

“AI adoption and sales growth in MSMEs: The mediating role of customer engagement”

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ARTICLE INFO	Frans Sudirjo (2026). AI adoption and sales growth in MSMEs: The mediating role of customer engagement. <i>Innovative Marketing</i> , 22(3), 206-225. doi: 10.21511/im.22(3).2026.14
DOI	http://dx.doi.org/10.21511/im.22(3).2026.14
RELEASED ON	Wednesday, 19 August 2026
RECEIVED ON	Tuesday, 11 November 2025
ACCEPTED ON	Wednesday, 24 June 2026
LICENSE	 This work is licensed under a Creative Commons Attribution 4.0 International License
JOURNAL	"Innovative Marketing "
ISSN PRINT	1814-2427
ISSN ONLINE	1816-6326
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

		
NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
29	1	7

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BUSINESS PERSPECTIVES



LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine
www.businessperspectives.org

Type of the article: Research Article

Received on: 11th of November, 2025

Accepted on: 24th of June, 2026

Published on: 19th of August, 2026

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Conflict of interest statement:

Author(s) reported no conflict of interest

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AI ADOPTION AND SALES GROWTH IN MSMES: THE MEDIATING ROLE OF CUSTOMER ENGAGEMENT

Abstract

This study examines the associations between AI adoption, content creativity, message personalization, customer engagement, and perceived sales growth among MSMEs in Semarang, Indonesia. Drawing on the Technology Acceptance Model (TAM) and Customer Engagement Theory (CET), the study investigates whether customer engagement mediates the relationships between AI-driven marketing practices and business performance outcomes. A quantitative approach was employed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4. Data were collected from 120 MSME owners and managers who reported using ChatGPT or other AI-based marketing tools. The findings indicate that AI adoption and content creativity are positively associated with customer engagement, whereas message personalization shows no significant association with customer engagement. Customer engagement is positively associated with perceived sales growth. Furthermore, customer engagement significantly mediates the association between AI adoption and perceived sales growth. However, the indirect associations of content creativity and message personalization with perceived sales growth through customer engagement are not statistically significant. These findings suggest that the benefits of AI adoption for MSMEs are primarily realized through stronger customer engagement rather than through a direct association with sales outcomes. This study contributes to the growing literature on AI-assisted marketing in MSMEs and highlights the importance of customer engagement as a mechanism linking AI adoption and perceived business performance.

Keywords

AI adoption, content creativity, message personalization,
sales growth, customer engagement

JEL Classification

M31, O33, L26

INTRODUCTION

The emergence of generative artificial intelligence (AI) tools such as ChatGPT has attracted considerable attention in the field of marketing. These tools enable businesses to generate marketing content, support customer communication, and assist in message customization with relatively limited resources. For Micro, Small, and Medium Enterprises (MSMEs), particularly those operating in developing economies, AI-based applications may provide opportunities to improve marketing efficiency and strengthen interactions with customers (Yoshikuni & Dwivedi, 2023). As a result, AI adoption has become an increasingly relevant topic in understanding how digital technologies support MSME marketing activities and business development.

ChatGPT and similar AI-driven tools have transformed marketing from a static, one-way communication process into a dynamic, interactive engagement platform. Globally, businesses leveraging AI in marketing report significant improvements in sales conversion, customer loyalty, and brand differentiation. For example, according to a 2024 McKinsey survey, 71% of global marketing leaders indicated that AI tools like ChatGPT improved their ability to tailor messages

and generate real-time responses to customer inquiries (Singla et al., 2025). In the United States, small enterprises using AI-based marketing automation observed a 25% growth in sales performance within the first year of adoption. Similarly, in Singapore, MSMEs have adopted ChatGPT to craft personalized product descriptions and optimize digital advertisements, resulting in enhanced engagement metrics and higher return on investment (Lim et al., 2024). These findings suggest that AI adoption, when coupled with creative and personalized marketing strategies, can act as a powerful driver of disruptive innovation in the MSME sector.

In Indonesia, ChatGPT has rapidly gained traction among MSMEs as a cost-effective and efficient solution to overcome marketing resource limitations. According to the Digitalization Trends of MSMEs in Indonesia 2025, over 60% of MSMEs in Indonesia have begun experimenting with AI tools, including ChatGPT, to automate marketing communication and improve customer interaction (Qasa, 2025). However, challenges remain in ensuring that business owners fully understand the strategic potential of AI beyond its technical use. Many MSMEs still struggle to create truly engaging and original content, leading to suboptimal marketing outcomes. Moreover, while personalization can significantly enhance customer connection, concerns regarding data privacy and ethical AI usage persist, influencing user trust and willingness to engage. These issues highlight the complexity of integrating AI-driven marketing solutions in a developing economy context, where digital literacy and technological infrastructure remain uneven across regions.

In Semarang, one of Indonesia's rapidly growing urban centers, the adoption of ChatGPT among MSMEs has been particularly notable in creative, culinary, and retail industries. Data from the Semarang City Office of Industry and Trade in 2024 indicate that over 55% of digital MSMEs in the city have integrated AI-assisted marketing tools to support content generation, customer communication, and social media engagement. However, disparities in adoption levels are evident: while technologically adept MSMEs leverage ChatGPT for advanced personalization and customer engagement, smaller or traditional enterprises tend to use it merely as a text generator (Adi et al., 2024). Interviews with MSME associations reveal that many business owners in Semarang still lack sufficient understanding of how ChatGPT can support disruptive marketing strategies that foster differentiation and customer loyalty. As a result, the potential of ChatGPT to enhance customer engagement and boost sales growth remains underutilized.

Customer engagement has become a critical construct in understanding the relationship between AI adoption, content creativity, message personalization, and MSME sales performance. Empirical studies indicate that AI-driven personalization fosters higher engagement levels, which in turn enhance customer retention and revenue growth (Hollebeek et al., 2014). Creative content, supported by AI tools like ChatGPT, allows MSMEs to maintain continuous interaction with consumers through engaging storytelling, adaptive tone, and real-time responsiveness. Yet, not all studies agree on the direct positive impact of AI adoption on customer engagement or sales. For instance, research in Malaysia found that AI adoption did not significantly influence customer engagement when users perceived content as overly automated or lacking emotional authenticity (Lim & Seng, 2024). These findings underline the importance of understanding how AI-driven marketing elements interact to produce engagement that genuinely contributes to business performance.

From a theoretical perspective, the Technology Acceptance Model (TAM) and Customer Engagement Theory provide a robust framework to analyze these relationships (Davis, 1989; Brodie et al., 2013). TAM explains how perceived usefulness and perceived ease of use influence the adoption of new technologies such as ChatGPT, emphasizing the cognitive mechanisms behind user acceptance. Meanwhile, Customer Engagement Theory focuses on the psychological and behavioral dimensions of consumer interaction with brands, highlighting engagement as a multidimensional construct encompassing cognitive, emotional, and behavioral components. Integrating both theories enables a comprehensive understanding of how MSME owners in Semarang perceive and utilize ChatGPT as a disruptive marketing tool, and how these perceptions translate into enhanced customer engagement and sales growth.

This research addresses a critical gap in current literature by examining how AI adoption, content creativity, and message personalization influence MSME sales growth through customer engagement as a mediating variable. While global research has explored AI's transformative impact on large corporations, limited attention has been given to its practical implications for MSMEs in emerging economies like Indonesia.

1. LITERATURE REVIEW AND RESEARCH HYPOTHESES

The Technology Acceptance Model (TAM) was first introduced by Fred Davis in 1989 to explain the determinants of user acceptance and adoption of new technologies (Davis, 1989). This model is grounded in two main constructs: perceived usefulness and perceived ease of use. Perceived usefulness refers to the extent to which an individual believes that using a particular technology enhances their job performance, while perceived ease of use denotes how effortless and uncomplicated the technology is perceived to be. In the context of this study, TAM serves as a theoretical foundation for analyzing how MSME owners in Semarang perceive and adopt ChatGPT as a marketing innovation tool. The constructs of perceived usefulness and perceived ease of use are particularly relevant to understanding AI adoption, as they determine whether users view ChatGPT as an effective and simple tool for creating marketing content. Through the TAM lens, this research explores how the perceived benefits and simplicity of ChatGPT influence MSME owners' behavioral intentions to integrate AI into their marketing practices, which in turn affect customer engagement and sales growth. Understanding these relationships through TAM provides critical insights into how ChatGPT adoption can serve as a disruptive marketing force among MSMEs in Semarang.

Customer Engagement Theory (CET), developed by Brodie in 2013, emphasizes the emotional, cognitive, and behavioral connections between customers and brands, reflecting the degree of involvement, participation, and loyalty fostered through interactive experiences (Brodie et al., 2013). CET posits that engagement arises from meaningful interactions between consumers and a brand, often leading to positive outcomes such as satisfaction, advocacy, and long-term loyalty. In the context of MSMEs us-

ing ChatGPT, CET provides a conceptual basis to understand how AI-driven marketing – through creative content generation and personalized messaging – can deepen emotional bonds and interactive relationships with customers. High customer engagement not only drives repeat purchases but also promotes word-of-mouth and brand advocacy, which are vital for MSME sustainability. Applying CET in this study allows the identification of how AI adoption, content creativity, and message personalization shape consumer engagement behavior and, consequently, influence sales performance in Semarang's MSME sector.

AI adoption refers to the extent to which MSME owners accept and utilize artificial intelligence technologies like ChatGPT in their business operations. According to Venkatesh (2000), technology adoption is influenced by perceived usefulness, ease of use, and social influence, which align with TAM's conceptual foundation. In the marketing context, AI adoption encompasses the use of ChatGPT for content generation, automated responses, marketing analytics, and personalized communication with consumers. For MSMEs in Semarang, adopting ChatGPT represents a strategic decision to enhance operational efficiency and marketing innovation despite limited human and financial resources. However, adoption success depends on MSME owners' awareness of AI's potential benefits and their confidence in using it effectively. Indicators of AI Adoption in this study include: a) Perceived usefulness: The belief that ChatGPT enhances marketing performance and creativity; b) Ease of use: The degree to which ChatGPT is user-friendly and does not require extensive technical skills; c) Technological readiness: The availability of supporting infrastructure and skills; and d) Intention to use: The willingness to continue using ChatGPT in daily marketing practices.

Content creativity in digital marketing reflects the ability to produce original, engaging, and innovative marketing materials that capture audience at-

tention and differentiate a brand from competitors (Fillis & Rentschler, 2010). Creativity is a vital determinant of marketing effectiveness, particularly in the era of AI-driven communication where automated tools like ChatGPT can support idea generation, storytelling, and design of persuasive messages. In the context of Semarang MSMEs, ChatGPT enables entrepreneurs to produce dynamic, contextually relevant, and linguistically rich content that aligns with their target market preferences. However, true creativity depends not only on the tool itself but also on the user's capacity to combine originality, relevance, and aesthetic appeal. Indicators of Content Creativity in this study include: a) Originality: The uniqueness and novelty of the generated content; b) Relevance: The suitability of content for target audiences; c) Emotional appeal: The ability to evoke positive feelings or empathy; and d) Innovation: The integration of new ideas and styles in marketing communication.

Message personalization is defined as the ability to tailor communication content to individual customer characteristics, preferences, and behaviors (Monk & Blom, 2007). Personalization is a central feature of disruptive marketing strategies, as it enhances consumer relevance and builds emotional connections between brands and customers. ChatGPT enables MSMEs to personalize marketing messages efficiently by analyzing customer feedback, behavior patterns, and contextual information, allowing them to craft customized product recommendations and responses. Personalized messages help consumers feel understood and valued, which increases engagement and loyalty. In this study, message personalization is examined through four indicators: a) Customer relevance: The extent to which messages address customer needs; b) Emotional connection: The capacity to establish empathy and trust through personalized tone; c) Contextual accuracy: Alignment of messages with customer preferences or purchase history; and d) Responsiveness: The ability to provide real-time, tailored communication through AI.

Customer engagement is a multidimensional construct involving cognitive, emotional, and behavioral participation in brand-related interactions (Hollebeek et al., 2014). It reflects the depth of a customer's relationship and involvement with a

brand, often manifested through attention, enthusiasm, and active participation. In the context of ChatGPT-driven marketing, customer engagement represents how AI-enabled creativity and personalized content influence customer interest and participation in digital platforms. Engaged customers are more likely to share content, provide feedback, and maintain long-term relationships with the brand, thereby contributing to sales growth. This study identifies customer engagement as a mediating variable that connects AI adoption, content creativity, and message personalization with MSME sales performance in Semarang. Indicators of Customer Engagement include: a) Cognitive engagement: Customer attention and awareness of marketing messages; b) Emotional engagement: Feelings of connection and enthusiasm toward the brand; c) Behavioral engagement: Active interactions such as sharing, commenting, or purchasing; and d) Advocacy intention: Willingness to recommend or promote the brand.

Sales growth represents the increase in business revenue resulting from enhanced marketing performance and customer engagement (Kotler & Keller, 2012). In this study, perceived sales growth refers to respondents' subjective assessment of changes in business performance following the use of AI-assisted marketing practices. Rather than relying on audited financial statements or objective sales records, the construct captures MSME owners' perceptions regarding revenue improvement, customer acquisition, repeat purchases, and market expansion. Therefore, the findings should be interpreted as perceived sales outcomes rather than objective measures of financial performance. Indicators of Sales Growth in this study include: a) Revenue increase: The percentage rise in total sales after adopting ChatGPT-based marketing; b) Customer base expansion: Growth in the number of new customers acquired; c) Repeat purchase rate: Frequency of returning customers; and d) Market reach: The extent to which digital campaigns attract wider audiences.

AI adoption refers to the extent to which MSMEs integrate artificial intelligence – particularly ChatGPT – into their marketing activities to enhance performance, productivity, and innovation. According to the Technology Acceptance Model

(TAM) developed by Davis (1989), users' acceptance of technology is primarily influenced by perceived usefulness and perceived ease of use. When MSME owners in Semarang perceive ChatGPT as beneficial in creating marketing content and simplifying communication with customers, their adoption tends to increase. Research by Venkatesh et al. (2012) supports that perceived usefulness directly impacts behavioral intention to use technology, ultimately improving business performance and customer interactions. Through ChatGPT, MSMEs can automate customer responses, generate creative marketing materials, and analyze consumer sentiment efficiently, leading to more engaging customer experiences. Therefore, the higher the level of AI adoption, the stronger the customer engagement generated through dynamic, personalized, and responsive marketing interactions.

Content creativity represents the ability of MSMEs to produce unique, relevant, and compelling marketing materials that attract and retain consumer attention. Fillis and Rentschler (2010) emphasized that creativity is a crucial component of marketing success, as it enables businesses to differentiate themselves in a competitive market. In the context of ChatGPT, creative content emerges from the capability to utilize AI tools to craft innovative, emotionally resonant, and contextually accurate messages. Hollebeek et al. (2014) highlight that creative and interactive content can significantly enhance customer engagement, as it triggers emotional responses and encourages active participation. For MSMEs in Semarang, leveraging ChatGPT to create storytelling-based campaigns or personalized product descriptions can foster deeper customer connections. Consequently, creativity in marketing content is expected to play a crucial role in driving higher engagement and stronger brand relationships.

Message personalization refers to tailoring marketing communications according to individual customer characteristics, needs, and preferences. Based on Customer Engagement Theory (Brodie et al., 2013), personalized interactions strengthen emotional and cognitive bonds between customers and brands. ChatGPT enables MSMEs to personalize messages at scale – by analyzing language patterns, preferences, and feedback – to ensure

that communications feel more human and contextually relevant. Research by Monk and Blom (2007) found that personalization significantly enhances user satisfaction and engagement because customers perceive higher value when interactions reflect their personal interests. For MSMEs in Semarang, adopting ChatGPT to deliver personalized messages helps improve customer trust, increase interaction frequency, and nurture long-term relationships. Therefore, personalization not only enriches user experience but also enhances customer engagement with MSME brands.

Customer engagement plays a mediating role between marketing strategies and business performance. As proposed by Hollebeek et al. (2014), engaged customers are emotionally and behaviorally invested in a brand, often resulting in repeat purchases, positive word-of-mouth, and stronger loyalty – all of which contribute to sales growth. When MSMEs effectively engage customers through interactive, personalized, and creative marketing driven by ChatGPT, customer participation increases, leading to higher sales. Research by Vivek et al. (2012) confirms that engagement enhances both short-term transactional outcomes and long-term relationship value. In Semarang's MSME context, sustained engagement through AI-powered marketing channels – such as automated chat responses or personalized campaign messages – helps improve conversion rates and customer retention. Hence, higher customer engagement is expected to translate directly into increased sales growth.

AI adoption enables MSMEs to optimize digital marketing efficiency by automating content creation, predicting consumer preferences, and improving communication speed. However, the benefits of AI adoption on sales growth are not always direct; they are often mediated by customer engagement. According to Brodie et al. (2013), engagement is a dynamic process through which customers' cognitive and emotional investment in a brand leads to tangible business outcomes. MSMEs that adopt ChatGPT can increase engagement by delivering more relevant and timely interactions, thus creating a sense of connection and trust. Studies by Mariani and Borghi (2021) have shown that AI-based tools improve customer relationships, which subsequently boost sales per-

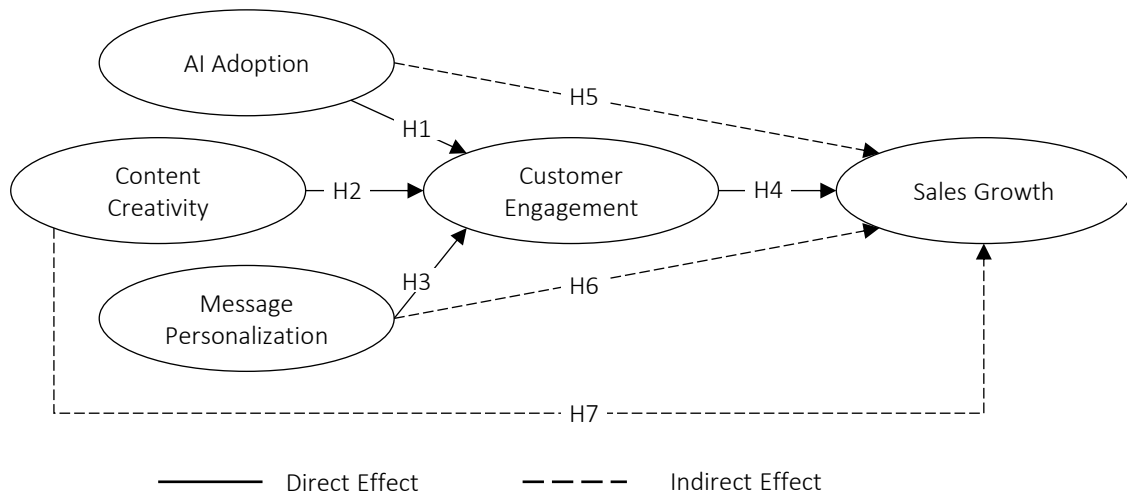


Figure 1. Conceptual model

formance. Therefore, engagement acts as a crucial link between AI adoption and sales outcomes.

Creative marketing content stimulates emotional responses and enhances the customer's perceived value of the brand. However, the effect of creativity on sales performance operates primarily through customer engagement. Hollebeek and Macky (2019) suggest that creativity fosters active participation, encouraging consumers to interact with content and share it within their social circles, indirectly driving sales growth. For MSMEs in Semarang, ChatGPT serves as an enabler of creativity, allowing entrepreneurs to produce attractive advertisements, social media captions, and brand narratives that appeal to target audiences. When customers find content creative and relatable, they are more likely to engage with the brand, leading to repeated interactions and purchases. Thus, customer engagement functions as the mediating pathway through which creativity translates into tangible sales growth.

Personalized messages help customers feel recognized and valued, establishing a sense of belonging and trust with the brand. Lemon and Verhoef (2016) indicate that personalized experiences enhance customer satisfaction and deepen engagement, which in turn positively affect purchase decisions. ChatGPT's natural language capabilities allow MSMEs to deliver personalized messages that reflect individual customer preferences, thereby strengthening interaction quality and increasing engagement. When engagement intensi-

fies, it fosters stronger loyalty and higher purchase frequency, leading to sales growth. For MSMEs in Semarang, this mechanism reflects how message personalization not only improves communication effectiveness but also drives customer-driven sales outcomes. Therefore, customer engagement serves as a critical intermediary linking message personalization with sales performance.

Based on literature review, the hypotheses are as follows:

- H1: AI adoption has a positive influence on customer engagement among MSMEs.*
- H2: Content creativity has a positive influence on customer engagement among MSMEs.*
- H3: Message personalization has a positive influence on customer engagement among MSMEs.*
- H4: Customer engagement has a positive influence on sales growth among MSMEs.*
- H5: AI adoption has a positive influence on sales growth through customer engagement.*
- H6: Content creativity has a positive influence on sales growth through customer engagement.*
- H7: Message personalization has a positive influence on sales growth through customer engagement.*

This study aims to examine the associations between AI adoption, content creativity, message personalization, customer engagement, and perceived sales growth among MSMEs in Semarang. In addition, the study investigates whether customer engagement mediates the relationships between AI-related marketing practices and perceived sales growth.

The proposed hypotheses establish the interconnected relationships among AI adoption, content creativity, and message personalization as predictors of customer engagement, which in turn leads to sales growth. Moreover, customer engagement acts as a mediating variable that bridges the effects of technological and creative marketing factors on MSME performance in Semarang, positioning ChatGPT as a transformative driver of disruptive marketing in the digital business landscape.

2. METHODOLOGY

This study adopts a quantitative research approach to analyze the influence of AI adoption, content creativity, and message personalization on sales growth among MSMEs in Semarang City, with customer engagement serving as a mediating variable. The quantitative approach was selected because it provides an objective and systematic framework to test theoretical models and measure causal relationships among multiple variables using numerical data. This method allows researchers to draw statistically valid conclusions about how ChatGPT-driven disruptive marketing affects MSME performance. The research employs a survey design, chosen for its efficiency in collecting standardized data from a large number of respondents within a relatively short time. Data collection was conducted from July to September 2025 through structured online questionnaires distributed via Google Forms to owners and managers of MSMEs in Semarang who actively utilize ChatGPT or other AI-based marketing tools. The survey instrument used a Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree) to measure respondents' perceptions related to AI adoption, content creativity, message personalization, customer engagement, and sales growth. This design was selected because it enables researchers to quantify complex behavioral and attitudinal factors that underlie the disruptive marketing process,

allowing for in-depth analysis of how ChatGPT influences the marketing dynamics and customer relationships of MSMEs in Semarang City.

The research sample comprised MSME owners and managers operating in various sectors across Semarang City, including culinary, fashion, crafts, and digital services, who have adopted or experimented with ChatGPT or similar AI technologies in their marketing activities. The study used purposive sampling to ensure the participants met specific inclusion criteria aligned with the research objectives. The inclusion criteria required respondents to (1) own or manage an MSME operating in Semarang City; (2) actively use AI tools such as ChatGPT for content creation, customer interaction, or marketing personalization; and (3) possess basic familiarity with digital marketing concepts and AI-based business tools. Meanwhile, exclusion criteria eliminated respondents who had no prior experience using ChatGPT or similar AI-based marketing tools, or those who had limited engagement in digital marketing activities. After data screening, 120 valid responses were collected from an initial pool of 132 respondents, ensuring that the sample represented diverse MSME profiles within Semarang's digital economy ecosystem. Purposive sampling was considered suitable as it targeted knowledgeable respondents who could provide relevant insights into how AI-driven marketing innovations impact customer engagement and business performance in a real-world MSME context.

Participation in this study was entirely voluntary. Before completing the questionnaire, respondents were informed about the purpose of the study and provided their consent electronically. No personally identifiable information was collected, and all responses were treated anonymously and confidentially. The collected data were stored securely and used solely for academic research purposes. Based on institutional research guidelines, the study did not involve vulnerable populations, medical interventions, or sensitive personal information and therefore qualified for ethical review exemption.

This research employed the Structural Equation Modeling approach using Partial Least Squares (SEM-PLS) with the assistance of SmartPLS 4.0 software for data analysis. The SEM-PLS method was chosen due to its capability to manage com-

plex models containing several latent variables and mediating relationships, even when the sample size is relatively small to medium. This analytical framework allows for simultaneous testing of both the measurement (outer) and structural (inner) models, thus providing an in-depth understanding of the direct and indirect interactions between variables. The initial stage of the analysis involved evaluating the measurement model to verify the constructs' reliability and validity. Convergent validity was determined through factor loadings (≥ 0.70), Average Variance Extracted ($AVE \geq 0.50$), and Composite Reliability ($CR \geq 0.70$), ensuring that each indicator accurately represented its associated latent variable. Discriminant validity was

further tested using the Fornell-Larcker criterion and the HTMT ratio to ensure that each construct measured a unique theoretical concept.

The next phase focused on analyzing the structural model to test the proposed hypotheses regarding the relationships among AI adoption, content creativity, message personalization, customer engagement, and sales growth. The R-squared (R^2) coefficient was employed to measure the explanatory capability of the independent variables, indicating the proportion of variance in customer engagement and sales growth explained by the predictors. Additionally, predictive relevance (Q^2) was calculated to evaluate the model's forecast-

Table 1. Demographic characteristics of respondents

Demographic Variable	Category	Frequency (n = 120)	Percentage (%)
Gender	Male	68	56.7
	Female	52	43.3
Age Group	20–29 years	28	23.3
	30–39 years	47	39.2
	40–49 years	32	26.7
	50 years and above	13	10.8
Education Level	Senior High School	21	17.5
	Diploma	25	20.8
	Bachelor's Degree	60	50.0
	Master's Degree or higher	14	11.7
Type of MSME Sector	Culinary	38	31.7
	Fashion	26	21.7
	Handicraft/Creative Industry	19	15.8
	Digital/Service-based Business	25	20.8
	Trade/Retail	12	10.0
Business Age (Years)	< 2 years	18	15.0
	2–5 years	43	35.8
	6–10 years	39	32.5
	> 10 years	20	16.7
Business Scale (Number of Employees)	1–4 employees (Micro)	53	44.2
	5–19 employees (Small)	47	39.2
	20–99 employees (Medium)	20	16.6
Experience Using ChatGPT/AI Tools	Less than 6 months	22	18.3
	6–12 months	37	30.8
	1–2 years	41	34.2
	More than 2 years	20	16.7
Frequency of AI Utilization in Marketing	Rarely (1–2 times/month)	14	11.7
	Occasionally (3–5 times/month)	31	25.8
	Frequently (Weekly)	49	40.8
	Very Frequently (Daily)	26	21.7
Primary Purpose of ChatGPT Usage	Content Creation (e.g., captions, copywriting)	46	38.3
	Customer Interaction (e.g., chatbot, responses)	33	27.5
	Marketing Personalization (targeted campaigns)	29	24.2
	Business Strategy and Planning	12	10.0

ing ability. The analysis of path coefficients was conducted to assess both the magnitude and direction of the relationships between constructs. Hypothesis testing was carried out using a bootstrapping method with 5,000 subsamples to determine the statistical significance of each path ($t\text{-value} > 1.96$ at $p < 0.05$). Finally, the mediating role of customer engagement was examined through the indirect effect analysis to identify whether it effectively transmitted the influence of AI adoption, content creativity, and message personalization on sales growth.

The use of SEM-PLS and SmartPLS 4.0 enabled a robust and comprehensive analysis of the conceptual framework based on the Technology Acceptance Model (TAM) and Customer Engagement Theory. TAM provided insights into how perceived usefulness and ease of AI adoption drive behavioral intention, while Customer Engagement Theory explained how interactive and personalized experiences foster deeper customer relationships and lead to business performance growth. Through this methodological approach, the study sought to empirically validate the proposed hypotheses and contribute to understanding how ChatGPT as an AI tool serves as a driver of disruptive marketing strategies that enhance customer engagement and ultimately improve MSME sales performance in Semarang City.

The demographic data show that most respondents are male MSME owners (56.7%), aged 30–39 years (39.2%), and possess a bachelor's degree (50%), indicating a relatively well-educated group with digital awareness. The culinary sector (31.7%) dominates the respondents, reflecting Semarang's vibrant food-based MSME ecosystem. The majority of businesses have operated between 2–10 years (68.3%), suggesting stable, growing enterprises adopting innovative marketing strategies. Most respondents represent micro and small enterprises (83.4%), highlighting ChatGPT's accessibility for smaller-scale entrepreneurs. A significant portion (34.2%) have used ChatGPT or similar AI tools for 1–2 years, and 40.8% use AI frequently for marketing, primarily for content creation (38.3%) and customer interaction (27.5%), reflecting ChatGPT's role as a catalyst for creative, personalized, and data-driven marketing approaches within Semarang's MSME ecosystem.

3. RESULTS

The first phase in the Structural Equation Modeling – Partial Least Squares (SEM-PLS) analysis involves the evaluation of the outer model or measurement model. This step ensures that each indicator used in the study accurately reflects its corresponding latent construct with validity and reliability. The outer model assesses the relationships between latent variables and their observed indicators, serving as a foundation for confirming that the constructs are both theoretically and empirically sound. In this study, the outer model evaluation was conducted using SmartPLS version 4.0 to analyze the relationships among AI Adoption, Content Creativity, Message Personalization, Customer Engagement, and Sales Growth among MSMEs in Semarang utilizing ChatGPT as a disruptive marketing tool. The evaluation consisted of three main stages: convergent validity, discriminant validity, and reliability testing, to ensure the precision and consistency of all constructs before analyzing the structural (inner) model.

Convergent validity measures the extent to which indicators of a construct are correlated and effectively represent the same underlying concept. Indicators are considered valid when their factor loadings exceed 0.70, demonstrating that they adequately reflect the intended construct. The results in Table 2 show that all factor loadings for each construct – AI Adoption, Content Creativity, Message Personalization, Customer Engagement, and Sales Growth – are above the 0.70 threshold, confirming strong convergent validity. These findings indicate that all indicators successfully converge to represent their respective latent variables and are suitable for inclusion in further SEM analysis.

The reliability test was conducted to confirm the internal consistency of each construct by examining Cronbach's Alpha and Composite Reliability values. In reflective measurement models, reliability is considered acceptable when both values exceed 0.70, signifying stability and consistency in measurement. As shown in Table 2, all constructs demonstrated Cronbach's Alpha and Composite Reliability values above the established benchmark, indicating that the items used in the study were dependable and consistently measured their

Table 2. Measurement model analysis

Variable	Item	Factor Loading	Cronbach's Alpha	Composite Reliability	AVE
AI Adoption (AIA)	AIA.1	0.823	0.784	0.851	0.669
	AIA.2	0.812			
	AIA.3	0.799			
	AIA.4	0.775			
Content Creativity (CC)	CC.1	0.855	0.801	0.872	0.694
	CC.2	0.834			
	CC.3	0.812			
	CC.4	0.778			
Message Personalization (MP)	MP.1	0.879	0.816	0.874	0.682
	MP.2	0.843			
	MP.3	0.806			
	MP.4	0.758			
Customer Engagement (CE)	CE.1	0.862	0.822	0.886	0.703
	CE.2	0.845			
	CE.3	0.827			
	CE.4	0.781			
Sales Growth (SG)	SG.1	0.871	0.794	0.862	0.688
	SG.2	0.854			
	SG.3	0.823			
	SG.4	0.758			

respective constructs. Furthermore, the Average Variance Extracted (AVE) values for all constructs were higher than 0.60, signifying that each construct was able to explain a substantial portion of the variance in its indicators. These findings collectively affirm the reliability, precision, and internal coherence of the measurement model used in this research.

3.1. Discriminant validity

Discriminant validity aims to ensure that each construct within the model is theoretically and empirically distinct from the others, confirming that no conceptual overlap exists among them. This validity is established when the square root of the Average Variance Extracted (AVE) for a construct is greater than its correlation with any other construct. As displayed in Table 3, the square roots of the AVE values (highlighted along the diagonal) are consistently higher than the corre-

sponding inter-construct correlation coefficients, signifying that discriminant validity has been achieved. These findings demonstrate that every construct – AI Adoption, Content Creativity, Message Personalization, Customer Engagement, and Sales Growth – represents a unique theoretical dimension and measures a separate conceptual aspect, thereby validating the distinctiveness of each variable in the research model.

Since all variables were measured using a single self-reported questionnaire, common method bias (CMB) was assessed using the full collinearity variance inflation factor (VIF) approach proposed by Kock (2015). A VIF value below 3.3 indicates that common method bias is unlikely to be a serious concern. The results showed that all constructs exhibited VIF values below the recommended threshold, suggesting that common method bias did not substantially influence the study findings.

Table 3. Discriminant validity (Fornell-Larcker criterion)

Variable	AIA	CC	MP	CE	SG
AI Adoption (AIA)	0.818	0.412	0.467	0.451	0.398
Content Creativity (CC)	0.412	0.833	0.448	0.472	0.439
Message Personalization (MP)	0.467	0.448	0.826	0.493	0.465
Customer Engagement (CE)	0.451	0.472	0.493	0.838	0.521
Sales Growth (SG)	0.398	0.439	0.465	0.521	0.830

Table 4. Common method bias

No.	Construct	VIF
1	AI Adoption	2.12
2	Content Creativity	2.24
3	Message Personalization	2.08
4	Customer Engagement	2.47
5	Perceived Sales Growth	2.31

The subsequent phase of Structural Equation Modeling–Partial Least Squares (SEM-PLS) analysis involves evaluating the inner or structural model. This stage determines how well the theoretical model explains and predicts the relationships among latent constructs. The evaluation focuses on three essential components: the coefficient of determination (R-square), predictive relevance (Q-square), and hypothesis testing (path coefficient significance). The inner model analysis was conducted using SmartPLS 4.0, chosen for its ability to handle complex models and moderate sample sizes – aligning with the profile of MSME owners and managers in Semarang. In this study, the constructs of AI Adoption, Content Creativity, and Message Personalization act as exogenous variables, Customer Engagement serves as a mediating variable, and Sales Growth functions as the endogenous variable.

The R-square (R^2) value measures how much variance in an endogenous construct is explained by the exogenous constructs. A higher R-square indicates a stronger explanatory power of the model. As shown in Table 5, the R-square value for Customer Engagement is 0.612, indicating that AI Adoption, Content Creativity, and Message Personalization explain 61.2% of the variance in Customer Engagement, while the remaining 38.8% is influenced by other unobserved factors. Similarly, the R-square value for Sales Growth is 0.574, meaning that AI Adoption, Content Creativity, Message Personalization, and Customer Engagement collectively explain 57.4% of the variance in Sales Growth. According to Hair et al. (2021), R^2 values above 0.50 are considered to reflect moderate to strong explanatory capacity. Therefore, the results demonstrate that this model possesses satisfactory

explanatory power in capturing the dynamics of disruptive marketing driven by ChatGPT utilization among MSMEs in Semarang.

Predictive relevance (Q-square) evaluates how effectively the model can predict endogenous constructs. A Q^2 value greater than zero signifies that the model possesses adequate predictive capability. Using the obtained R-square values, Q^2 can be computed as follows:

$$Q^2 = 1 - (1 - R1^2) (1 - R2^2)$$

$$Q^2 = 1 - (1 - 0.612) (1 - 0.574)$$

$$Q^2 = 1 - (0.388 \times 0.426)$$

$$Q^2 = 1 - 0.165$$

$$Q^2 = 0.835$$

The resulting Q^2 value of 0.835 indicates high predictive relevance, confirming that the structural model has strong predictive accuracy for both Customer Engagement and Sales Growth constructs. This finding reinforces the robustness of the model in explaining how ChatGPT-facilitated marketing strategies enhance customer relationships and business performance.

Hypothesis testing evaluates the significance of relationships between constructs through path coefficients, t-values, and p-values. A relationship is considered statistically significant when $p < 0.05$. Based on the bootstrapping results from SmartPLS 4.0, several hypotheses were supported, while others were found to be statistically insignificant. As presented in Table 6, the analysis reveals that AI Adoption and Content Creativity significantly enhance Customer Engagement, which in turn

Table 5. R-square test

No	Variable	R-square
1	Customer Engagement (CE)	0.612
2	Sales Growth (SG)	0.574

Table 6. Hypothesis testing results

Hypothesis	Path Coefficient	t-value	p-value	Decision
AI Adoption → Customer Engagement	0.512	6.884	0.000	Accepted
Content Creativity → Customer Engagement	0.451	6.271	0.000	Accepted
Message Personalization → Customer Engagement	−0.082	1.221	0.223	Rejected
Customer Engagement → Sales Growth	0.387	5.326	0.000	Accepted
AI Adoption → Customer Engagement → Sales Growth	0.276	2.942	0.004	Accepted
Content Creativity → Customer Engagement → Sales Growth	0.091	1.438	0.152	Rejected
Message Personalization → Customer Engagement → Sales Growth	−0.064	1.117	0.265	Rejected

exerts a strong positive effect on Sales Growth. However, Message Personalization was found to have an insignificant and slightly negative effect on Customer Engagement, suggesting that over-customization may not always strengthen engagement when not aligned with customer expectations. Likewise, the indirect effects of Message Personalization and Content Creativity on Sales Growth through Customer Engagement were statistically insignificant, indicating that the mediating role of engagement is not uniform across all dimensions of disruptive marketing behavior. These findings imply that while ChatGPT-driven strategies hold strong potential, their effectiveness depends on the balance between automation, creativity, and the perceived authenticity of personalized communication within the Semarang MSME context.

4. DISCUSSION

Based on the hypothesis testing results presented in Table 6, the relationship between AI Adoption and Customer Engagement shows a path coefficient of 0.512, a t-value of 6.884, and a p-value of 0.000, indicating a positive and significant relationship at the 0.05 significance level. This result suggests that the higher the perceived level of AI adoption among MSME actors in Semarang, the greater the level of customer engagement across cognitive, emotional, behavioral, and advocacy dimensions toward the brand or product offered. According to the Technology Acceptance Model (TAM) proposed by Davis (1989), perceived usefulness and ease of use are key determinants influencing individuals or organizations to accept and utilize new technologies. In the context of MSMEs in Semarang, most respondents are in the productive age group of 30–39 years (39.2%) and hold a bachelor's degree (50.0%), indicating a high

level of digital literacy and technological readiness. This condition supports a strong intention to integrate AI tools such as ChatGPT into their digital marketing activities. The use of AI enables MSMEs to better understand customer needs, create more relevant messages, and build interactive relationships that foster customer engagement cognitively through product understanding, emotionally through trust and satisfaction, and behaviorally through active interactions on social media.

This finding aligns with the Customer Engagement Theory (CET), which emphasizes that customer engagement results from continuous interactions between customers and brands through meaningful experiences (Brodie et al., 2013). AI adoption has been proven to be a key driver in forming deeper engagement, as it enables two-way communication and personalization that enhance customer satisfaction and loyalty. Previous studies by Borghi et al. (2023) and Dwivedi et al. (2021) found that AI adoption enhances customer engagement through more efficient communication, interactive digital experiences, and easier access to information. A similar pattern is observed among MSMEs in Semarang, where over 70% of respondents reported using AI actively for more than six months, primarily for content creation (38.3%) and customer interaction (27.5%), indicating the active implementation of AI to strengthen customer interactions. Thus, this study confirms that AI adoption has a positive and significant influence on customer engagement, as perceived ease of use, perceived benefits, technological readiness, and a strong intention to use AI collectively reinforce customer engagement across cognitive, emotional, behavioral, and advocacy dimensions within MSMEs in Semarang.

Based on the hypothesis testing results shown in Table 6, the relationship between Content Creativity and Customer Engagement has a path

coefficient of 0.451, a *t*-value of 6.271, and a *p*-value of 0.000, indicating a positive and significant relationship at the 0.05 significance level. This finding demonstrates that the higher the level of content creativity developed by MSME actors in Semarang, the greater the level of customer engagement across cognitive, emotional, behavioral, and advocacy aspects. In this context, content creativity – encompassing originality, relevance, emotional appeal, and innovation – plays a crucial role in capturing customer attention and encouraging sustained interaction. According to the Customer Engagement Theory (CET) proposed by Brodie et al. (2013), customer engagement emerges through meaningful experiences created by brands, where creative content acts as a primary stimulus shaping customers' perceptions, emotions, and actions toward the brand. This is further supported by the demographic characteristics of respondents, most of whom are aged 30–39 years (39.2%) and hold a bachelor's degree (50.0%), reflecting high appreciation for innovative digital content aligned with market needs. With respondents largely representing MSMEs in the culinary (31.7%) and fashion (21.7%) sectors, content creativity becomes a key element in generating visual and emotional appeal that enhances customer engagement on social media and other digital platforms.

This finding is consistent with previous research emphasizing that creative content significantly improves customer engagement. A study by Tafesse and Wien (2018) showed that original, relevant, and emotionally appealing content increases customer interaction with brands through likes, comments, and information sharing. Similarly, Mariani & Borghi (2021) found that digitally innovative content strengthens customer engagement by enhancing more personal and immersive brand experiences. Among MSMEs in Semarang, approximately 38.3% of respondents reported using AI tools such as ChatGPT for content creation, reflecting a strong awareness of the importance of creativity in digital marketing strategies. By leveraging artificial intelligence to produce fresher, more relevant, and emotionally engaging content, MSMEs can build stronger and more sustainable relationships with customers. Therefore, this study confirms that content creativity has a positive and significant influence on customer engagement, as the combination of originality, message relevance,

emotional appeal, and innovation effectively fosters customer involvement cognitively, emotionally, behaviorally, and through advocacy toward MSME brands in Semarang.

Based on the hypothesis testing results presented in Table 6, the relationship between Message Personalization and Customer Engagement shows a path coefficient of -0.082, a *t*-value of 1.221, and a *p*-value of 0.223, indicating a negative and insignificant relationship at the 0.05 significance level. This finding suggests that message personalization efforts implemented by MSMEs in Semarang have not contributed meaningfully to enhancing customer engagement across cognitive, emotional, behavioral, or advocacy dimensions. Indicators such as customer relevance, emotional connection, contextual accuracy, and responsiveness appear not to have been optimally implemented in digital marketing practices. According to the Customer Engagement Theory (CET) proposed by Brodie et al. (2013), customer engagement emerges when interactions between customers and brands are meaningful and capable of fostering emotional connection. However, in the context of MSMEs in Semarang, the majority of respondents are micro and small business owners (83.4%) who likely face technological and digital knowledge limitations that hinder effective personalized message management. This is further supported by demographic data showing that only 16.7% of respondents have used AI for more than two years, reflecting relatively low digital maturity. Consequently, the messages delivered often lack contextual accuracy and fail to align with customer needs.

This result is consistent with several prior studies showing that message personalization does not always yield positive effects on customer engagement, particularly when its implementation lacks a deep understanding of audience behavior and preferences. Kruikemeier et al. (2020) found that excessive or inaccurate personalization may have negative effects, as customers tend to feel their privacy is being invaded or perceive the message as inauthentic. Similarly, An and Ngo (2025) emphasized that the effectiveness of message personalization largely depends on customer trust and perceived message relevance. In the case of MSMEs in Semarang, the limited impact of personalized messages may stem from a lack of technical capa-

bility in managing customer data and insufficient use of AI to analyze user context and emotional responses. Therefore, this study concludes that message personalization has a negative and insignificant influence on customer engagement, as non-contextual, less responsive, and emotionally weak personalization has not effectively encouraged customers to engage cognitively, emotionally, behaviorally, or through advocacy toward MSME brands in Semarang.

Based on the hypothesis testing results presented in Table 6, the relationship between Customer Engagement and Sales Growth shows a path coefficient of 0.387, a t-value of 5.326, and a p-value of 0.000, indicating a positive and significant relationship at the 0.05 significance level. This result implies that higher customer engagement levels lead to greater sales growth among MSMEs in Semarang. Customer engagement, measured through cognitive engagement, emotional engagement, behavioral engagement, and advocacy intention, plays a vital role in strengthening the relationship between customers and brands, which subsequently drives revenue increase, customer base expansion, repeat purchase rate, and market reach. According to the Customer Engagement Theory (CET) proposed by Brodie et al. (2013), meaningful and continuous interactions between customers and brands foster emotional loyalty that directly contributes to business performance. In the context of MSMEs in Semarang, most businesses operate in the culinary (31.7%) and fashion (21.7%) sectors, which rely heavily on customer interaction through digital platforms and social media. Furthermore, with 64.8% of respondents having more than one year of experience using AI, customer engagement can be strengthened through digital strategies that enable two-way communication, personalized customer experiences, and increased customer participation in brand promotion and advocacy.

This finding aligns with previous research emphasizing that customer engagement is a key factor in improving sales performance. Hollebeek and Macky (2019) found that customers who are cognitively and emotionally engaged are more likely to make repeat purchases and recommend the brand to others, directly contributing to sales growth. Similarly, Dessart (2017) confirmed that

strong customer engagement can expand the customer base through advocacy and positive word-of-mouth effects, particularly in digital environments. In the case of MSMEs in Semarang, actively engaged customers who provide feedback, share product-related content, and interact with brands on social media help expand market reach organically without high promotional costs. Therefore, this study reinforces the understanding that customer engagement has a positive and significant effect on sales growth, as high levels of engagement lead to increased revenue, purchase loyalty, and market expansion for MSMEs in Semarang.

Based on the mediation test results presented in Table 6, the indirect relationship between AI Adoption and Sales Growth through Customer Engagement shows a path coefficient of 0.276, a t-value of 2.942, and a p-value of 0.004, indicating a positive and significant relationship at the 0.05 significance level. This finding suggests that AI adoption can indirectly enhance sales growth among MSMEs in Semarang through improved customer engagement. In other words, the higher the level of AI adoption – reflected through perceived usefulness, ease of use, technological readiness, and intention to use – the stronger the MSMEs' ability to build customer engagement across cognitive, emotional, behavioral, and advocacy dimensions, ultimately driving revenue increase, customer base expansion, repeat purchases, and market reach. According to the Technology Acceptance Model (TAM) developed by Davis (1989), technology acceptance is determined by perceived usefulness and ease of use, which influence both intention and actual behavior in using the technology. In this context, MSMEs in Semarang that have integrated AI-based technologies such as ChatGPT into their marketing strategies can create more responsive and personalized customer interactions, thereby enhancing engagement and gradually contributing to sales growth. The fact that a majority of respondents (64.8%) have used AI for more than six months up to two years indicates increasing digital maturity, enabling more effective utilization of AI to improve communication efficiency and customer experience.

This finding is consistent with the Customer Engagement Theory (CET), which posits that customer engagement acts as a crucial mediating

mechanism linking technological interactions to business outcomes (Brodie et al., 2013). Borghi et al. (2023) support this view, showing that the use of AI in digital marketing strategies strengthens customer engagement through content personalization, timely responsiveness, and interactive experiences that enhance purchase intention and customer advocacy. Likewise, Dwivedi et al. (2021) found that AI technology adoption significantly improves business performance by increasing customer participation in digital ecosystems. In the context of MSMEs in Semarang, AI serves as a catalyst for building sustainable and high-value customer relationships. Customers who feel more attended to and experience interactive engagement tend to exhibit stronger loyalty and contribute to long-term sales growth. Therefore, this study confirms that AI adoption has a positive and significant influence on sales growth among MSMEs in Semarang through customer engagement, as the effective implementation of AI strengthens emotional and behavioral connections with customers, ultimately resulting in measurable sales growth and enhanced competitiveness in the digital era.

Based on the mediation analysis in Table 6, the indirect association between content creativity and perceived sales growth through customer engagement was positive but statistically insignificant ($\beta = 0.091$, $p = 0.152$). This finding suggests that although creative content may contribute to customer engagement, the resulting association with perceived sales growth is not sufficiently strong to achieve statistical significance within the present sample. According to the Customer Engagement Theory (CET) proposed by Brodie et al. (2013), customer engagement is formed through meaningful and emotional interactions between customers and brands. However, for MSMEs in Semarang, many businesses are still in the early stages of adopting digital marketing technologies and have yet to integrate content creativity with deeper communication strategies. Demographic data show that most MSMEs operate on a micro and small scale (83.4%) with limited resources, meaning their primary focus remains on production and sales rather than on optimizing digital content quality and consistency. This condition leads to creative content that is not strong enough to generate meaningful engagement that translates into increased sales.

This finding aligns with previous studies emphasizing that content creativity does not always result in improved business performance if not accompanied by targeted digital marketing strategies. Schivinski and Dabrowski (2016) found that while creative content can attract customer attention, without contextual relevance and communication continuity, it does not have a significant impact on purchasing decisions or customer loyalty. Likewise, de Vries et al. (2017) highlighted that creativity without active digital interaction tends to fail in generating meaningful engagement. In the case of MSMEs in Semarang, although 38.3% of respondents reported using AI for content creation, most have not utilized it to strengthen two-way interactions or consistently respond to customer feedback. As a result, the engagement formed remains superficial and does not translate into tangible sales growth. Therefore, this study concludes that content creativity has a negative and not significant influence on sales growth among MSMEs in Semarang through customer engagement, as creativity without relevance, continuity, and depth of customer interaction fails to create emotional and behavioral connections that can substantially drive sales performance.

Based on the results of the indirect effect analysis, the influence of message personalization on sales growth through customer engagement shows a path coefficient value of $\beta = -0.048$, with a t-statistic of 1.217 and a p-value of 0.224, indicating a negative and insignificant relationship. This finding suggests that although message personalization is expected to strengthen customers' emotional and cognitive connections to a brand, in the context of MSMEs in Semarang, its effect does not contribute meaningfully to sales growth through customer engagement. This can be explained through Customer Engagement Theory (CET), which emphasizes the importance of customer engagement as an outcome of meaningful interactions between customers and businesses. However, when message personalization is poorly targeted or culturally misaligned, it can create perceptions of intrusiveness or manipulation among customers, thereby reducing rather than enhancing engagement. Considering that most respondents are MSME owners with moderate education levels and limited technological proficiency, it is likely that message personalization efforts were not sup-

ported by a deep understanding of customers' digital behavior, resulting in ineffective engagement stimulation.

Furthermore, this insignificant result aligns with the findings of Kirk and Givi (2025), who discovered that AI-based message personalization does not always enhance customer engagement when not accompanied by strong contextual and emotional communication strategies. In the context of MSMEs in Semarang, this is reflected in the tendency of business owners to focus more on price and product promotions rather than building emotional connections through personally relevant messages. Consequently, even when customers re-

ceive personalized messages, they do not perceive a meaningful connection, which fails to encourage greater interaction, repeat purchases, or brand advocacy. From the perspective of the Technology Acceptance Model (TAM), this condition can also be interpreted as low perceived usefulness and perceived ease of use of personalization technologies, given that most MSMEs lack sufficient digital capabilities to optimally leverage customer data. Therefore, message personalization among MSMEs in Semarang has yet to serve as an effective link between customer engagement and sales growth, and in some cases, may even generate negative effects due to mismatches between message content, media, and customer preferences.

CONCLUSION

The findings indicate that AI adoption is positively associated with customer engagement among MSMEs in Semarang. Customer engagement, in turn, is positively associated with perceived sales growth. The mediation analysis further shows that customer engagement significantly mediates the association between AI adoption and perceived sales growth. In contrast, the indirect associations of content creativity and message personalization with perceived sales growth through customer engagement were not statistically significant. Therefore, the results suggest that customer engagement is an important mechanism through which AI adoption is related to perceived business performance. Given the cross-sectional design and self-reported measures employed in this study, these findings should be interpreted as associations rather than causal relationships.

THEORETICAL IMPLICATIONS

Grounded in Customer Engagement Theory (CET) and the Technology Acceptance Model (TAM), the results reinforce the theoretical proposition that technology adoption, perceived usefulness, and user acceptance significantly influence customer interaction quality and behavioral engagement. This study extends CET by demonstrating that engagement acts as a key mediator linking technological readiness to business performance. Furthermore, it contributes to TAM by validating that ease of use and intention to use AI technologies enhance engagement and drive organizational outcomes in the MSME context.

PRACTICAL IMPLICATIONS

Practically, the study suggests that MSMEs in Semarang should prioritize digital investment and capacity building in AI adoption, particularly in tools for data analytics, customer relationship management (CRM), and automated yet empathetic communication. Business owners should also emphasize training programs that enhance their understanding of AI-driven marketing and foster emotionally and contextually relevant engagement strategies. By doing so, MSMEs can improve customer experiences, strengthen loyalty, and achieve more consistent sales growth in a competitive digital marketplace.

LIMITATIONS AND FUTURE RESEARCH

This study has several limitations that should be considered when interpreting its findings. First, the research scope is limited to MSMEs in Semarang City, which restricts the generalizability of the results to

other regions with different socio-economic and digitalization characteristics. Second, the measurement of variables relies on respondents' perceptions, which may be influenced by subjectivity and limited understanding of technological concepts such as AI or message personalization. Third, the study employs a cross-sectional design, which does not capture the long-term causal relationships between AI adoption, customer engagement, and sales growth. Therefore, future research is encouraged to expand the geographical scope to the provincial or national level and employ longitudinal methods to analyze the dynamics of customer behavior in response to digital interventions. Additionally, future studies should integrate moderating variables such as digital capability or market competitiveness to gain deeper insights into how technological readiness and market intensity influence the effectiveness of AI-driven engagement strategies on MSME sales performance in Indonesia.

AUTHOR CONTRIBUTIONS

Conceptualization: Frans Sudirjo.
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ACKNOWLEDGMENT

The author would like to thank all survey participants who took the time to share information and advice, contributing significantly to the success of this study.

DECLARATION OF GENERATIVE AI STATEMENT

During the preparation of this manuscript, the authors used ChatGPT solely for language editing, grammar checking, and text refinement. ChatGPT was not used for data collection, data generation, statistical analysis, hypothesis testing, interpretation of findings, or preparation of conclusions without direct author review and verification. All analyses, interpretations, and final decisions regarding the content of the manuscript remain the sole responsibility of the authors.

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APPENDIX A

Table A1. Operational research variables

Variable	Indicators	Statement	Scale (Likert 1–5)
AI Adoption	Perceived Usefulness	ChatGPT helps improve my marketing performance and effectiveness.	1 = Strongly Disagree ... 5 = Strongly Agree
	Ease of Use	ChatGPT is easy to use for my daily business activities.	1–5
	Technological Readiness	I have adequate devices and internet access to use ChatGPT.	1–5
	Intention to Use	I intend to continue using ChatGPT for marketing activities.	1–5
Content Creativity	Originality	The content generated using ChatGPT is unique and different from competitors.	1–5
	Relevance	The content produced is suitable for my target audience.	1–5
	Emotional Appeal	The content created can evoke positive emotions in customers.	1–5
	Innovation	ChatGPT enables me to experiment with new marketing styles.	1–5
Message Personalization	Customer Relevance	My marketing messages match customer needs and preferences.	1–5
	Emotional Connection	Personalized messages make customers feel valued.	1–5
	Contextual Accuracy	Messages align with customer behavior or purchase history.	1–5
	Responsiveness	I can respond quickly to customer inquiries using ChatGPT.	1–5
Customer Engagement	Cognitive Engagement	Customers pay attention to my marketing content.	1–5
	Emotional Engagement	Customers feel emotionally connected to my brand.	1–5
	Behavioral Engagement	Customers actively interact (like, comment, share) with my content.	1–5
	Advocacy Intention	Customers are willing to recommend my business to others.	1–5
Sales Growth	Revenue Increase	My business revenue has increased after using ChatGPT.	1–5
	Customer Base Expansion	The number of new customers has increased.	1–5
	Repeat Purchase Rate	Customers frequently make repeat purchases.	1–5
	Market Reach	My digital marketing reaches a wider audience.	1–5