The Effect of Artificial Intelligence on Digital Marketing Management of MSMEs

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ABSTRACT

The advancement toward the Society 5.0 era has encouraged MSMEs to increasingly adopt artificial intelligence in various business activities, particularly in digital marketing practices. However, empirical evidence examining the role of artificial intelligence in supporting digital marketing management among MSMEs, especially in developing countries, remains limited. This study investigates the influence of artificial intelligence utilization on digital marketing management among MSMEs in the Society 5.0 era. A quantitative approach was employed through a survey involving MSMEs that actively utilize digital technologies in their marketing activities. The collected data were analyzed using linear regression analysis with the assistance of SPSS software. The findings reveal that artificial intelligence utilization has a positive and statistically significant effect on digital marketing management among MSMEs. These results indicate that the integration of artificial intelligence into digital marketing activities contributes to improving marketing effectiveness and strengthening MSMEs' competitiveness in the Society 5.0 era. Furthermore, this study contributes to the literature on technology-based digital marketing and provides practical implications for MSME practitioners and policymakers.

Keywords*: Artificial Intelligence, Digital Marketing Management, MSMEs Competitiveness, Society 5.0.*

INTRODUCTION

The rapid development of digital technology has transformed marketing practices, particularly through the use of digital platforms as the main medium of interaction between businesses and consumers (Rangaswamy et al., 2020). In the Society 5.0 era, technology has become a strategic component in data-driven decision-making (Indarwati, 2025). One of the most widely adopted innovations is Artificial Intelligence (AI), which enables marketing activities to become more adaptive, personalized, and efficient through consumer data analysis and automated marketing communication (Senyapar, 2024). For Micro, Small, and Medium Enterprises (MSMEs), the utilization of AI provides opportunities to strengthen digital marketing management by improving promotional accuracy, analyzing customer behavior, and supporting more effective communication strategies. Compared to conventional promotional approaches, AI-supported digital marketing allows MSMEs to reach wider audiences, reduce operational costs, and improve marketing efficiency through data-driven decision-making (Andriana & Fadilah, 2024). Furthermore, AI enables MSMEs to deliver targeted marketing and personalized customer experiences, which are essential in increasingly competitive digital markets (Laksmono et al., 2025). These capabilities indicate that artificial intelligence has become an important technological resource for supporting digital marketing management among MSMEs.

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The utilization of artificial intelligence in digital marketing activities also provides MSMEs with greater flexibility in responding to changes in consumer preferences and market trends. AI-based systems support automated marketing management, real-time market analysis, and predictive consumer insights, enabling businesses to improve the effectiveness of digital marketing campaigns. In addition, the integration of AI into marketing activities helps MSMEs increase customer engagement and optimize digital marketing performance more efficiently. Effective digital marketing management practices, including planning, implementation, monitoring, and evaluation of digital campaigns, may also support the effectiveness of marketing activities among MSMEs (Taherdoost, 2023; Librianty et al., 2025). Although managerial and digital marketing practices may strengthen implementation processes, the effectiveness of digital marketing management is strongly associated with the ability of MSMEs to utilize artificial intelligence technologies in their marketing activities (Ziakis & Vlachopoulou, 2023; Rahmani et al., 2025). Therefore, AI utilization is increasingly viewed as a strategic factor that influences digital marketing management among MSMEs.

Despite the considerable potential of artificial intelligence in supporting digital marketing activities, the adoption of AI among MSMEs remains relatively limited. Several barriers continue to hinder the effective implementation of AI-based technologies, including low levels of digital literacy, financial limitations, inadequate technological infrastructure, and insufficient technological readiness (Drydakis, 2022). Similarly, Andriana and Fadilah (2024) explained that many MSMEs still experience difficulties in understanding and utilizing digital technologies effectively due to limited knowledge and skills. These challenges indicate that the implementation of artificial intelligence among MSMEs is still not fully optimized, particularly in utilizing AI to support digital marketing activities and improve marketing effectiveness.

Previous studies have examined the role of artificial intelligence and digital technology in improving business performance and marketing effectiveness. Research conducted by Ribhi et al. (2025) emphasized the importance of digital transformation in strengthening business adaptability and marketing effectiveness. In addition, studies by Putri et al. (2023) and Ekasari et al. (2024) highlighted that digital technology contributes positively to MSME development and customer engagement. However, empirical studies specifically examining the relationship between artificial intelligence utilization and digital marketing management among MSMEs, particularly within the Society 5.0 context, remain limited. Most previous studies focused primarily on digital transformation, business performance, or general marketing effectiveness without specifically analyzing digital marketing management as a strategic marketing outcome influenced by AI utilization. This condition reveals a research gap that requires further investigation to provide more context-specific empirical evidence regarding the role of artificial intelligence in supporting digital marketing management among MSMEs.

Therefore, this study aims to analyze the effect of artificial intelligence utilization on digital marketing management among MSMEs. This study is expected to contribute theoretically to the development of technology-based marketing literature, particularly regarding the role of artificial intelligence in supporting digital marketing effectiveness within MSMEs. In addition, the findings are expected to provide practical insights for MSME practitioners and policymakers in developing more adaptive, efficient, and technology-driven digital marketing strategies in the Society 5.0 era.

LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

Artificial Intelligence in Digital Marketing

Artificial Intelligence (AI) refers to computer-based technology capable of performing cognitive functions such as data analysis, pattern recognition, machine learning, and automated decision-making. In the context of digital marketing, AI is widely utilized to analyze consumer behavior, personalize content, automate customer service, and optimize digital advertising strategies. Through real-time data processing capabilities, AI enables businesses to better understand consumer preferences and develop marketing

strategies that are more effective, adaptive, and data-driven (Sharabati et al., 2024; Biriukov, 2025).

The implementation of AI in digital marketing also improves marketing efficiency through the use of chatbots, recommendation systems, predictive analytics, and automated advertising tools. These technologies help businesses enhance customer interaction, accelerate service responses, and improve the effectiveness of digital marketing campaigns. Furthermore, AI enables more accurate marketing personalization, allowing consumers to receive experiences and recommendations tailored to their specific needs and preferences (Ghazaldi & Wijaya, 2025).

For Micro, Small, and Medium Enterprises (MSMEs), AI serves as a strategic solution to overcome limitations in resources, including labor, promotional costs, and market analysis capabilities. By adopting AI technologies, MSMEs can improve customer targeting accuracy, expand digital market reach, and optimize marketing communication through social media and e-commerce platforms (Putra et al., 2024). AI utilization also supports MSMEs in increasing competitiveness through marketing automation and faster, more accurate decision-making processes (Bhalla, 2025).

In addition, AI helps MSMEs better understand consumer behavior through the analysis of transaction data and customer digital activities. The insights generated from AI systems can be used to design more relevant promotional strategies and strengthen customer loyalty. Therefore, the integration of AI into digital marketing has become an important factor in supporting digital transformation and sustainable business growth among MSMEs in the digital economy era (Fadillah et al., 2025; Hasan, 2025).

Digital Marketing Management of MSMEs

Digital marketing management involves the planning, implementation, monitoring, and evaluation of marketing activities through digital technologies and online platforms. In an increasingly competitive business environment, MSMEs rely on digital marketing to expand market access, strengthen customer relationships, and improve business sustainability. Effective digital marketing management enables MSMEs to communicate with consumers through social media, e-commerce, websites, and digital advertising platforms in a more interactive and measurable manner (Setiawan et al., 2025; Karundeng & Suyanto, 2025).

The success of digital marketing management depends on managerial capabilities in organizing marketing resources, creating relevant content, and maintaining customer engagement across digital platforms. MSMEs that effectively manage digital marketing activities are able to improve brand visibility, increase customer trust, and optimize marketing performance through data-driven decision making (Fadillah et al., 2025; Almaliki & Rofiqoh, 2025). In addition, digital transformation encourages MSMEs to adapt quickly to changes in consumer behavior and technological developments, which contributes to higher competitiveness in the digital economy (Jurnalita, 2024).

Furthermore, digital marketing management supports MSMEs in building long-term customer relationships through personalized communication and integrated digital strategies (Setyowati & Kurniawan, 2025). The use of digital analytics and customer relationship management tools also helps businesses evaluate campaign effectiveness and improve customer engagement more efficiently (Wulandari et al., 2025; Wiweko & Anggara, 2025).

Digital Advertising Optimization among MSMEs

Digital advertising optimization refers to efforts to improve advertising effectiveness and efficiency through the strategic use of digital platforms and technologies. Optimized digital advertising is characterized by accurate audience targeting, relevant promotional messages, effective ad placement, and measurable marketing outcomes (Shoib & Hermawan, 2025). For MSMEs, digital advertising optimization is essential because limited financial resources require businesses to maximize the impact of every marketing activity (Indarwati, 2025).

The integration of artificial intelligence into digital advertising enables MSMEs to analyze consumer behavior, identify target markets, and personalize advertising content more effectively. AI-based tools can help businesses determine the best timing for advertisements, optimize advertising budgets, and improve customer engagement through data-driven strategies (Ribhi et al., 2025). In addition, digital analytics technologies allow MSMEs to monitor advertising performance in real time, enabling faster evaluation and strategic adjustments to improve campaign effectiveness (Sahat et al., 2025).

Furthermore, optimized digital advertising contributes to increased brand visibility, higher conversion rates, and stronger customer relationships. The adoption of AI and digital marketing technologies also supports MSMEs in expanding market reach and improving competitiveness in the digital economy era (Hartanti, 2025; Arfah, 2025). Therefore, digital advertising optimization has become an important strategy for MSMEs to achieve sustainable marketing performance and business growth.

The Effect of Artificial Intelligence on Advertising Optimization

Artificial intelligence has become an important driver of digital marketing management among MSMEs because it enables businesses to analyze customer behavior, automate marketing activities, and improve marketing accuracy. AI-based tools help MSMEs personalize marketing content, predict consumer preferences, and increase marketing efficiency through data-driven decision making (Putra et al., 2024; Lawrence, 2025). In addition, AI supports targeted marketing activities and real-time marketing adjustments, allowing MSMEs to manage digital marketing activities more effectively with lower operational costs (Le Dinh et al., 2025). Through machine learning algorithms and predictive analytics, AI also assists MSMEs in identifying market trends and evaluating marketing performance more efficiently. As a result, MSMEs are able to optimize digital marketing strategies, improve customer reach, and increase engagement with potential consumers on digital platforms. These findings support the proposed hypothesis that artificial intelligence utilization positively influences digital marketing management among MSMEs.

Moreover, the effectiveness of digital marketing management can be strengthened by proper managerial and digital marketing practices implemented by MSMEs. Structured digital marketing activities, such as social media utilization and online promotional strategies, contribute to improving audience engagement and marketing effectiveness (Sharabati et al., 2024). MSMEs that consistently adopt digital-based marketing approaches are generally more capable of strengthening brand visibility and marketing performance (Dauda & Gulani, 2025; Novitasari et al., 2025). In addition, effective digital marketing management enables MSMEs to evaluate campaign performance and adapt marketing strategies according to market dynamics. These conditions may reinforce the effectiveness of AI utilization in improving digital marketing management among MSMEs (Indarwati, 2025).

H1: Artificial intelligence has a significant and positive effect on digital marketing management.

Artificial intelligence is increasingly recognized as a strategic tool for improving digital marketing performance and business sustainability among MSMEs. AI adoption supports data-driven decision-making, enhances operational efficiency, and improves marketing effectiveness through better targeting, personalization, and optimization of digital marketing activities (Santosa & Surgawati, 2024; Ribhi et al., 2025). In addition, AI contributes to financial and operational efficiency by optimizing resource allocation and strategic decision-making processes (Liliana et al., 2025). However, AI adoption among MSMEs remains limited due to inadequate technological readiness, managerial capability, and digital competencies, highlighting the importance of integrating AI with

effective digital marketing management to achieve sustainable business performance, as shown in Figure 1.

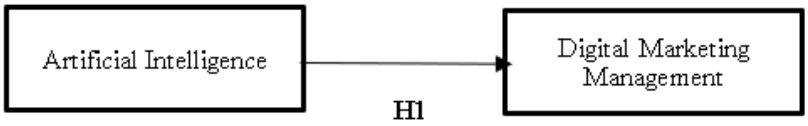

Figure 1. Research Framework

RESEARCH METHODS

This study employed an explanatory quantitative research design to examine the relationship between artificial intelligence utilization and digital marketing management among MSMEs in the Society 5.0 era. A quantitative approach was selected because it enables objective measurement of the relationship between variables through statistical analysis and supports the systematic testing of the research hypothesis. The study focused on MSMEs in Cilegon City that have implemented digital marketing practices and utilized digital technologies in their business activities.

The population of this study consisted of 100 MSME actors in Cilegon City, while the final sample included 80 respondents who completed the questionnaire fully and met the data quality requirements. The respondents were selected using a saturated sampling approach, in which all members of the population were initially targeted as research participants. The response rate of 80% was considered adequate for quantitative statistical analysis and sufficiently representative of MSMEs utilizing digital marketing in the research area. In terms of demographic characteristics, the sample showed a relatively balanced gender distribution, with 42 male respondents (52.5%) and 38 female respondents (47.5%). This balanced composition helped reduce potential bias and ensured broader representation of MSME perspectives regarding artificial intelligence utilization and digital marketing management. Although several MSME actors did not participate due to time limitations, lack of interest, or technical constraints in accessing the questionnaire, the final dataset remained complete and consistent for further statistical analysis using SPSS software.

A systematic questionnaire that was sent both online and offline to MSME actors who had embraced digital marketing techniques was used to collect primary data. The indicators of the research variables, the use of artificial intelligence and digital marketing management, were used to build the questionnaire. The purpose of the tool was to gauge how respondents felt about the use of AI and how it helped with digital marketing management in their companies. A five-point Likert scale, from strongly disagree (1) to strongly agree (5), was used to score each questionnaire item. All gathered responses were checked for consistency and completeness before to analysis, incomplete or erroneous replies were eliminated from the final analysis.

The degree to which MSMEs use AI technologies in digital marketing activities was assessed using a number of variables, such as consumer data analysis, content personalization, customer service automation, and marketing decision assistance. Meanwhile, digital marketing management was measured based on indicators representing the effectiveness of managing digital marketing activities, including planning, implementation, control, and evaluation of digital marketing strategies. All indicators were measured using a five-point Likert-type scale. In order to investigate the relationship between variables and evaluate the suggested study hypothesis, the gathered data were then processed and analyzed using SPSS. The data analysis technique in this study uses quantitative statistical analysis, which includes descriptive analysis, validity test, reliability test, classical assumption test, coefficient of determination (R Square), and hypothesis test with simple linear regression to test the effect of artificial intelligence on digital marketing management in MSMEs.

RESULTS

The results of the data analysis done to look at how artificial intelligence use affects MSMEs' digital marketing management are shown in this part. To guarantee the validity, reliability, and accuracy of the study findings, the analysis uses descriptive statistics, reliability testing, classical assumption testing, coefficient of determination, and hypothesis testing utilizing statistical techniques.

Table 1. Respondent Characteristic

Characteristics	Category	Frequency	Percentage
Gender	Male	42	52.5%
	Female	38	47.5%
Total		80	100%

The characteristics of the respondents by gender are shown in Table 1. 42 respondents (52.5%) were men, and 38 respondents (47.5%) were women out of the 80 MSME actors who took part in the survey. Gender bias in the analysis is lessened by this comparatively balanced gender distribution, which shows that both male and female MSME players are proportionately represented in the sample. The close ratio between the two categories also implies that opinions about the use of AI and digital marketing management among MSMEs can be more accurately recorded without being dominated by a single gender category. As a result, the respondent composition is deemed sufficient and representative for bolstering the validity of the study's findings in characterizing MSME attributes linked to technology adoption and digital marketing strategies.

Table 2. Descriptive Statistics

Variable	Minimum	Maximum	Mean	Std. Deviation
Artificial Intelligence	3.00	5.00	4.12	0.53
Digital Marketing Management	3.00	5.00	4.08	0.57

The research variables' descriptive statistics are shown in Table 2. With a mean score of 4.12 and a standard deviation of 0.53, artificial intelligence is generally seen favorably and consistently by respondents when used in digital marketing initiatives. Digital marketing management, on the other hand, received a mean score of 4.08 with a standard deviation of 0.57, indicating that MSMEs use comparatively effective digital marketing management techniques. Respondents tended to give moderate to high ratings for both factors, as indicated by the minimum and maximum values between 3.00 and 5.00.

All of the measurement tools utilized in this study are suitable for additional investigation, according to the findings of the validity and reliability tests. According to the validity test, every indicator of the digital marketing variable has significant values less than 0.05, indicating that every item is reliable and measures the desired construct. Furthermore, all variables have Cronbach's Alpha values above the minimum criterion of 0.60, according to the reliability test findings, demonstrating the consistency and dependability of the research tool. These results support the validity and reliability of the measurement items, making them appropriate for this study's hypothesis testing.

Table 3. Reliability Test

Variable	Cronbach's Alpha	Result
Artificial Intelligence	0.971	Reliable
Digital Marketing Management	0.962	Reliable

The reliability test results are displayed in Table 3, which demonstrates that all research variables have Cronbach's Alpha values more than 0.70. Digital marketing management received a score of 0.962, while artificial intelligence received a score of 0.971, demonstrating that all measurement tools are extremely dependable and appropriate for further examination. Additionally, reliability testing reveals that the digital marketing and artificial intelligence variables both attain Cronbach's Alpha values above the lowest

permissible threshold. These results show a high degree of internal consistency, suggesting that the research tool is trustworthy and appropriate for evaluating hypotheses.

The appropriateness of the regression model was assessed using classical assumption testing prior to hypothesis testing. Significance values greater than 0.05 show that the residual values are distributed regularly, according to the normality assessment. Additionally, because all variables exhibit significant values above the necessary threshold, the heteroscedasticity evaluation verifies that the regression model does not have heteroscedasticity problems. These results show that the regression model can be utilized for additional statistical analysis since it satisfies the necessary assumptions.

Table 4. Classical Assumption Test

Test	Criteria	Result	Conclusion
Normality Test	Sig. > 0.05	Fulfilled	Residuals are normally distributed
Heteroscedasticity Test	Sig. > 0.05	Fulfilled	No heteroscedasticity detected

Table 4 presents the results of the classical assumption tests, indicating that the regression model satisfies the required statistical requirements for multiple regression analysis. The normality test shows a significance value above 0.05, which confirms that the residuals are normally distributed and that the data meet the assumption of normality. This indicates that the regression estimates are reliable and not biased due to non-normal data distribution. In addition, the heteroscedasticity test also produces a significance value above 0.05, indicating that there is no heteroscedasticity problem in the model. This means that the variance of the residuals is constant across all levels of the independent variables. These results confirm that the regression model is statistically valid, free from classical assumption violations, and appropriate to be used for further hypothesis testing in this study.

Table 5. Model Summary

Statistics	Value
R	0.721
R Square	0.520
Adjusted R-Square	0.514
Std. Error	0.428
F-statistics	72.963
Sig.	0.000

The R value of 0.721 in Table 5 shows that the model and the dependent variable have a significant association. The independent variables in the model account for 52.0% of the variation in the dependent variable, with the remaining 48.0% being impacted by factors outside the research, according to the R Square value of 0.520. Furthermore, the Adjusted R Square value of 0.514 attests to the model's strong explanatory power. Additionally, the ANOVA test result reveals an F-statistic of 72.963 with a significance value of 0.000, suggesting that the regression model is appropriate for explaining the relationship between the variables and is statistically significant.

Table 6. Hypothesis Testing

Variable	B	Std. Error	Beta	t-statistic	Sig.
Constant	1.245	0.583		2.134	0.036
Artificial Intelligence	0.721	0.084	0.721	8.542	0.000

Table 6 demonstrates that the use of AI has a favorable and noteworthy impact on MSMEs' digital marketing management. This is demonstrated by the significance value of 0.000, which is less than the 0.05 cutoff, and the regression coefficient value of 0.721. The significant impact of artificial intelligence on digital marketing management is further supported by the t-statistic of 8.542. The positive coefficient indicates that MSMEs' digital marketing management tends to improve with increased use of artificial intelligence.

Furthermore, when the independent variable is taken to be constant, the constant value of 1.245 represents the baseline level of digital marketing management.

DISCUSSION

The results of this study demonstrate that artificial intelligence utilization has a positive and significant effect on digital marketing management among MSMEs. These findings indicate that the integration of artificial intelligence into digital marketing activities can significantly improve the effectiveness of managing digital marketing strategies, particularly in identifying target audiences, managing promotional activities, and delivering marketing messages more efficiently. This result supports previous studies conducted by Bu et al. (2025) and Laksmono et al. (2025), which emphasized that artificial intelligence enhances marketing effectiveness through automation, personalization, and predictive analysis. In the context of MSMEs, these capabilities are highly important because many small businesses operate with limited resources and require efficient digital marketing solutions to remain competitive in digital markets.

Artificial intelligence enables MSMEs to collect and analyze consumer data more accurately, allowing businesses to better understand customer preferences, purchasing behavior, and market trends. Through AI-based analysis, MSMEs can develop more adaptive digital marketing strategies and optimize marketing activities based on real-time consumer responses. This finding is consistent with the study of Yang et al. (2021), which found that artificial intelligence improves marketing performance by supporting data-driven decision-making and increasing customer targeting accuracy. Similarly, Laksmono et al. (2025) argued that AI adoption strengthens the ability of businesses to respond quickly to changes in consumer behavior in digital environments. The present study confirms these arguments by showing that MSMEs that actively utilize artificial intelligence experience better digital marketing management compared to those relying on conventional marketing approaches.

In addition, several supporting managerial and digital marketing practices may strengthen the effectiveness of artificial intelligence utilization in digital marketing activities. Effective digital marketing implementation, including planning, monitoring, and evaluation of digital campaigns, can help MSMEs maximize the benefits of AI technologies in improving marketing performance. Previous studies by Ahluwalia et al. (2023) and Indarwati (2025) explained that well-managed digital marketing activities contribute to stronger customer engagement and broader market reach. In this context, digital marketing practices can be viewed as supporting conditions that enhance the effectiveness of AI-based digital marketing activities among MSMEs.

The findings of this study also reinforce the broader literature regarding the strategic role of technology adoption in MSME development. Previous studies by Ho et al. (2022) and Ribhi et al. (2025) emphasized that digital transformation and artificial intelligence implementation positively influence business adaptability and marketing performance. However, this study extends prior research by specifically demonstrating that artificial intelligence utilization contributes directly to digital marketing management among MSMEs. This indicates that AI is not only relevant for general business transformation but also plays a strategic role in improving marketing effectiveness and digital marketing performance in digital environments.

These findings imply that MSMEs should focus on improving their capability to utilize artificial intelligence technologies in digital marketing activities. In addition, MSMEs also need to strengthen their digital literacy and managerial readiness to maximize the benefits of AI implementation. Without sufficient understanding of digital marketing strategies, consumer analytics, and technological integration, the effectiveness of artificial intelligence may not be fully optimized. Therefore, improving technological capabilities and digital competencies is essential to support sustainable business growth and effective digital marketing management in increasingly competitive digital markets.

CONCLUSION

This study demonstrates that the utilization of artificial intelligence plays a crucial role in improving digital marketing management among MSMEs. The findings indicate that artificial intelligence supports more effective digital marketing management by enabling better data processing, audience targeting, personalization, and campaign management. The results further suggest that digital marketing management among MSMEs is strongly associated with the ability of businesses to utilize artificial intelligence technologies effectively in their digital marketing activities. Therefore, artificial intelligence utilization can be regarded as a strategic element that strengthens MSMEs' competitiveness and adaptability in the Society 5.0 era.

However, this study is limited by its relatively small and geographically focused sample, which may restrict the generalizability of the findings to broader MSME populations. In addition, the research only examines one independent variable, while other relevant factors that may influence digital marketing management were not included in the analysis. Based on the findings, MSME practitioners are encouraged to optimize the use of artificial intelligence in digital marketing activities, particularly for data analysis, content customization, audience targeting, and campaign monitoring to improve digital marketing effectiveness. Policymakers and relevant institutions are advised to develop programs that enhance digital literacy and technological readiness among MSME actors through targeted training on AI-based digital marketing to accelerate adoption and reduce implementation barriers. Future research is suggested to expand the model by including additional variables such as organizational readiness, innovation capability, or digital competency, examining different regional or sectoral contexts, and applying alternative or longitudinal approaches to obtain deeper insights into the long-term impact of artificial intelligence on digital marketing management among MSMEs.

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