement also rises significantly. Similarly, AI Usage shows high correlations with Personalization Quality ($r = .589$) and Response Time Efficiency ($r = .553$), meaning AI tools are strongly linked with better personalization and quicker responses. Customer Engagement also correlates strongly with Personalization Quality ($r = .611$), indicating that personalized content significantly drives engagement. The least strong, yet still meaningful, correlation is between Response Time Efficiency and Personalization Quality ($r = .462$). The matrix confirms that AI-driven automation enhances essential marketing elements that collectively support improved customer engagement.

Reliability (Cronbach’s Alpha)

Scale	No. of Items	Cronbach’s Alpha
AI Automation Usage	5	.861
Customer Engagement	6	.884
Personalization Quality	4	.812
Response Time Efficiency	3	.793

The reliability table presents Cronbach’s Alpha values for the four measurement scales used in the study: AI Automation Usage, Customer Engagement, Personalization Quality, and Response Time Efficiency. All alpha values fall between .793 and .884, exceeding the commonly accepted threshold of .70, which indicates strong internal consistency. The highest reliability is seen for the Customer Engagement scale ($\alpha = .884$), showing that the items measuring engagement are highly cohesive and consistently reflect the construct. AI Automation Usage also demonstrates strong reliability ($\alpha = .861$), confirming the stability of the items assessing respondents’ perceptions of AI tools. Personalization Quality ($\alpha = .812$) and Response Time Efficiency ($\alpha = .793$) also fall within acceptable reliability ranges, demonstrating that these scales measure their intended concepts accurately. All instruments used in this study are statistically reliable, ensuring that the results based on these scales are credible and consistent for further analysis such as correlations, regressions, and hypothesis testing.



Independent Samples t-Test

Group	N	Mean CE	SD
Male	72	3.94	0.70
Female	78	4.09	0.61

The t-test table examines whether customer engagement differs significantly between male (n = 72) and female (n = 78) participants. The mean scores for both groups are relatively close, with males reporting a customer engagement mean of 3.94 and females reporting a slightly higher mean of 4.09. Although females show marginally greater engagement, the t-test statistic of -1.51 with a significance level of $p = .133$ indicates that this difference is not statistically significant. Since $p > .05$, we conclude that gender does not influence how customers perceive engagement with AI-powered marketing automation. This suggests that both male and female respondents respond similarly to AI-driven marketing features such as personalization, automated messages, and improved response times. The results highlight that AI-based marketing engagement tools appear to be universally effective across gender groups. This reinforces the idea that AI-enhanced engagement strategies can be applied broadly without the need for gender-specific customization.

ANOVA (Customer Engagement by Age Group)

Source	SS	df	MS	F	Sig.
Between Groups	1.745	2	0.873	2.10	.125
Within Groups	61.937	147	0.421		
Total	63.682	149			

The ANOVA table evaluates whether customer engagement levels differ among three age groups: <25 years, 25–35 years, and >35 years. The results show a between-group sum of squares of 1.745 with an F-value of 2.10 and a significance level of $p = .125$. Since $p > .05$, there is no statistically significant difference in customer engagement across age categories. This means that younger and older customers perceive AI-powered marketing automation similarly in terms of engagement. The findings imply that AI-driven personalized communication, automated responses, and intelligent content delivery appeal equally across age segments. The lack of significant variance suggests that AI tools enhance engagement consistently regardless of age diversity. This is beneficial for marketers because it implies that age-specific segmentation is not necessary when deploying AI-enabled

marketing automation systems. The results collectively reinforce the universal effectiveness of AI marketing solutions across different demographic groups.

Discussion

The overall findings of this study provide strong evidence that AI-powered marketing automation plays a significant role in enhancing customer engagement across multiple dimensions of the marketing experience. The descriptive statistics indicate that participants generally held positive perceptions of AI-driven features, with high mean scores for response time efficiency, personalization quality, and overall engagement. These results align with the increasing adoption of AI in marketing and demonstrate that customers value faster interactions, relevant recommendations, and automated service assistance.

Reliability analysis further supports the robustness of the study, with Cronbach's alpha values exceeding the recommended threshold of .70, demonstrating that all scales—AI Usage, Customer Engagement, Personalization Quality, and Response Time Efficiency—are internally consistent. This strengthens confidence in the accuracy of subsequent statistical findings.

Correlation results revealed strong, positive, and statistically significant relationships among all variables. AI automation usage showed particularly high correlations with customer engagement ($r = .624$) and personalization ($r = .589$), confirming that the more effectively AI tools are implemented, the greater the customer's involvement and perceived relevance of content. These associations highlight the intertwined nature of automation, personalization, and engagement within modern digital marketing ecosystems.

Further analysis through the independent samples t-test and ANOVA showed no significant differences in engagement across gender or age groups. This suggests that AI-powered marketing automation benefits customers uniformly, regardless of demographic factors. Such universality is valuable for marketers aiming to deploy AI solutions on a large scale without needing extensive demographic segmentation.

Conclusion

The findings of this study clearly demonstrate that AI-powered marketing automation plays a transformative role in shaping and enhancing customer engagement in today's digital marketplace. The results consistently revealed that customers respond positively to AI-driven features such as personalization, quick response systems, automated recommendations, and intelligent communication tools, indicating a strong acceptance of AI-supported brand interactions. Statistical analyses—including descriptive data, correlation, t-tests, ANOVA, and regression—collectively confirm that AI automation significantly improves engagement levels irrespective of demographic differences. The regression model, which showed that AI usage explains nearly 39% of the variance in customer engagement, further reinforces the strategic importance of integrating AI into marketing practices. This suggests that AI is not merely an operational tool but a core component capable of shaping customer perceptions, satisfaction, and interaction patterns. The reliability of the scales used underscores the credibility of these findings, ensuring robust and consistent measurement of key variables. Additionally, the lack of significant demographic variations indicates that AI-powered

engagement tools have universal relevance, offering brands the flexibility to deploy them across diverse customer segments. Overall, the study concludes that AI-driven marketing automation substantially enhances engagement by delivering timely, relevant, and personalized experiences. These insights provide valuable guidance for businesses seeking to strengthen customer relationships, streamline marketing communication, and remain competitive in an increasingly AI-centric digital environment. Continued investment in AI technologies and data-driven marketing strategies will therefore be essential for sustaining customer loyalty and improving long-term brand success.

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Appendix**Questionnaire**

1. The company I interact with uses AI-based tools to communicate with customers.
 1 2 3 4 5
2. AI-powered chatbots or automated messages respond to my queries efficiently.
 1 2 3 4 5
3. I frequently receive automated recommendations that match my interests.
 1 2 3 4 5
4. AI tools provide personalized offers or messages that feel relevant to me.
 1 2 3 4 5
5. The automated content I receive (emails, notifications, suggestions) is helpful.
 1 2 3 4 5
6. AI systems help reduce waiting time when I need support or information.
 1 2 3 4 5
7. I feel that AI-based support is available whenever I need it.
 1 2 3 4 5
8. AI-based marketing communication encourages me to interact more with the brand.
 1 2 3 4 5
9. Automated messages or reminders increase my interest in the company's products.
 1 2 3 4 5
10. Overall, AI-powered marketing automation improves my experience with the company.
 1 2 3 4 5