International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

The Effect Of Artificial Intelligence Adoption And Digital Marketing Capability On MSME Business Performance: The Mediating Role Of Customer Engagement In Tangerang City

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Abstract

The rapid development of digital technologies and Artificial Intelligence (AI) has created new opportunities for Micro, Small, and Medium Enterprises (MSMEs) to improve competitiveness and business performance. This study aims to analyze the effect of Artificial Intelligence adoption and digital marketing capability on MSME business performance through the mediating role of customer engagement among MSMEs in Tangerang City, Indonesia. This research employed a quantitative approach using a survey method involving 150 MSME owners selected through purposive sampling. Data were analyzed using Structural Equation Modeling-Partial Least Squares (SEM-PLS). The variables examined in this study include Artificial Intelligence adoption, digital marketing capability, customer engagement, and MSME business performance. The findings reveal that Artificial Intelligence adoption and digital marketing capability have positive and significant effects on customer engagement. Furthermore, customer engagement positively influences MSME business performance and serves as a significant mediating variable in the relationship between Artificial Intelligence adoption, digital marketing capability, and business performance. The results indicate that the integration of digital technologies and digital marketing capabilities, supported by strong customer engagement, can significantly enhance sustainable business performance among MSMEs. This study contributes to the literature on digital transformation and provides practical implications for MSME practitioners and policymakers in developing technology-based business strategies in emerging economies.

Keywords: Artificial Intelligence, Digital Marketing Capability, Customer Engagement, Business Performance, MSMEs.

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INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) play a strategic role in economic growth, employment generation, and community welfare improvement in developing countries, including Indonesia. In recent years, rapid technological advancement and digital transformation have fundamentally changed the business environment, requiring MSMEs to adapt continuously to maintain their competitiveness and sustainability. Digital transformation is no longer considered merely a strategic option but has become an essential requirement for organizations seeking to improve operational efficiency, innovation capability, and business performance in increasingly competitive markets (Sharabati et al., 2024).

The emergence of Artificial Intelligence (AI) technologies has significantly transformed the way organizations conduct their business activities. Artificial Intelligence enables organizations to automate business processes, analyze customer behavior, personalize services, and improve decision-making processes through data-driven approaches. Previous studies have demonstrated that AI implementation contributes positively to organizational productivity, operational efficiency, innovation capability, and business performance across various industries (Cui, 2025). In the context of MSMEs, the utilization of AI technologies such as chatbots, predictive analytics, recommendation systems, customer analytics, and content generation tools offers substantial opportunities to enhance business competitiveness and sustainability.

Despite its potential benefits, the adoption of Artificial Intelligence among MSMEs remains challenging due to several barriers, including limited financial resources, inadequate technological infrastructure, low digital literacy, and organizational readiness issues (Alnajjar et al., 2025). Consequently, understanding how AI adoption influences business outcomes among MSMEs has become an important area of investigation, particularly in emerging economies where digital transformation is rapidly evolving.

In addition to Artificial Intelligence adoption, digital marketing capability has emerged as another critical factor affecting organizational performance in the digital era. Digital marketing capability refers to an organization's ability to utilize digital technologies, platforms, and analytical tools to develop effective marketing strategies, manage customer relationships, and create business value. Organizations with strong digital marketing capabilities are more likely to achieve competitive advantages, improve customer relationships, and enhance overall business performance (Kong, 2025). The increasing use of social media platforms, e-commerce marketplaces, and digital

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communication technologies has encouraged MSMEs to strengthen their digital marketing competencies to survive and grow in highly competitive environments.

From the perspective of the Resource-Based View (RBV), technological capabilities and digital marketing capabilities are considered strategic organizational resources that can create sustainable competitive advantages. Organizations capable of effectively managing and integrating these strategic resources are expected to achieve superior business performance compared to their competitors (Sipos, 2025). Furthermore, Dynamic Capability Theory emphasizes that organizations must possess the ability to integrate, build, and reconfigure internal and external competencies to respond effectively to environmental changes and technological disruptions (Civelek et al., 2023). Therefore, the integration of Artificial Intelligence adoption and digital marketing capability can be viewed as a strategic organizational capability that contributes significantly to business success.

However, technological capability alone may not be sufficient to ensure business success. Organizations must also establish strong relationships with customers to maximize the benefits of digital transformation initiatives. Customer engagement has become an important construct that explains the emotional, cognitive, and behavioral involvement of customers with organizations, products, or brands. Higher levels of customer engagement are associated with increased customer loyalty, improved brand image, and enhanced business performance (Abdullah, 2025). Previous studies have demonstrated that customer engagement serves as an important mechanism through which digital capabilities influence organizational performance by strengthening customer relationships and increasing customer satisfaction (Magableh et al., 2024).

Although numerous studies have examined the relationships between Artificial Intelligence adoption, digital marketing capability, customer engagement, and business performance separately, empirical research integrating these variables into a single comprehensive model remains limited, particularly within the context of MSMEs in developing countries (Vu et al., 2025). Existing studies have predominantly focused on large enterprises, while empirical evidence concerning MSMEs, especially in Indonesia, remains insufficient. Furthermore, limited studies have investigated the mediating role of customer engagement in explaining how digital transformation capabilities influence MSME business performance (Liando et al., 2025).

Tangerang City represents one of the fastest-growing economic regions in Indonesia, characterized by a significant number of MSMEs and increasing digital technology penetration. The widespread adoption of social media platforms, e-commerce

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marketplaces, and AI-based business applications among MSMEs in Tangerang indicates the growing importance of digital transformation in supporting business sustainability and competitiveness (Siahaan et al., 2025). However, empirical evidence regarding the influence of Artificial Intelligence adoption and digital marketing capability on customer engagement and business performance among MSMEs in this region remains limited.

Based on the aforementioned discussion, this study addresses the existing research gap by investigating the relationships among Artificial Intelligence adoption, digital marketing capability, customer engagement, and business performance within a unified research framework. Specifically, this study aims to analyze the effects of Artificial Intelligence adoption and digital marketing capability on MSME business performance through the mediating role of customer engagement among MSMEs in Tangerang City. The findings of this study are expected to contribute to the development of digital transformation and marketing management literature while providing practical implications for MSME practitioners and policymakers in developing effective technology-based business strategies to enhance MSME competitiveness and sustainability (Oduro et al., 2023).

Objectives

This study intends:

1. To analyze the effect of Artificial Intelligence adoption on customer engagement among MSMEs in Tangerang City.
2. To examine the effect of digital marketing capability on customer engagement among MSMEs in Tangerang City.
3. To investigate the effect of customer engagement on MSME business performance.
4. To analyze the direct effects of Artificial Intelligence adoption and digital marketing capability on MSME business performance.
5. To examine the mediating role of customer engagement in the relationship between Artificial Intelligence adoption and MSME business performance.
6. To examine the mediating role of customer engagement in the relationship between digital marketing capability and MSME business performance.
7. To provide empirical evidence regarding the integration of digital transformation capabilities and customer engagement in improving MSME business performance.

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DISCUSSION

Research Methodology

This study employed a quantitative research approach using a survey method to investigate the effects of Artificial Intelligence adoption and digital marketing capability on MSME business performance through the mediating role of customer engagement. The study adopted an explanatory research design to examine the causal relationships among the proposed variables based on the developed conceptual framework. Data analysis was conducted using the Structural Equation Modeling-Partial Least Squares (SEM-PLS) approach with the assistance of SmartPLS software.

The population of this study consisted of Micro, Small, and Medium Enterprise (MSME) owners operating in Tangerang City who had implemented digital technologies in their business activities. Considering the specific characteristics of the respondents, purposive sampling was employed as the sampling technique. The selected respondents were MSME owners or managers who had operated their businesses for at least one year, utilized digital platforms for marketing activities, and possessed experience or familiarity with Artificial Intelligence-based technologies in supporting their business operations.

A total of 150 respondents participated in this study. This sample size was considered adequate for SEM-PLS analysis and fulfilled the minimum sample requirements for estimating structural models with acceptable statistical power. Primary data were collected through an online questionnaire distributed using Google Forms, while secondary data were obtained from relevant publications, reports, and previous studies related to digital transformation and MSME development.

The research instrument consisted of four constructs: Artificial Intelligence adoption, digital marketing capability, customer engagement, and MSME business performance. Artificial Intelligence adoption was measured through indicators related to the utilization of AI technologies for marketing, customer service, business analytics, decision-making, and operational efficiency. Digital marketing capability was measured through the organization's ability to utilize digital technologies for planning, implementing, and evaluating marketing strategies. Customer engagement referred to the emotional, cognitive, and behavioral involvement of customers with the business, whereas business performance was measured through indicators of sales growth, profitability, customer growth, market share, and overall business performance.

All measurement items were assessed using a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). Data analysis was conducted in two major

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stages: measurement model evaluation and structural model evaluation. The measurement model was evaluated through convergent validity, discriminant validity, and reliability assessments using outer loading values, Average Variance Extracted (AVE), Cronbach's Alpha, Composite Reliability, Fornell-Larcker Criterion, and Heterotrait-Monotrait Ratio (HTMT). Furthermore, the structural model was evaluated using coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), Standardized Root Mean Square Residual (SRMR), and hypothesis testing through bootstrapping procedures at a significance level of 5%.

RESULTS

This study involved 150 owners and managers of Micro, Small, and Medium Enterprises (MSMEs) operating in Tangerang City. The respondents were selected using purposive sampling criteria, focusing on MSMEs that had adopted digital technologies and possessed experience in utilizing digital platforms for business activities. The characteristics of respondents were analyzed to provide a comprehensive overview of the research subjects and to strengthen the interpretation of the empirical findings.

Table 1: Characteristics of Respondents

Characteristics	Category	Frequency	Percentage (%)
Business Sector	Retail	34	22.67
	Technology	29	19.33
	Fashion	24	16.00
	Handicrafts	24	16.00
	Culinary	22	14.67
	Services	17	11.33
Age	Average	40.47 years	
Business Experience	Average	11.09 years	

The findings indicate that the majority of respondents were entrepreneurs within the productive age group, with an average age of 40.47 years. This characteristic suggests that respondents possessed a relatively high capacity for adapting to technological changes and implementing digital transformation initiatives. Furthermore, the average business experience of 11.09 years demonstrates that the participating MSMEs had accumulated substantial managerial and operational experience. The

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diversity of business sectors represented in this study also indicates that digital transformation and Artificial Intelligence adoption have increasingly penetrated various MSME industries in Tangerang City.

The descriptive analysis of the research variables was conducted to provide an initial overview of the respondents' perceptions regarding Artificial Intelligence adoption, digital marketing capability, customer engagement, and business performance. The results revealed that all research variables achieved relatively high mean scores.

Table 2: Descriptive Statistics of Research Variables

Variable	Mean	Interpretation
Artificial Intelligence Adoption	3.66	High
Digital Marketing Capability	3.77	High
Customer Engagement	3.68	High
MSME Business Performance	3.72	High

The findings indicate that Digital Marketing Capability obtained the highest mean score among all variables, suggesting that MSMEs in Tangerang City have increasingly adopted digital technologies and marketing platforms to support their business activities. Artificial Intelligence adoption also demonstrated a relatively high level, indicating that MSMEs have begun utilizing AI-based technologies such as customer analytics, automated communication systems, recommendation engines, and digital content generation tools. Similarly, customer engagement and business performance achieved high average scores, reflecting the increasing importance of customer-oriented strategies and digital transformation initiatives in supporting business sustainability.

Measurement Model Evaluation

The measurement model was evaluated to ensure the validity and reliability of all constructs used in the study. The assessment included convergent validity, internal consistency reliability, and discriminant validity analyses.

Table 3: Outer Loading Values

Construct	Indicator	Outer Loading
AI	AI1	0.812

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	AI2	0.841
	AI3	0.856
	AI4	0.794
	AI5	0.827
DMC	DMC1	0.845
	DMC2	0.817
	DMC3	0.862
	DMC4	0.835
	DMC5	0.848
CE	CE1	0.824
	CE2	0.803
	CE3	0.857
	CE4	0.811
	CE5	0.838
BP	KB1	0.851
	KB2	0.833
	KB3	0.816
	KB4	0.847
	KB5	0.825

The results presented in Table 3 indicate that all indicators exhibited outer loading values exceeding the recommended threshold value of 0.70. The highest loading value was observed for indicator DMC3 (0.862), while the lowest loading value was recorded for indicator AI4 (0.794). These findings confirm that all indicators adequately represent their respective latent constructs and satisfy the requirements of convergent validity.

Table 4: Reliability and Convergent Validity Assessment

Variable	AVE	Cronbach's Alpha	Composite Reliability
Artificial Intelligence Adoption	0.679	0.882	0.914
Digital Marketing Capability	0.709	0.897	0.924
Customer Engagement	0.680	0.881	0.914
Business Performance	0.696	0.890	0.919

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The reliability assessment demonstrated that all constructs achieved Cronbach's Alpha and Composite Reliability values above the recommended threshold of 0.70. Additionally, all Average Variance Extracted (AVE) values exceeded 0.50, confirming the convergent validity of the constructs. Therefore, all constructs were considered valid and reliable for further analysis.

The discriminant validity of the constructs was evaluated using the Fornell-Larcker Criterion.

Table 5: Fornell-Larcker Criterion

Variable	AI	DMC	CE	BP
AI	0.824			
DMC	0.631	0.842		
CE	0.652	0.674	0.825	
BP	0.596	0.617	0.731	0.834

The results indicate that the square root of the AVE for each construct exceeded the correlations with other constructs, confirming satisfactory discriminant validity. Furthermore, all HTMT values were below the threshold value of 0.90, indicating that each construct possessed adequate discriminant properties.

Structural Model Evaluation

The structural model evaluation aimed to assess the explanatory and predictive capabilities of the proposed research model. The evaluation was conducted using coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and model fit assessment.

Table 6: Coefficient of Determination and Predictive Relevance

Endogenous Variable	R^2	Q^2
Customer Engagement	0.582	0.381
Business Performance	0.671	0.472

The results reveal that Artificial Intelligence adoption and Digital Marketing Capability explained 58.2% of the variance in Customer Engagement. Meanwhile, Artificial Intelligence adoption, Digital Marketing Capability, and Customer Engagement

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collectively explained 67.1% of the variance in MSME Business Performance. These findings indicate that the proposed model possesses satisfactory explanatory power and predictive capability.

Table 7: Effect Size (f^2)

Relationship	f^2	Interpretation
AI → CE	0.245	Medium
DMC → CE	0.312	Medium
AI → BP	0.173	Small
DMC → BP	0.218	Medium
CE → BP	0.428	Large

The effect size analysis indicates that Customer Engagement exerted the strongest influence on MSME Business Performance. This finding highlights the strategic importance of customer relationships in enhancing organizational performance within the digital business environment.

The model fit assessment produced an SRMR value of 0.067, which is below the recommended threshold of 0.08, indicating that the structural model achieved an acceptable level of goodness-of-fit.

Hypothesis Testing

The hypothesis testing was performed using the bootstrapping procedure in SEM-PLS. The results demonstrated that all proposed hypotheses were statistically significant.

Table 8: Hypothesis Testing Results

Hypothesis	Path	β	t-value	p-value	Decision
H1	AI → CE	0.381	5.872	0.000	Supported
H2	DMC → CE	0.452	6.543	0.000	Supported
H3	CE → BP	0.486	7.214	0.000	Supported
H4	AI → BP	0.217	2.982	0.003	Supported
H5	DMC → BP	0.254	3.621	0.000	Supported

The findings indicate that both Artificial Intelligence adoption and Digital Marketing Capability positively and significantly influence Customer Engagement and MSME

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Business Performance. Furthermore, Customer Engagement demonstrated the strongest direct effect on Business Performance, emphasizing its strategic role in supporting organizational growth and sustainability.

Mediation Analysis

Table 9: Mediation Analysis Results

Mediation Path	β	t-value	p-value	Result
AI → CE → BP	0.185	3.822	0.000	Significant
DMC → CE → BP	0.220	4.115	0.000	Significant

The mediation analysis revealed that Customer Engagement significantly mediates the relationships between Artificial Intelligence adoption and MSME Business Performance, as well as between Digital Marketing Capability and Business Performance. The significance of both direct and indirect effects indicates the existence of partial mediation. These findings suggest that the successful implementation of digital transformation strategies among MSMEs depends not only on technological capabilities but also on the organization's ability to establish and maintain strong customer engagement. Consequently, customer engagement serves as a strategic mechanism that strengthens the impact of digital transformation initiatives on sustainable business performance.

CONCLUSION

This study aimed to investigate the effects of Artificial Intelligence adoption and digital marketing capability on MSME business performance through the mediating role of customer engagement among MSMEs in Tangerang City. The findings of this study demonstrate that Artificial Intelligence adoption and digital marketing capability positively and significantly influence customer engagement and MSME business performance. Furthermore, customer engagement was found to have a significant positive effect on business performance and partially mediates the relationships between Artificial Intelligence adoption, digital marketing capability, and business performance.

The results indicate that the successful implementation of digital transformation initiatives among MSMEs depends not only on the adoption of advanced technologies but also on the organization's ability to establish and maintain strong customer relationships. The findings confirm that customer engagement plays a strategic role in strengthening

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the impact of technological capabilities and digital marketing practices on business performance. Therefore, the integration of Artificial Intelligence technologies, digital marketing capabilities, and customer-oriented strategies can become an effective approach for enhancing the competitiveness and sustainability of MSMEs.

From a theoretical perspective, this study contributes to the development of digital transformation, marketing management, and strategic management literature by providing empirical evidence supporting the Resource-Based View (RBV) and Dynamic Capability Theory. The findings suggest that technological resources and digital capabilities represent strategic organizational assets that can generate sustainable competitive advantages when effectively integrated with customer engagement strategies.

From a practical perspective, the findings provide important implications for MSME owners and policymakers. MSMEs should increase their investment in Artificial Intelligence technologies and strengthen their digital marketing capabilities to improve business performance. Technologies such as customer analytics, chatbots, recommendation systems, social media analytics, and digital content generation tools can assist MSMEs in improving customer experiences and operational efficiency. Additionally, policymakers should develop programs that support digital transformation initiatives, digital literacy enhancement, and Artificial Intelligence adoption among MSMEs to strengthen their competitiveness in the digital economy.

This study has several limitations. First, the research was conducted only among MSMEs in Tangerang City, which may limit the generalizability of the findings. Second, the study employed a cross-sectional research design that could not capture changes in digital transformation practices over time. Third, this study focused only on Artificial Intelligence adoption, digital marketing capability, customer engagement, and business performance, while other potentially influential variables were not included.

Future studies are recommended to expand the geographical scope of the research, employ longitudinal research designs, and incorporate additional variables such as digital orientation, innovation capability, organizational agility, and competitive advantage to provide a more comprehensive understanding of digital transformation and business performance among MSMEs.

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