University of Tehran Press

Interdisciplinary Journal of Management Studies (IJMS) Online ISSN: 2981-0795

Home Page: https://ijms.ut.ac.ir

Driving Sustainable Marketing Success in SMEs through Artificial Intelligence Competencies: Do Marketing Innovation and Marketing Capabilities Matter?

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ARTICLE INFO

Article type:
Research Article

Article History:
Received: 21 April 2025
Revised: 26 October 2025
Accepted: 11 November 2025
Published Online: 01 November 2026

Keywords:
Sustainable marketing performance,
AI competencies,
Marketing innovation,
Marketing capabilities.

ABSTRACT

With marketing innovation and marketing capabilities as mediating factors, this study aims to explore how artificial intelligence (AI) competencies influence sustainable marketing performance. The research methodology is quantitative and descriptive-correlational. The target population comprises employees and managers of SMEs in Iran with a workforce of over 100 individuals. The required sample size for the statistical population of 423 was determined as 200 participants based on Morgan's table, and a non-probability convenience sampling method was employed. Data were collected through standardized questionnaires and analyzed using structural equation modeling with PLS-Smart 4 software. The findings show that AI competencies have a positive impact on innovation and marketing capabilities. Furthermore, AI competencies have a significant impact on sustainable marketing performance through the intervention of marketing innovation and marketing capabilities. The findings indicate that the use of artificial intelligence can, as a transformative factor, pave the way for these businesses to achieve competitive advantage and long-term success.

Cite this article: Hosseini, E. & Allafjafari, E. (2027). Driving Sustainable Marketing Success in SMEs through Artificial Intelligence Competencies: Do Marketing Innovation and Marketing Capabilities Matter?. *Interdisciplinary Journal of Management Studies* (*IJMS*), 20 (1), 183-205. http//doi.org/10.22059/Ijms.2025.393881.677582

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Publisher: University of Tehran Press.
DOI: http//doi.org/10.22059/Ijms.2025.393881.677582

1. Introduction

The concept of sustainability—integrating and balancing a company's social, economic, and environmental aspects—has garnered a lot of attention in recent years (Ahmed, Strielkowski, et al., 2024). Businesses are beginning to recognize that sustainability is essential to ongoing business expansion, and they are modifying their marketing strategies accordingly (Jung et al., 2020). To build shared value and achieve long-term success, SMEs that practice sustainable marketing incorporate socially responsible practices into their marketing strategies. This is because the incorporation of sustainable issues in marketing strategies has become an absolute necessity for survival and creating a competitive market advantage in the long term (Heinicke, 2018). Iran, characterized by distinctive attributes such as abundant natural resources, a youthful and educated workforce, and a semi-governmental economic framework aimed at performance-driven growth (Safari, 2018), generally faces relative underdevelopment in entrepreneurship and technology sectors. This challenge is particularly pronounced within technology-focused SMEs, which are crucial for fostering growth and development (Arabiun et al., 2025). Key issues include significant weaknesses in government policies and implementation strategies, underdeveloped commercial and legal infrastructures, limited financial resources, as well as low rankings in innovation indices and technological readiness (Safari, 2018). These deficiencies have also been highlighted in empirical studies, such as the Iranian Entrepreneurship Association report (2013). Compared to developed nations, countries like Iran are more vulnerable due to factors such as higher investment risks, lower capital inflows, reliance on tourism and exports, and less structured markets. Consequently, SMEs, especially startups, may be overlooked in these contexts (Salamzadeh & Dana, 2021). Notably, despite facing stringent sanctions and various constraints that heavily impact entrepreneurship, Iran's small and medium enterprises have still managed to grow (Arabiun et al., 2024). Therefore, despite making a significant contribution to the GDP of a nation, SMEs also have a negative influence on the environment, as they frequently do not integrate sustainable environmental practices into their operations and business plans (Rita et al., 2018). Moreover, small and medium-sized companies in Iran with strong financial systems and performance can mitigate the impact of sanctions and maintain themselves in the market (Hassanzadeh et al., 2024).

There is a claim that SMEs find it difficult and expensive to implement environmental practices. Remarkably, SMEs are responsible for roughly 70% of all pollution in the world, but only a tiny percentage of them—approximately 0.4%—account for environmental management system compliance. Consequently, to secure a better future for subsequent generations, SMEs need to adopt more environmentally friendly practices (Malesios et al., 2021). According to Dathe et al. (2024), SMEs can draw in an increasing number of customers who are interested in sustainably marketed goods, as the majority of consumers are prepared to pay more for eco-friendly purchases. Moreover, the correlation that exists between the performance of SMEs and sustainable marketing strategies emphasizes the significance of customer satisfaction, loyalty, and profitability in supporting sustainability initiatives within SMEs (Dathe et al., 2024).

Integrating sustainability into marketing decisions is crucial to achieving high performance and responsible organizational participation to support sustainable development. It is essential to make marketing decisions that are more sustainable and to use fewer resources while encouraging consumer behavior that supports sustainable development (Saura et al., 2021). According to Giustiziero et al. (2023), the resource-based view (RBV) in this context places a strong emphasis on utilizing a company's internal resources to identify assets, capabilities, and competencies that achieve high marketing performance and build a sustainable competitive advantage (Giustiziero et al., 2023).

A lot of today's marketers run their businesses using technology. AI Intelligence is a technology for increasing marketing capabilities that can boost output and add value by fostering creativity and opening up new avenues (Twyford et al., 2026). Given the unpredictability of results and the damaging effects of uncontrolled applications, it also presents a risk of negative economic, social, and environmental effects (Hussain et al., 2023). Large companies have benefited from the integration of this technology into a variety of sectors, and it now has the potential to completely change the operational dynamics of small and medium-sized enterprises (SMEs), opening up new avenues for growth and innovation in the face of unique obstacles (Ridho, 2023). That is because AI improves analytical abilities, data quality, and decision-making, which improves marketing performance and

results in more customer engagement, effective strategies, and long-term business growth (Sajili et al., 2024). While large companies across industries have already made progress in implementing AI applications, SMEs face unique challenges, particularly limited financial and human resources, that often prevent them from adopting AI solutions. SMEs typically operate on tight budgets and have limited access to capital, making it difficult for them to afford the expensive technologies needed for digital transformation (Schönberger, 2023).

However, the literature on AI in marketing is widely scattered, and the field is still in its infancy, with a significant amount of unexplored research. Previous studies have examined the impact of AI on marketing performance (Shaik, 2023; Wu & Monfort, 2023), but they have not given as much attention to the precise interactions between AI competencies, sustainability, and marketing performance. The majority of research concentrates on conventional metrics for measuring marketing success without taking sustainability into account. Researchers study innovation and capabilities marketing independently (Mikalef et al., 2023; Rasool et al., 2019). Moreover, different cultures prioritize values such as environmental responsibility, social equity, or economic growth differently. For example, in some cultures, community well-being and environmental stewardship might be deeply ingrained, making sustainable marketing more readily accepted (Paehlke, 2003). In others, short-term economic gains might take precedence, affecting the willingness to invest in sustainability (Feng et al., 2025) Cultural norms shape consumer expectations and responses to marketing messages. Sustainable marketing strategies that resonate in one cultural context may not be effective or even understood in another. Within SMEs, cultural attitudes toward innovation, risk-taking, and technology adoption vary. Some cultures encourage experimentation and openness to AI, while others may have resistance due to the fear of job loss, mistrust of technology, or hierarchical decision-making styles. Ignoring culture can lead to generalized conclusions that do not apply universally, reducing the practical relevance of the research (Hamdan & Aldhaen, 2024)

As the role of AI in enhancing performance becomes increasingly acknowledged, researchers like Abrokwah-Larbi and Awuku-Larbi (2024) have explored how AI impacts the financial performance, customer relations, internal business processes, and growth of SMEs. Similarly, Khan (2023) highlighted AI's positive influence on sustainable performance, focusing on organizational agility and environmental dynamics. Wu and Monfort (2023) concluded that the causal conditions of marketing capabilities, co-creation of customer value, market orientation, and AI marketing strategy are necessary and sufficient guidelines for higher performance. Limited research has examined the relationships among AI competencies, mediating capabilities, and marketing innovation and their effects on sustainable marketing performance in SMEs, particularly from the perspective of the resource-based view (RBV) theory. RBV is a theory that examines a company's internal resources and capabilities, which drive competitive advantage and overall performance. It assesses these capabilities and resources, analyzing their specific characteristics (Mansour et al., 2022). Research suggests that increased product and marketing innovation is a result of AI-assisted personalization for consumers (Anwar et al., 2025). Also, technological advances have a significant impact on innovation, which is a specialized type of technological eco-innovation that involves unique and highly improved services, processes, and products that reduce environmental risks and impact sustainability (Ahmed et al., 2021).

RBV posits that sustainable competitive advantage and performance can be achieved by integrating unique resources and capabilities developed within companies. Consequently, SMEs can achieve sustainable competitive advantage and performance if they effectively utilize their internal resources, such as marketing capabilities, along with related factors like personalization enhanced by AI (Abrokwah-Larbi & Awuku-Larbi, 2024). Since each of the mentioned researches has dealt with certain dimensions of the variables affecting the sustainable marketing performance of businesses, and there is a lack of research that has discussed the sustainable marketing performance concerning marketing innovation, marketing capabilities, and AI competencies, this research seeks to investigate the impacts of marketing innovation, AI competencies, and marketing capabilities. Consequently, this survey can add to the mainstream literature in the following manners: (1) it extends the sustainable marketing performance of technology-focused SMEs literature and relates it to marketing innovation, AI competencies, and marketing capabilities, and (2) examining the mediating effect of marketing innovation and marketing capabilities contributes to the components of the AI competencies and sustainable marketing performance of technology-focused SMEs. Furthermore, this study seeks to

implement a novel approach toward the sustainable marketing performance of technology-focused SMEs, thereby expanding the related literature. Therefore, to address these research gaps, this study proposes to integrate insights from the management and entrepreneurship literature. Therefore, this study examines the influence of AI competencies on the sustainable marketing performance of technology-based companies, with a particular focus on the mediating roles of marketing innovation and marketing capabilities. The present research seeks to address the question, what effect does AI competence have on sustainable marketing performance through the mediation of marketing capabilities and marketing innovation?

The remainder of the article elucidates the theoretical foundations, the structure of the theoretical model, and the development of hypotheses with a focus on the research variables. Finally, the research methodology and findings are presented, concluding with a discussion of the findings and offering recommendations.

2. Study Background and Hypotheses

AI competence is a creative ensemble that harmonizes technologies, market knowledge, and institutional structures as a coherent whole and fosters innovation (Mikalef et al., 2023). On the other hand, the concept of AI competence extends conventional thinking about the development of AI technologies by integrating their design and deployment within the organizational environment to facilitate value creation and competitive advantage (Lampropoulos, 2023). Despite the significant potential of AI technologies, Brynjolfsson et al. (2019) indicate that one of the primary reasons AI has not yet delivered the expected results is delays in implementation and restructuring (Brynjolfsson et al., 2019). On the other hand, AI, with its capabilities such as process automation, accurate data analysis and reduction of human errors, significantly increases the efficiency of marketing campaigns (Arun Kumar, 2021). For example, one could elaborate that by minimizing human error, AI systems provide cleaner, more accurate data, which in turn enables marketers to develop more sophisticated and reliable analytical tools. These tools can then generate deeper insights into customer behavior, market trends, and campaign effectiveness (Hamdan & Aldhaen, 2024). Therefore, by eliminating human error, AI ensures higher data accuracy and consistency, which forms the foundation for developing advanced marketing analysis techniques that rely on precise and reliable information. Consequently, SMEs can use this technology to develop advanced analytical solutions, such as targeting potential customers and accurately predicting consumer behavior. Additionally, they can create a contextual customer value proposition to achieve a sustainable experience in consuming products or services (Kushariyadi et al., 2024).

The effectiveness and efficiency of an organization's marketing activities concerning market-related goals, such as revenue, growth, and market share, can be defined as marketing performance (Chong & Ali, 2022). Sustainable marketing emphasizes the integration and advancement of long-term environmental, economic, and social objectives, which attracts customers and satisfies stakeholders' requirements (Sun et al., 2020). In contrast, sustainable marketing performance encompasses financial, social, and environmental sustainability to achieve long-term objectives and generate value through the company's balanced practices (Purnama, 2024). Therefore, experts have discussed sustainable marketing as a new perspective toward efficient resource use, which can provide the best value for customers and stakeholders while considering the long-term benefits for society, individuals, and the environment (Saura et al., 2021).

Sustainable marketing is the marketing of products and services that are environmentally sound, socially equitable, and economically viable over the long term (Haverila et al., 2026). It is oriented towards satisfying the needs of a firm’s multiple stakeholders—including customers, employees, communities, and shareholders—in a way that creates value for all without compromising the ability of future generations to meet their own needs (Belz et al., 2025). In contemporary marketing literature, sustainable marketing performance is measured through indicators such as increased sales volume, expanded market share, strengthened customer loyalty, and heightened brand awareness. These criteria indicate the organization's ability to maintain a competitive advantage and create sustainable value for customers (Adesoga & James, 2019).

From this perspective, sustainability means “continuing success in the marketplace,” not simply compliance with environmental principles. In other words, a marketing strategy is considered

sustainable when it can consistently attract demand, strengthen customer loyalty, and stabilize the organization's competitive position over time (Saura et al., 2021).

This interpretation is consistent with the sustainability from the customer's perspective approach, in which sustainability is measured through long-term relationships, trust, and customer-perceived value (Sun et al., 2020). The utilization of AI in sustainable marketing processes is expanding, and it has the potential to significantly improve an organization's marketing performance (Davenport & Kalakota, 2019). Organizations that can develop AI competency have a competitive advantage over their rivals. This is because AI is already adding value to customer experiences by developing new products, setting prices, and improving customer communications (Chaffey & Smith, 2022). Although considerable enthusiasm surrounds the potential business value of AI, organizations that have begun adopting AI solutions face numerous challenges that hinder them from realizing performance gains (Fountaine et al., 2019). Therefore, the first hypothesis of the research is defined as follows:

> **Hypothesis 1 (H1):** AI competencies have substantial impacts on sustainable marketing performance.

Marketing innovation is defined as significant changes in aesthetic designs, improved product packaging, new media channels, pricing, sales strategies, and the use of new technology (Monica & Soju, 2024; Quaye & Mensah, 2019). A company's innovative capacity enables it to generate concepts for new products that satisfy the current market demands. Hence, the organization must comprehend the market environment to optimize its performance and enhance its product innovation capabilities (Chatterjee et al., 2024). SMEs are also required to implement sustainability systems and tools because they face consequences such as financial instability, dissatisfied and unproductive employees, negative public perception, and environmental damage. To survive, these businesses must continuously improve their performance through innovation in their strategies (Álvarez Jaramillo et al., 2019).

In contemporary literature, marketing innovation is not limited to cosmetic changes in packaging or distribution channels; it increasingly includes marketing innovation processes driven by data and analytics (Chatterjee et al., 2024; Ransbotham et al., 2019). This approach defines marketing innovation as the redefinition of internal marketing processes through the use of data, advanced analytics, and digital technologies; processes that lead to more accurate decision-making, more effective campaign design, and improved marketing performance. In this study, marketing innovation means the application of data analytics and new technologies (including artificial intelligence) to redesign decision-making processes, optimize strategies, and improve the efficiency of marketing activities. This definition is consistent with the approach of Chatterjee et al. (2024) who measured marketing innovation through four dimensions: (1) the role of data analytics in improving processes, (2) the importance of process innovation in organizational performance, (3) the importance of data-driven decision-making in developing new processes, and (4) the role of leadership support in facilitating these transformations.

Such innovations rooted in a data-driven culture and the use of smart technologies, help organizations not only respond to current market needs but also maintain their competitive value in a dynamic and sustainable manner (Davenport et al., 2020; Ransbotham et al., 2019). Especially in SMEs, which have limited resources, data-driven marketing innovation processes can be a key strategy for achieving sustainable performance—as this approach allows for optimal resource allocation, reduced error costs, and increased accuracy in customer targeting (Mustak et al., 2021).

Therefore, AI acts not only as a technical tool but also as a driver for innovation in the very nature of marketing processes—processes that directly impact an organization’s ability to create sustainable value (Bezuidenhout et al., 2023; Cockburn et al., 2018).

Therefore, recent advances in machine learning, AI, and neural networks, as well as their ability to improve the performance of end-use technologies and the nature of the innovation process, will have a significant impact on innovation and the improvement of sustainable marketing performance. Thus, innovation across many market processes has the potential to impact sustainable development (Cockburn et al., 2018).

AI has the potential to deliver significant efficiencies and benefits by creating a better customer experience, simultaneously changing the nature of services, and directly influencing marketing practices with an emphasis on innovation (Bezuidenhout et al., 2023). Davenport et al. (2020)

indicated that the challenge of integrating AI projects with existing sustainable marketing processes requires innovation. Customers view AI as a business advantage, offering cost reductions, expanded service channels, innovative opportunities, and the potential to foster human creativity in marketing innovation (Mustak et al., 2021). Ransbotham et al. (2019) stated that a data-driven culture and the use of AI positively impact a company's marketing innovation, thereby improving its performance and providing a better competitive advantage in the current business environment. Therefore, the second and third hypotheses of the research are defined as follows:

Hypothesis 2 (H2): AI competencies have substantial impacts on marketing innovation.
Hypothesis 3 (H3): AI competencies have substantial impacts on sustainable marketing performance through the intervention of marketing innovation.

Marketing capabilities can be defined as integrated processes that are designed to use the company's necessary resources for market-related needs and enable the company to add value and meet competitive demands (Martin et al., 2020). SMEs utilize their existing resources to develop capabilities that add value to the company and enhance its competitiveness. Typically, SMEs have lean organizational structures and specific marketing capability sets that enable them to remain agile. These capabilities often focus on adapting to changing customer needs, enabling SMEs to develop more appealing online solutions compared to larger companies (Tolstoy et al., 2022). In addition, SMEs with higher levels of marketing capabilities are likely to successfully implement and integrate marketing strategies into their overall marketing plan, which can create competitive advantage and enhance marketing performance (Wang, 2020). The relationship between marketing capability and sustainable marketing performance is based on the idea that companies that invest in marketing capabilities are more likely to produce higher marketing performance. This is because these companies are better equipped to respond to changes in consumer behavior (Homburg & Wielgos, 2022). Additionally, companies with strong marketing capabilities are more likely to deliver highly personalized marketing messages that resonate with their target audience. This can lead to greater customer engagement, brand loyalty, and ultimately, increased profits and sustainable performance (Grewal et al., 2009).

SMEs have adopted artificial intelligence as a key tactical marketing strategy to facilitate successful real-time and data-driven marketing decisions (Gabelaia, 2022). Digitally oriented SMEs are adopting smart solutions to create a demanding customer experience. AI-based operational alternatives offer a powerful approach for SMEs to manage the extensive customer data they collect, thereby enhancing their insights into target markets (Abrokwah-Larbi & Awuku-Larbi, 2024).

Mikalef et al. (2023) demonstrated that AI competency can enhance marketing capabilities. Moreover, AI can create value in processes, which in turn can increase marketing capabilities and indirectly impact sustainable performance. On the other hand, marketing capabilities are the set of skills, resources, and techniques that allow an organization or business to effectively market its products and services (Zahara et al., 2023). The use of artificial intelligence can predict market demands, help companies manage their resources most optimally, and have a direct impact on marketing capabilities. Besides, the use of chatbots and other automated systems will help customers quickly respond to questions and receive their feedback, which can improve user experience (Liu et al., 2024) and promote sustainable marketing performance (Khan, 2023). In summary, previous research suggests that companies with strong marketing capabilities are better positioned to succeed in today's fast-paced and competitive business environment. It leads companies to a sustainable competitive advantage and sustainable marketing performance that drives long-term success and growth. Consequently, the fourth and fifth research hypotheses are formulated as follows:

Hypothesis 4 (H4): AI competencies have substantial impacts on marketing capabilities.
Hypothesis 5 (H5): AI competencies have substantial impacts on sustainable marketing performance through the intervention of marketing capabilities.

2-1. Iranian Context

Emerging markets are nations exhibiting traits of developed markets found in industrialized countries, yet do not meet the criteria required to be classified as developed countries. In these nations, industrial and social activities are expanding swiftly, leading to rapid industrialization. The numerous challenges in the financial system of Iran necessitate the sustainability of SMEs to address these issues. The technological framework of SMEs in Iran is centered on the management, implementation, and assessment of information pertinent to knowledge creation (Arabiun et al., 2024).

Nonetheless, this is contingent upon the ability of these companies to effectively implement knowledge management practices initially. The predominance of independent advanced companies indicates that when the principal concept is fragmented, the entire system is compromised or cannot maintain its original quality. Consequently, it is imperative for these companies to execute the performance process accurately (Zarea et al., 2026).

Data show that SMEs account for more than 80% of industrial activities in Iran, playing a crucial role in economic growth by tackling unemployment and improving income distribution nationwide (Arabiun et al., 2025). Over the past five years, SMEs have created 85% of new job opportunities, which are vital for driving innovation, economic progress, social advancement, and employment. Given the current economic situation in Iran and the significant contribution of SMEs to the resistance economy, it is vital to strengthen these industries to ensure sustainability and resilience against environmental challenges and fluctuations. However, Iranian statistics reveal a concerning trend for these businesses (Hosseini Fard et al., 2021).

In developing countries like Iran, SME management faces several challenges, including: (a) A lack of trust among employees: Trust is critical for employees to accept and engage with AI systems. Without trust, employees may resist using AI tools, fearing job displacement or questioning AI reliability, hampering effective AI adoption and utilization. Distrust can reduce collaboration and openness needed for sustainable initiatives, limiting innovation and long-term commitment to sustainability goals (Katyal, 2022).

(b) Restricted creativity and knowledge sharing: AI thrives on data and knowledge exchange. Limited creativity and poor knowledge sharing reduce the generation of innovative ideas and the effective use of AI-driven insights, weakening AI's potential benefits. Creativity drives sustainable solutions; without it, SMEs struggle to develop novel, eco-friendly, or socially responsible practices (Botega & Da Silva, 2020).

(c) An inappropriate hierarchical and governmental structure: Rigid hierarchies slow decision-making and reduce agility, making it difficult to implement AI innovations quickly. Governmental bureaucracy can restrict access to resources or support. Such structures hinder adaptive management and responsiveness, which are essential for integrating sustainability into business models (Cetina Presuel & Martinez Sierra, 2024).

(d) The absence of a comprehensive business model: Without a clear business model, SMEs lack strategic direction for AI investments, leading to inefficient or misaligned AI adoption. A well-designed business model is necessary to embed sustainability into core operations and marketing, ensuring long-term viability (Kanbach et al., 2024).

(e) A shortage of both material and intrinsic incentives: Lack of incentives reduces motivation among employees and management to learn, adopt, and optimize AI technologies. Incentives drive engagement in sustainability initiatives; their absence leads to low participation and commitment (Lin et al., 2018).

(f) Reduced enthusiasm for innovation: Innovation enthusiasm fuels exploration and experimentation with AI. Low enthusiasm results in resistance to change and missed opportunities for AI-driven improvements. Innovation is key to developing sustainable products and processes; reduced enthusiasm stalls progress (ElMadhi & Ait Nasser, 2024).

(g) Inadequate technical skills: AI adoption requires skilled personnel. A lack of technical expertise limits SMEs' ability to implement, maintain, and leverage AI tools effectively. Technical skills are also needed to develop and manage sustainable technologies and practices (Göranzon & Josefson, 2012).

(h) Low levels of hardware and software technology: Insufficient or outdated technology infrastructure restricts AI deployment and performance, limiting data processing, analytics, and

automation capabilities. Modern technology is often essential for monitoring and reducing environmental impacts; therefore, low tech levels impede sustainability efforts (Batra et al., 2019).

(i) Insufficient support from the government: Government support in funding, training, and infrastructure development is crucial for overcoming resource constraints and fostering AI adoption in SMEs. Its absence slows progress and increases risks. Government policies and incentives often drive sustainability standards and practices; lack of support reduces SMEs' ability to implement sustainable initiatives. These challenges collectively create significant barriers to both the adoption of artificial intelligence and the achievement of sustainable performance in SMEs. Lack of trust, skills, infrastructure, and support reduce SMEs' capacity to leverage AI's potential for innovation, efficiency, and sustainability.

Addressing these issues is essential for SMEs in developing countries like Iran to successfully integrate AI and sustainable practices into their business strategies (van Noordt et al., 2025). Consequently, SMEs can leverage AI to formulate marketing strategies and secure a competitive edge during the sanctions period in Iran. This technology enables SMEs to execute efficient marketing with constrained resources. Consequently, to advance towards a sustainable business model, innovative initiatives are essential for establishing a sustainable market (Chatterjee & Kar, 2020; Goni et al., 2021). Although sustainability is regarded as an essential concept in technology-based companies, there is an insufficient coverage of this topic by researchers in Iran.

3. Methodology

3-1. Research Design

It seems that there are a few studies on how artificial intelligence affects sustainable marketing performance. That is why we examine how the skills and capabilities of artificial intelligence may affect sustainable marketing performance. The research believes that having strong AI skills and capabilities can not only improve sustainable marketing performance but also help marketing and innovation capabilities. In this regard, a conceptual model has been provided to collect and analyze data to test ideas. By doing so, we hope to learn more about how to use AI tools and strategies, encourage innovative practices, and lead to better sustainable marketing performance. This knowledge can make a noticeable difference in theoretical and practical applications in the world of sustainable marketing. To help better explain the research, a conceptual model is presented in Figure 1.

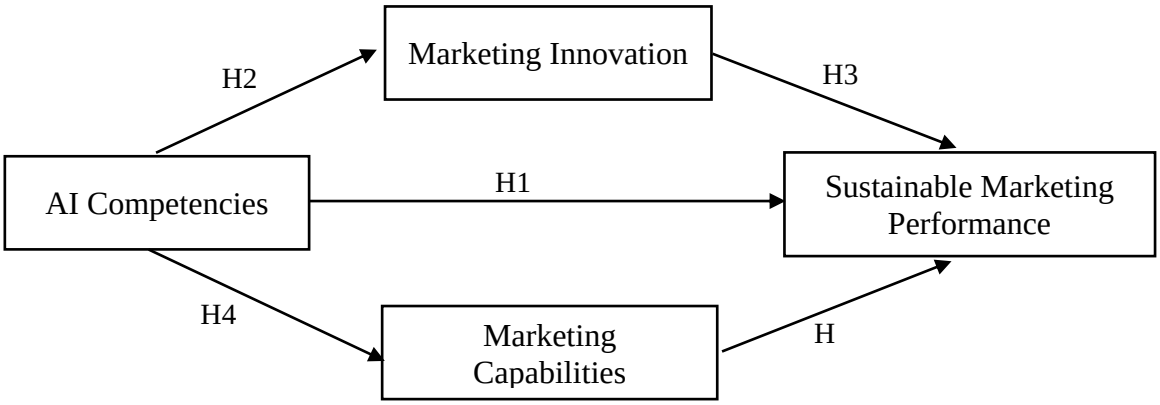


Fig. 1. The Conceptual Model

3-2. Measures and Data Collection Method

This study aims to examine the impact of AI competence on sustainable marketing performance, with a focus on the mediating role of marketing capabilities and innovation in small and medium-sized enterprises (SMEs) in Iran. We surveyed Iranian SMEs under the umbrella of some mega companies. Mega companies use AI agents and require their SMEs to use AI software. The experts who completed the questionnaires were affiliated with the human resources departments in these SMEs. The study population consisted of SMEs that faced various crises in their first three years and continued to remain in a sustainable environment. Among these companies are Digikala Company for using artificial intelligence in product recommendation systems, user behavior analysis, and service

intelligence; Snap Company for using artificial intelligence in routing algorithms, demand forecasting, and dynamic pricing; Petrochemical Industries Company for using artificial intelligence in predictive maintenance systems; Novin Kesht Iranian Company for intelligent agricultural product monitoring systems; Pars Agricultural Technology Company for plant disease diagnosis systems; Sahar Food Industries Company for automatic quality control, production process optimization, and other companies that use artificial intelligence for different applications. Therefore, the present study is applied nature and descriptive-correlational.

The statistical population of this study comprises employees and managers of SMEs in Iran, which includes 423 individuals. According to SEM guidelines, the sample size should be at least 5 to 10 times the number of questionnaire items. The sample size was determined using the Morgan table for a known population, resulting in a sample of 200 participants. Therefore, with an 18-item questionnaire, a minimum sample size of between 90 and 180 is recommended, and a sample size of 200 would satisfy this rule and provide an even greater margin (Hair et al., 2019). This research employed non-probability convenience sampling as its sampling method. To assess the variables, a standardized questionnaire was used, with all items scored on a five-point Likert scale, from "strongly disagree" (1) to "strongly agree" (5). The questionnaire was developed using the Porsline website in Iran. Participants received an email with a link to the questionnaire, along with confidentiality assurances, instructions to complete an informed consent form, and the option to withdraw from the study at any time (See Table 1). To test the hypotheses, structural equation modeling was employed using the statistical software SmartPLS4.

Table 1. Measurement Model Evaluation for Constructs

Variables and Items	Standard Dev.	Mean	Factor Loadings
AI Competencies **(Mikalef et al., 2023)**			
We are capable of and continue to experiment with new AI tools and techniques as necessary.	0.997	3.895	0.842
We have a climate that is supportive of trying out new ways of using AI.	0.987	3.550	0.803
We constantly seek new ways to enhance the effectiveness of AI use.	0.912	3.735	0.893
We constantly keep current with new AI innovations.	0.906	3.800	0.713
Marketing Innovation **(Chatterjee et al., 2024)**			
Data analytics plays an important role in improving existing processes.	0.968	4.915	0.662
Process innovation is important for improving overall firm performance.	0.916	4.090	0.819
Data-driven decision-making is important for developing new processes.	0.878	4.000	0.812
I believe that leadership support plays an important role in developing new processes.	0.914	3.650	0.615
Marketing Capabilities **(Mikalef et al., 2023)**			
It is useful in the effective allocation of marketing resources.	0.976	3.415	0.872
It is useful in organizing and delivering marketing plans.	0.978	3.410	0.846
It is useful for turning marketing strategies into action.	0.909	3.705	0.776
It is useful in the quick implementation of marketing strategies.	0.946	3.615	0.914
It is useful in monitoring marketing performance.	0.813	3.780	0.733
Sustainable Marketing performance **(Adesoga & James, 2019)**			
Sustainable marketing increases sales volume.	0.872	3.865	0.784
Sustainable marketing has a higher market share for the company.	0.809	3.740	0.760
Sustainable marketing causes customers to experience a higher degree of loyalty.	0.888	3.770	0.715
Sustainable marketing is effective in maintaining seller loyalty.	0.912	3.880	0.698
Sustainable marketing makes customers aware.	0.907	3.250	0.773

4. Data Analysis Techniques

4-1. Evaluation, Reliability, Validity

The validity and reliability of the questionnaire were measured to ensure the accuracy and accountability of the findings. For this purpose, content and construct validity indices were assessed. The content validity was measured based on professors' and practitioners' opinions, while the construct validity was assessed using structural equation modeling (SEM). Furthermore, the convergent validity was evaluated using the average variance extracted (AVE) index, and the divergent validity was evaluated using the square root of the average variance extracted index (Monfared et al., 2023). Researchers implemented Cronbach's alpha index and composite reliability

(CR) to measure the reliability of the proposed instrument. Cronbach's alpha index ranges between 0 and 1, where an obtained index of 0.7 or higher would be considered acceptable. On the other hand, CR reflects the reliability of each construct in correlation with other constructs. Appropriate CR index refers to any measured value of 0.7 or higher, which indicates acceptable internal reliability for the proposed model (Hosseini et al., 2025). Table 2 shows the attained values for each construct.

Table 2. Variables, Reliability, and Validity

Variables	items	Cronbach's alpha	rho-A	CR	AVE	R^2	Q^2
AI Competencies	1-4	0.832	0.862	0.887	0.665	---	---
Marketing Capabilities	5-8	0.888	0.911	0.917	0.690	0.523	0.348
Marketing Innovation	9-13	0.708	0.718	0.820	0.537	0.413	0.213
Sustainable Marketing Performance	14-18	0.802	0.809	0.863	0.558	0.641	0.340

The obtained value of 0.5 suggests that the research variables possess divergent validity. Furthermore, the square root of the average variance extracted for each variable is greater than the correlations with other variables. As these values are higher than those under the primary diagonal, the divergent validity of the variables is confirmed (Hosseini et al., 2025).

Table 3. Divergent Reliability

Variables	AI Competencies	Marketing Capabilities	Marketing Innovation	Sustainable Marketing Performance
IA Competencies	0.815			
Marketing Capabilities	0.723	0.831		
Marketing Innovation	0.643	0.515	0.733	
Sustainable Marketing Performance	0.713	0.711	0.653	0.747

Table 4. Heterotrait-Monotrait Ratio (HTMT)

Variables	AI Competencies	Marketing Capabilities	Marketing Innovation
Marketing Capabilities	0.795		
Marketing Innovation	0.807	0.611	
Sustainable Marketing Performance	0.841	0.803	0.848

Based on the findings and the outcomes of the SmartPLS4 software (Tables 2, 3, and 4), the validity (divergent and convergent) and reliability (composite reliability and Cronbach's alpha index) of the measurement model are acceptable.

The Variance Inflation Factor (VIF) is used to assess multicollinearity in a regression analysis. It reflects the impact of other factors on the behavior of a variable (Hosseini et al., 2025).

We examined all scales using the self-report technique to eliminate potentially common method bias in the research. Kock (2015) suggested that the proposed model would be considered free from bias if all variance inflation factors (VIFs), as determined by a comprehensive collinearity test, were equal to or less than 3.3. AI Competencies (VIF = 1.951), Marketing Innovation (VIF = 1.529), Marketing Capabilities (VIF = 2.818), and Sustainable Marketing Performance (VIF = 1.615) were all below the threshold of 3.3. This suggests that common method bias did not influence the model.

5. Results

The model fit was evaluated at measurement and structural levels. The structural fit of the model was assessed using different variables within the partial least squares regression, including the significance index (i.e., t-value) (Figure 2).

5-1. Coefficient of Determination (R^2)

R^2 is another criterion to measure the fit of the structural model, which is related to the latent and internal variables of the model. This criterion applies to dependent variables and evaluates the relationship between constructs. R^2 represents the impact of external variables on an internal variable, where the attained values of 0.19, 0.33, and 0.67 indicate weak, average, and strong evaluations of R^2, respectively (Hosseini et al., 2025). According to the findings, the obtained R^2 values for sustainable

marketing performance, marketing capabilities, and marketing innovation were 0.641, 0.523, and 0.413, respectively (Figure 3).

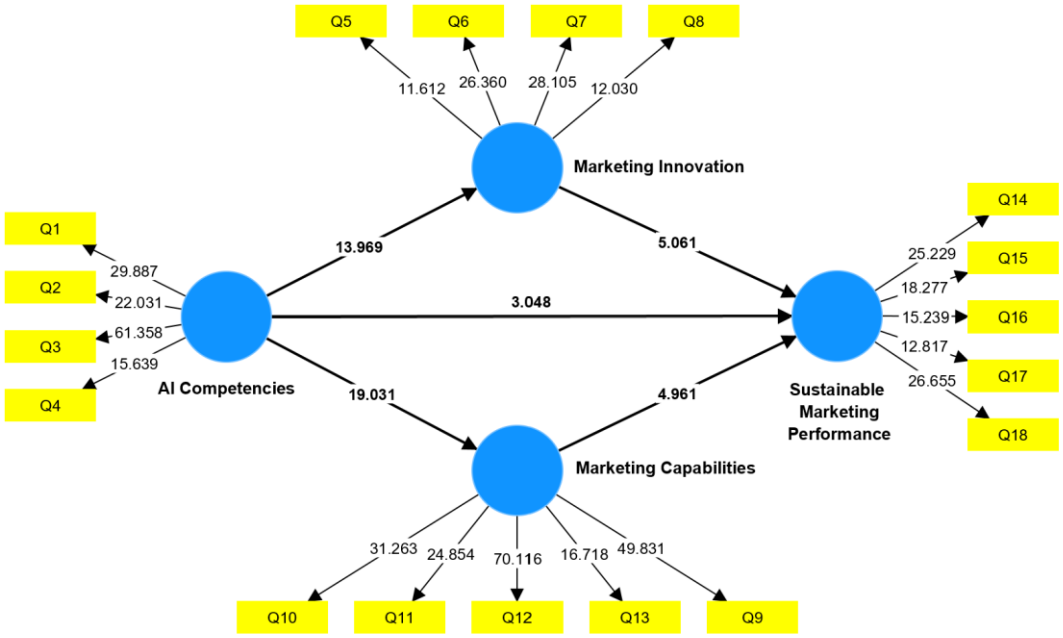


Fig. 2. T-value Coefficients

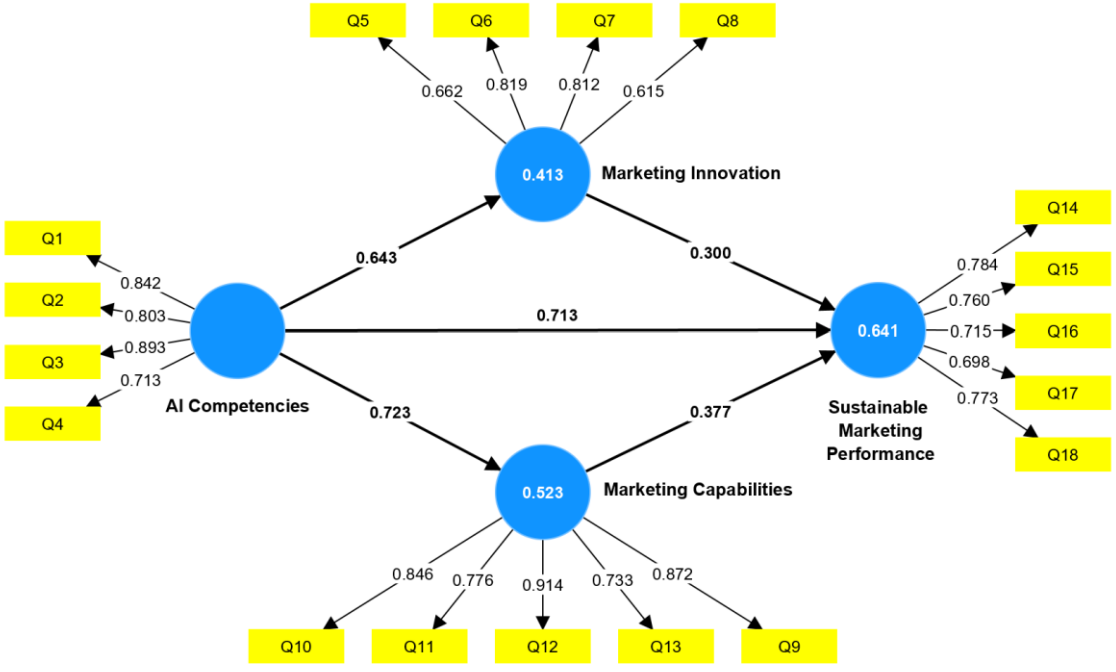


Fig. 3. Standard Factor Loading Coefficients of the Model

5-2. Predictive Relevance Criterion (Q^2)

The Q^2 criterion is calculated for all the dependent constructs and represents the product of the combined values of the research constructs and the values of the respective coefficients of determination (Ahmed, Streimikiene, et al., 2024). This criterion was measured at 0.348 for marketing capabilities, 0.213 for marketing innovation, and 0.340 for sustainable marketing performance. Accordingly, the fit of the structural model of the research is acceptable.

5-3. The Overall Fitness of the Model

The overall fit of the model includes measurement and structural fit. Therefore, the overall fit of the model is calculated using the goodness of fit (GOF) value. The attained values of 0.01, 0.25, and 0.36 represent weak, average, and strong indicators of GOF, respectively. Thus, the observed GOF value of 0.566 indicates a strong fit for the research model (Hosseini et al., 2025).

$$GOF = \sqrt{\text{average (Communality)} \times \text{average } (R^2)} = 0.566$$

Additionally, the Sobel test was employed to examine the mediating effects of marketing capabilities (3.484) and innovation (5.969). The results showed that z-values exceeding 1.96 indicate a significant positive influence (Table 5).

Table 5. Z-Value Coefficients and the Effect Size of Mediating Variables

Formula Hypotheses	Marketing Capabilities	Marketing Innovation
A	0.733	0.641
B	0.377	0.300
S_a	0.038	0.038
S_b	0.076	0.059
z-value	4.800	4.868

The attained VAF values for marketing capabilities (0.276) and for marketing innovation (0.212) reveal that the mediating variables have partial impacts. Overall, it can be concluded that the measurement and structural fit of the model are approved.

$$VAF = (a \times b)/ (a \times b) + c$$

We also calculated the standardized root mean square residual (SRMR) values to evaluate the model's fit. Scholars hold diverse opinions on this measure, with some advocating for values below 0.05 and others accepting values below 0.08 as sufficient. Generally, values under 0.1 are considered to indicate a satisfactory fit. Furthermore, we utilized the Normed Fit Index (NFI) to evaluate the model's fit, as its acceptable range spans from 0 to 1, with values above 0.9 being deemed satisfactory (Kline, 2023). According to Table 5, the obtained value is 0.910, which is also within an acceptable range.

Table 6. Fitness Indices

	Saturated Model	Estimated Model
SRMR	0.083	0.083
NFI	0.910	0.910

5-4. Testing the Research Hypotheses

Eventually, the t-value was used to examine the assumed relationships between the variables. According to Table 6, the t-value was confirmed for all the relationships. Based on the results, the obtained value for the path of the impact of AI competencies on sustainable marketing performance was 3.048, the impact of AI competencies on marketing innovation was 13.969, and the path of the impact of AI competencies on sustainable marketing performance through marketing innovation was 5.061. The path of the impact of AI competencies on marketing capability was 19.031, and the effect path of AI on sustainable marketing performance through marketing capability was 4.961. The critical value of the five paths at the 95% confidence level is greater than 1.96, which means that the paths are significant, the structural model is appropriate, and the five research hypotheses are confirmed.

The PLS-SEM algorithm was used to calculate the path coefficient of the structural model between − 1 and + 1, where the positive and highly correlated value is closer to + 1, and the negative and highly correlated value is closer to − 1. The closer the value to 0, the weaker the relationship. Based on the results, the coefficient of influence for the path of the impact of AI competencies on sustainable marketing performance was 0.713, the impact of AI competencies on marketing innovation was 0.643, and the effect path of AI competencies on sustainable marketing performance through marketing innovation was 0.300. The path of the influence of AI competencies on marketing capability was 0.723, and the path of the impact of AI on sustainable marketing performance through marketing capability was 0.377 (See Table 7).

Table 7. T-Vales and Research Variables Effect Size

Path	t-Statistics	Factor Loading	P-Values	Hypothesis Test
H1: AI competencies have substantial impacts on sustainable marketing performance.	3.048	0.713	0.002	Confirmed
H2: AI competencies have substantial impacts on marketing innovation.	13.969	0.643	0.000	Confirmed
H3: AI competencies have substantial impacts on sustainable marketing performance through the intervention of marketing innovation.	5.061	0.300	0.000	Confirmed
H4: AI competencies have substantial impacts on marketing capabilities.	19.031	0.723	0.000	Confirmed
H5: AI competencies have substantial impacts on sustainable marketing performance through the intervention of marketing capabilities.	4.962	0.377	0.000	Confirmed

6. Discussion

In recent years, companies have adopted sustainable marketing strategies in response to heightened focus on environmental and social issues (Dathe et al., 2024). In this context, artificial intelligence serves as a crucial instrument for data analysis and decision enhancement, thereby improving marketing performance. Marketing innovation, a critical element for the success of small and medium enterprises, enhances companies' abilities to deliver sustainable solutions, thereby improving marketing performance (Sajili et al., 2024). This research seeks to examine the influence of AI competencies on sustainable marketing performance, mediated by marketing innovation and marketing capabilities in small and medium-sized enterprises. All hypotheses were assessed using the PLS4 tool, and the results are as follows.

The initial hypothesis indicates that AI competencies positively influence sustainable marketing performance. The results of our study demonstrate a robust positive correlation between AI competencies and sustainable marketing performance in Iranian SMEs. Iranian SMEs operate under significant economic sanctions, which limit access to international markets and technologies. This constraint has driven many SMEs to innovate internally, leveraging AI to optimize limited resources and enhance marketing efficiency sustainably. The necessity to adapt to sanctions may amplify the positive impact of AI competencies on sustainable marketing, as firms rely heavily on data-driven decision-making to survive and grow. The Iranian government has increasingly prioritized digital transformation and the development of AI technologies as part of its national strategy. Supportive policies, funding, and infrastructure development have facilitated SMEs' adoption of AI tools, enabling them to implement more sustainable marketing practices that reduce waste, improve customer targeting, and enhance brand reputation. Iranian consumers are becoming more environmentally conscious and socially aware, creating a market demand for sustainable products and ethical marketing. SMEs with strong AI competencies can better analyze consumer data and tailor their marketing strategies to meet these evolving preferences, thereby improving sustainable marketing performance. Organizations that adeptly utilize AI technologies—such as predictive analytics, customer segmentation, and personalized marketing—exhibit enhanced results in their marketing initiatives. Research indicates that AI enhances data-driven decision-making, enabling businesses to react promptly to market fluctuations (Sajili et al., 2024). Our findings substantiate this concept, illustrating that SMEs utilizing AI capabilities can more efficiently identify sustainable marketing opportunities than those dependent on conventional methods. Studies indicate that AI improves customer engagement by providing personalized experiences (Chaffey & Smith, 2022). The beneficial influence of AI competencies on sustainable marketing performance in our research underscores this trend, suggesting that SMEs utilizing AI-driven strategies can cultivate stronger relationships with their customers, resulting in enhanced loyalty and brand advocacy. The literature highlights the efficiency improvements derived from the application of AI in marketing (Arun Kumar, 2021). Our findings support this viewpoint by demonstrating that SMEs with strong AI capabilities are more likely to optimize their marketing resources, leading to more sustainable practices that align with long-term business objectives. Small and medium-sized enterprises should employ a strategic methodology for integrating AI tools that correspond with their marketing goals. By concentrating on technologies

that augment customer insights and engagement, these enterprises can enhance their sustainable practices while fostering growth. These findings corroborate prior research, highlighting the significance of AI in improving decision-making processes and optimizing resource allocation (Abrokwah-Larbi & Awuku-Larbi, 2024). For instance, AI algorithms can forecast the timing and location of resource utilization by discerning customer needs, thereby significantly mitigating environmental impacts (Saura et al., 2021). The findings are consistent with studies by Sajili et al. (2024), Chaffey and Smith (2022), and Arun Kumar (2021). These studies also argue that AI helps reduce waste, increase efficiency, and strengthen ethical and sustainable relationships by providing accurate insights into consumer behavior, demand forecasting, and resource optimization.

The second hypothesis indicates that AI competencies positively influence marketing innovation. Organizations that proficiently employ AI technologies—such as machine learning, natural language processing, and data analytics—exhibit improved capacities to innovate their marketing strategies. These findings indicate that organizations possessing robust AI capabilities are more adept at formulating innovative marketing strategies, adjusting to evolving consumer preferences, and capitalizing on emerging market opportunities. Current literature suggests that AI can facilitate innovation by allowing organizations to rapidly analyze extensive data sets and extract actionable insights (Bezuidenhout et al., 2023). Our findings align with this viewpoint, illustrating that SMEs utilizing AI can more effectively identify market gaps and produce innovative marketing solutions compared to those employing conventional methods. Research highlights that AI improves customer insights via sophisticated data analytics, enabling businesses to customize their offerings more precisely (Lemon & Verhoef, 2016). Our study demonstrates that the advantageous influence of AI competencies on marketing innovation supports this idea, suggesting that SMEs employing AI tools can enhance their comprehension of consumer behavior and preferences, resulting in more innovative marketing campaigns. To leverage the identified positive relationship, Iranian SMEs should prioritize training programs designed to enhance AI competencies among their workforce. These enterprises can propel innovative marketing strategies by cultivating a workforce skilled in AI technologies. Small and medium-sized enterprises should promote experimentation with innovative marketing strategies informed by AI insights, enabling teams to pursue creative solutions without the apprehension of failure. By synthesizing insights from both research fields, we offer practical recommendations for SMEs aiming to utilize AI as a catalyst for marketing innovation. These contributions enhance theoretical comprehension and provide practical avenues for SMEs to prosper in a progressively competitive environment. The findings are consistent with Bezuidenhout et al. (2023) and Lemon and Verhoef (2016), as these studies show that, by analyzing large volumes of customer data (such as opinions, purchasing behavior, and digital interactions), AI enables organizations to discover hidden patterns and generate new ideas for products, messages, or marketing channels.

The third hypothesis posits that AI competencies positively influence sustainable marketing performance by mediating marketing innovation. This section facilitates discourse between our empirical findings and the extant literature, examining how AI competencies augment marketing innovation, propelling sustainable marketing performance in small and medium-sized enterprises (SMEs) in Iran. Our findings demonstrate that AI competencies directly affect sustainable marketing performance and indirectly promote marketing innovation (Cockburn et al., 2018). Small and medium-sized enterprises that proficiently employ AI technologies exhibit elevated levels of innovative marketing strategies, resulting in enhanced sustainability outcomes. This mediating effect underscores the essential function of marketing innovation as a mechanism by which AI capabilities improve sustainable marketing performance (Mustak et al., 2021). Our findings substantiate this concept, indicating that SMEs with strong AI capabilities are more inclined to innovate their marketing strategies. Marketing innovation enables companies to distinguish their products and convey sustainability to consumers effectively. The findings of our study corroborate this viewpoint, demonstrating that the innovative strategies formulated through AI competencies enhance the efficacy of sustainable marketing initiatives. To develop AI competencies, Iranian SMEs should implement an action plan consisting of three basic steps: first, holding specialized training courses on AI tools such as content optimization platforms (Persado), data analysis systems (Google Analytics 4), and smart chatbots; second, implementing pilot projects such as product recommendation systems, demand forecasting tools (Amazon Forecast), and customer sentiment analysis (Brand watch); and third,

developing infrastructure through cooperation with specialized accelerators (such as Avatech), forming multidisciplinary teams, and allocating a percentage of net profit to digital development. This plan is designed considering the resource constraints of Iranian SMEs and is fully feasible. This finding is consistent with the frameworks of Cockburn et al. (2018) and Mustak et al. (2021), as these studies argue that advanced technologies (such as AI) alone are not enough; rather, their impact is translated into sustainable performance through innovative processes—such as designing new sustainable messages or delivering customer experiences based on social values.

The fourth hypothesis indicates that AI competencies positively influence marketing capabilities. Small and medium-sized enterprises that adeptly utilize AI technologies demonstrate improved capabilities in customer segmentation, targeted communication, and campaign optimization. The findings indicate that AI competencies are essential for developing resilient marketing capabilities that can adjust to evolving market conditions (Wang, 2020). Our findings reveal that SMEs possessing advanced AI capabilities can more effectively categorize their customer base, resulting in more customized marketing strategies. Research demonstrates that AI improves targeting and personalization strategies, enabling businesses to provide pertinent content to distinct audience segments (e.g., via predictive analytics) (Liu et al., 2024). The findings corroborate this viewpoint, indicating that SMEs employing AI tools can enhance their marketing efficacy by generating personalized customer experiences. Iranian SMEs ought to prioritize investments in AI technologies that augment their marketing capabilities. This encompasses instruments for data analytics, customer relationship management (CRM), and automated marketing platforms that enable targeted campaigns. The findings are consistent with Wang (2020) and Liu et al. (2024), as these studies emphasize that AI provides the necessary infrastructure to enhance dynamic marketing capabilities—including intelligent customer segmentation, message personalization, and real-time campaign optimization.

The fifth hypothesis posits that AI competencies positively influence sustainable marketing performance through mediating marketing capabilities. Small and medium-sized enterprises that adeptly utilize AI technologies demonstrate enhanced marketing capabilities, including refined customer targeting and campaign optimization, which are directly linked to improved sustainability results. This mediating effect highlights the essential function of marketing capabilities as a conduit between AI competencies and sustainable marketing performance. Current literature demonstrates that AI technologies improve multiple marketing capabilities, such as customer segmentation and personalized communication (Mikalef et al., 2023; Rasool et al., 2019). Our findings corroborate this concept, indicating that SMEs possessing robust AI capabilities are more adept at formulating effective marketing strategies that tackle sustainability issues. Effective marketing strategies enable companies to articulate their sustainability initiatives clearly and engage consumers noticeably. Our findings corroborate this viewpoint, demonstrating that augmented marketing capabilities facilitated by AI result in more effective sustainable marketing initiatives. This viewpoint enhances the Resource-Based View (RBV) framework by emphasizing the dynamic interplay among technology, capability development, and sustainability. By incorporating sustainability into their fundamental marketing strategies—enhanced by AI insights—businesses can improve their overall performance while positively impacting environmental and social objectives. This finding is consistent with Mikalef et al. (2023) and Rasool et al. (2019). These studies show that functional marketing capabilities (such as precise targeting and effective communication) act as a bridge between technological investments and strategic outcomes.

7. Implications

7-1. Practical Limitations

Implementing AI solutions can be expensive, with costs varying widely depending on the complexity of the system. Basic AI tools like chatbots may cost between $5,000 and $50,000, while advanced custom AI systems can exceed $100,000 or more (Kerzner, 2025). In Iran, despite a national commitment of around $115 million to AI research and development, SMEs often struggle to allocate sufficient financial resources to adopt AI technologies due to broader economic difficulties and sanctions (Fatemi et al., 2024). This financial barrier limits their ability to invest in necessary hardware, software, and expert personnel. Although Iran benefits from a strong academic foundation and a growing number of AI researchers and developers, there remains a shortage of specialized

technical skills required for effective AI deployment, especially within SMEs (Atwood, 2025). This gap hinders the practical integration of AI tools, as SMEs may lack access to qualified AI engineers, data scientists, and machine learning experts needed to develop, maintain, and optimize AI systems. Fragmented AI ecosystems, inconsistent internet infrastructure, and insufficient government support in coordinating AI initiatives further complicate AI adoption. SMEs face difficulties accessing centralized AI platforms or affordable AI-as-a-Service models that could mitigate high upfront costs and technical barriers.

7-2. Theoretical Implications

In the theoretical context, researchers have investigated the impact of various factors on sustainable marketing performance. From among these, the study of AI variables (Davenport & Kalakota, 2019; Sajili et al., 2024), marketing capabilities (Manis & Madhavaram, 2023; Nath & Siepong, 2022), and marketing innovation (Harini et al., 2020; Sun et al., 2020) can be mentioned.

However, there are still gaps in these fields, and the current research deepens the existing studies with a completely different approach to studying the variables of AI competencies with the mediation of marketing capabilities and marketing innovation on sustainable marketing performance in SMEs.

This study employed a conceptual framework based on the Resource-Based View. Sustainable marketing performance is crucial for SMEs, as it supports long-term viability and increases competitive advantage in a market. BRV emphasizes the importance of efficient use and management of resources to achieve sustainable development, as SMEs often work with limited resources. Sustainable marketing practice encourages businesses to use their unique resources, such as innovative capabilities, in ways that are environmentally friendly, socially responsible, and economically viable (Abrokwah-Larbi & Awuku-Larbi, 2024).

Moreover, AI technology can optimize supply chain processes through managing resources by predicting demand, thereby reducing waste and ensuring sustainable use of resources (Sharma et al., 2022). This contributes to the overall sustainable marketing practice by minimizing the environmental impact. In addition, AI-enabled automation can simplify marketing processes, reduce manual effort, and allow SMEs to allocate resources more effectively (Peretz-Andersson et al., 2024). This may reduce operational costs and free up time for companies to innovate and focus on using marketing capabilities in sustainable ways.

Therefore, RBV posits that a firm's resources and capabilities are critical for achieving competitive advantage. The digital transformation of SMEs necessitates a reevaluation of what constitutes valuable resources. Digital competencies, such as data analytics and AI integration, emerge as essential capabilities that can differentiate firms in a crowded market. The findings from Iranian SMEs indicate that digital tools enhance operational efficiency and customer engagement, thereby broadening the scope of RBV to include digital resources as pivotal for competitiveness. This evolution challenges traditional views that primarily emphasize physical and human resources. Many SMEs in Iran face significant barriers to adopting digital technologies, such as limited financial resources, inadequate infrastructure, and cultural resistance to change. These challenges highlight the need for a more nuanced understanding of how external factors influence the adoption of digital transformation strategies. The Technology-Organization-Environment (TOE) framework complements RBV by addressing these external challenges, suggesting that successful digital transformation requires internal capabilities and favorable external conditions.

7-3. Practical Implications

Integrating AI competencies into sustainable marketing for SMEs in Iran can improve performance and foster sustainable practices. That is because SMEs can use AI tools to analyze local market data and identify trends in consumer preferences for sustainable products. This allows marketing strategies to resonate with the values of Iranian consumers and increase engagement and sales. AI can also help SMEs segment their audience based on preferences and behaviors, allowing personalized marketing campaigns (Ayub et al., 2023). On the other hand, the integration of AI in marketing strategies necessitates SMEs to revamp and reorganize their existing frameworks. This involves altering managerial and employee work practices, which in turn transforms the internal processes and structure of SMEs. Consequently, AI aids SME managers and owners in overcoming specific analytical

challenges related to customers and markets by leveraging machine learning to analyze extensive data sets. This enables SMEs to quickly adapt and deliver a distinctive customer experience, from acquisition to retention, thereby boosting their growth and performance (Abrokwah-Larbi & Awuku-Larbi, 2024).

On the other hand, SMEs can use marketing capabilities such as AI-based social media analytics to assess public sentiment on sustainability issues related to their products. This insight can inform marketing and product development strategies and ensure alignment with consumer expectations (Zarea et al., 2026). This interaction fosters stronger relationships and builds trust in the brand. With the support of AI competencies, SMEs can develop content that educates consumers about sustainability issues and the benefits of their products.

AI can facilitate cooperation among local SMEs with a focus on sustainability. Creating networks or platforms where companies share resources and data can strengthen their marketing impact and foster a collective commitment to sustainability. Furthermore, AI competencies for natural language processing can help SMEs create marketing content in Farsi that fits local cultural differences and ensures better communication with target audience. The ramifications of digital empowerment transcend theoretical constructs to encompass practical implementations within Iranian SMEs. The Iranian government has launched initiatives to promote digital transformation in SMEs, acknowledging their significance in national economic competitiveness. This assistance is essential for surmounting obstacles associated with technology adoption. Policies that facilitate access to digital tools and training can augment the capabilities of SMEs, allowing them to compete more effectively on both local and international stages. There is an urgent requirement for training programs that provide SME employees with vital digital competencies (Asaadi, 2023). Investing in human capital is essential for the effective utilization of new technologies. Ongoing educational programs can address the skill gap, ensuring employees are equipped to leverage advanced technologies, such as artificial intelligence and big data analytics. The implications highlight the need for specific government policies, skill development programs, and innovative strategies designed to address the distinct challenges encountered by Iranian SMEs. These contributions enhance theoretical comprehension and provide practical avenues for improving competitiveness in a progressively digital economy.

8. Conclusion

The integration of AI capabilities and competencies significantly affects sustainable marketing performance, acting through the mediating roles of marketing capabilities and marketing innovation. As organizations adopt AI technologies, they increase their ability to analyze market trends and consumer behavior, leading to more informed decision-making and increased efficiency. This synergy fosters innovative marketing strategies and contributes to sustainable practices that resonate with environmentally conscious consumers.

The findings emphasize the need for companies to invest in AI-based solutions and develop strong marketing capabilities to stay competitive in the evolving market; thus, achieving economic and environmental goals. In this area, the prominence of cultivating a culture of innovation is not overlooked. Embracing AI may equip companies with sophisticated tools to optimize their marketing efforts and foster a mindset of continuous improvement and adaptability. This cultural shift encourages teams to test new ideas and approaches. Ultimately, it will lead to groundbreaking marketing innovations that meet customer's demands and aligns with environmental values.

Studies emphasize that AI enhances firms' ability to process large volumes of consumer data, enabling personalized marketing and predictive analytics that improve customer engagement while reducing resource wastage—key components of sustainable marketing. Moreover, researchers highlight that AI-driven marketing innovation not only improves operational efficiency but also fosters the development of eco-friendly products and services by identifying consumer preferences for sustainability. However, integrating AI in SMEs faces challenges such as limited technical expertise, financial constraints, and organizational resistance. These barriers necessitate cultivating a culture of innovation and continuous learning, which the current study rightly identifies as critical for successful AI adoption. Furthermore, firms embedding AI within their marketing capabilities gain a competitive advantage by responding swiftly to market changes and aligning with evolving environmental standards.

In light of these insights, it becomes clear that incorporating AI into sustainable marketing strategies is not just an option but a strategic imperative. Companies should prioritize integrating AI technologies with their marketing capabilities to stay ahead of the competition. By doing so, they will contribute to the advancement of sustainable practices and take advantage of new opportunities for growth in an evolving digital landscape. As the discourse on sustainability continues to gain momentum, those who lead in AI-driven marketing will undoubtedly gain a significant competitive advantage and strengthen their position as leaders in innovation and environmental stewardship.

9. Limitations and Potential Areas of Future Studies

The present study has certain limitations that needs further investigation. This study concentrated on SMEs in Iran; therefore, it is recommended to apply the research model to other industries and compare the results. The study findings also disclose social, economic, commercial, and cultural conditions in Iran. Additional research in diverse contexts may further substantiate the findings. Moreover, Iranian markets may possess distinct requirements and preferences owing to cultural and social diversity. It could influence the adoption and execution of AI technologies in marketing. Economic fluctuations and international sanctions can impact SMEs' performance and capacity to adopt new technologies. Legislation and regulations regarding data and personal information usage in Iran may influence the execution of AI-based marketing strategies. This study examined the influence of AI capabilities and competencies on sustainable marketing performance, mediated by marketing innovation and capabilities. Consequently, forthcoming research may concentrate on the influence of knowledge frameworks regarding environmental matters on sustainable marketing efficacy through an AI methodology. Distributing tailored proposals for sustainable products can enhance customer loyalty and conversion rates. Similarly, the innovative deployment of AI chatbots on websites or social media platforms can enhance customer engagement by delivering prompt responses to inquiries regarding sustainable practices and products. Furthermore, AI capabilities in natural language processing can assist SMEs in generating marketing content in Farsi that aligns with local cultural nuances and enhances communication with target audience. It is also recommended to incorporate additional variables, including consumption patterns, feasible purchasing behavior, and sustainable trust, which facilitates enhancing the study methodology and evaluating a more comprehensive model. In addition to its geographical limitation (focusing on Iran), this study has methodological limitations that should be considered when interpreting the results. For example, the non-random (convenience) sampling method may cause bias in sample selection and affect the generalizability of the findings. Moreover, relying on a questionnaire increases the risk of respondent bias (the tendency to give socially acceptable answers). On the other hand, the cross-sectional nature of the data limits the possibility of examining causal relationships. It is suggested that future studies reduce these limitations by using random sampling methods, longitudinal data, and a mixed method (qualitative-quantitative).

Conflicts of Interest

The authors declare that there are no conflicts of interest in relation to this research.

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