Minnesota Journal of Business Law and Entrepreneurship

Volume 2026, No. 3

ISSN: 1540-3270

AI-Driven Digital Marketing and Sustainable Entrepreneurship: A Multi-Dimensional Entrepreneurial Learning Framework

Smita Poi

Vinod Gupta School of Management, Indian Institute of Technology Kharagpur

Abstract

Purpose: Artificial intelligence (AI) is increasingly transforming digital marketing practices and creating new opportunities for entrepreneurial ventures to engage customers and generate market insights. At the same time, entrepreneurs face growing pressure to balance economic performance with social and environmental sustainability. Despite these developments, existing research remains fragmented, with limited integration between AI-driven marketing capabilities, entrepreneurial opportunity recognition, customer engagement, and sustainable value creation. This study aims to develop a conceptual framework explaining how AI-driven digital marketing capabilities contribute to sustainable entrepreneurial growth through a dynamic entrepreneurial learning process.

Design/methodology/approach: This study adopts a conceptual research design that integrates insights from digital marketing, entrepreneurship, and sustainability literature. Building on theories of customer engagement, opportunity recognition, resource-based view, and dynamic capabilities, the study develops a multi-dimensional conceptual framework. The framework conceptualizes entrepreneurship as a dynamic learning system in which AI-driven digital marketing capabilities generate data-driven marketing intelligence, support entrepreneurial opportunity recognition, enhance customer engagement, and contribute to entrepreneurial competitive advantage and sustainable value creation.

Findings: The study proposes a multi-stage entrepreneurial learning framework linking AI-driven digital marketing capability, data-driven marketing intelligence, entrepreneurial opportunity recognition, customer engagement, competitive advantage, and sustainable value creation. The model suggests that AI-enabled marketing technologies enhance entrepreneurs' ability to interpret market signals and identify opportunities. These opportunities facilitate stronger customer engagement, which generates relational and informational assets such as brand trust, customer knowledge advantages, switching costs, and network effects. These mechanisms contribute to entrepreneurial competitive advantage, which in turn enables ventures to pursue sustainability-oriented strategies that generate economic, social, and environmental value. The framework also incorporates dynamic feedback loops that reinforce capability development and market learning over time.

Practical implications: The proposed framework provides guidance for entrepreneurs and small and medium-sized enterprises (SMEs) seeking to leverage AI-driven marketing technologies for sustainable growth. Entrepreneurs can enhance competitive positioning by investing in AI-enabled marketing analytics, strengthening customer engagement strategies, and using digital data to identify emerging opportunities. Policymakers may also support entrepreneurial ecosystems by promoting AI adoption, digital infrastructure development, and data-driven capabilities among SMEs.

Originality/value: This study contributes to the literature by integrating AI-driven digital marketing, entrepreneurial opportunity recognition, customer engagement, and sustainable entrepreneurship within a unified conceptual framework. By conceptualizing entrepreneurship as a multi-dimensional entrepreneurial learning system and introducing a capability–engagement–value perspective, the study provides a novel theoretical lens for understanding how AI-enabled marketing technologies can support sustainable entrepreneurial development in digital markets.

Keywords: Artificial intelligence; Digital marketing; Customer engagement; Opportunity recognition; Competitive advantage; Sustainable entrepreneurship

Minnesota Journal of Business Law and Entrepreneurship

Volume 2026, No. 3

ISSN: 1540-3270

Introduction

Artificial intelligence (AI) is rapidly transforming the global digital economy and reshaping how firms interact with customers, design marketing strategies, and compete in data-driven markets. Recent industry reports indicate that more than 55% of organizations worldwide have adopted artificial intelligence in at least one business function, with marketing representing one of the fastest-growing areas of application (McKinsey, 2023). AI-driven technologies such as predictive analytics, recommendation systems, conversational chatbots, and automated personalization algorithms enable firms to analyze large volumes of consumer data, automate marketing processes, and deliver highly tailored customer experiences. These technologies significantly enhance firms' ability to understand consumer preferences, anticipate demand patterns, and optimize marketing decisions (Davenport et al., 2020; Huang & Rust, 2021). As digital interactions between firms and customers increasingly occur through online platforms, AI-driven marketing capabilities are becoming a critical strategic resource for firms seeking to remain competitive in rapidly evolving digital markets.

At the same time, entrepreneurial ventures play a central role in economic development, innovation, and job creation worldwide. Small and medium-sized enterprises (SMEs) account for more than 90% of firms globally and generate approximately 50–60% of employment across both developed and emerging economies (OECD, 2022). In recent years, however, the expectations placed on entrepreneurial ventures have expanded significantly. Beyond generating economic growth, entrepreneurs are increasingly expected to contribute to broader societal goals, including environmental sustainability and social responsibility. These expectations are reflected in global initiatives such as the United Nations Sustainable Development Goals (SDGs), which emphasize the importance of sustainable business practices and responsible innovation in addressing pressing global challenges such as climate change, resource depletion, and social inequality.

The growing emphasis on sustainability has led to increasing scholarly interest in sustainable entrepreneurship, which refers to entrepreneurial activities that simultaneously create economic value while generating social and environmental benefits (Schaltegger & Wagner, 2011). Sustainable entrepreneurs seek to develop business models and innovations that address societal challenges while maintaining long-term economic viability. However, achieving such outcomes can be particularly challenging for entrepreneurial ventures. Compared to large corporations, startups and SMEs often face significant constraints related to limited financial resources, restricted access to advanced technologies, and insufficient market intelligence. These constraints can make it difficult for entrepreneurs to identify emerging opportunities, interpret rapidly changing consumer preferences, and develop sustainable competitive advantages.

In this context, advances in digital technologies—particularly AI-driven marketing systems—may provide new opportunities for entrepreneurial ventures to overcome these challenges. AI-enabled marketing technologies allow firms to collect and analyze large volumes of customer data generated through online interactions, social media engagement, digital transactions, and platform-based communication. By transforming these data into actionable insights, AI-driven marketing systems can enhance firms' ability to interpret market signals, identify emerging customer needs, and design targeted marketing strategies. Moreover, digital platforms facilitate continuous interaction between firms and consumers, enabling entrepreneurs to engage customers more directly and incorporate feedback into the development of products, services, and business models.

A growing body of academic research has begun to examine the role of AI and digital technologies in marketing and entrepreneurship. Studies on AI in marketing highlight how machine learning algorithms, predictive analytics, and marketing automation tools can improve marketing performance and customer relationship management (Davenport et al., 2020; Huang & Rust, 2021). Similarly, research on digital customer engagement emphasizes the importance of interactive communication, co-creation, and relational exchanges between firms and consumers in digital environments (Brodie et al., 2011; Hollebeek et al., 2014). In parallel, entrepreneurship research has long emphasized the importance of opportunity recognition, defined as the process through which entrepreneurs identify and exploit new market opportunities (Shane & Venkataraman, 2000; Shepherd & DeTienne, 2005). More recently, scholars have also explored how digital technologies influence opportunity recognition by increasing

entrepreneurs' access to information and enabling new forms of market sensing (Kreuzer et al., 2022).

Despite these advances, the existing literature remains fragmented. Most studies examine isolated relationships, such as the impact of AI adoption on marketing performance, the role of digital engagement in customer loyalty, or the contribution of entrepreneurial innovation to sustainability outcomes. However, relatively little research integrates these perspectives to explain how AI-driven digital marketing capabilities enable entrepreneurial ventures to generate sustainable value through market learning and customer engagement processes. In particular, the mechanisms through which AI technologies help entrepreneurs interpret market signals, recognize opportunities, develop competitive advantage, and ultimately achieve sustainable entrepreneurial growth remain insufficiently understood.

Addressing this gap, the present study proposes a conceptual framework that explains how AI-driven digital marketing capabilities contribute to sustainable entrepreneurial value creation through a multi-stage entrepreneurial learning process. The framework suggests that AI-enabled marketing technologies enhance firms' ability to generate data-driven marketing intelligence, which supports entrepreneurial opportunity recognition. Recognized opportunities allow ventures to develop more effective customer engagement strategies, which in turn generate relational and informational assets that strengthen entrepreneurial competitive advantage. Over time, these capabilities enable firms to pursue sustainable value creation, encompassing economic, social, and environmental outcomes.

By integrating insights from digital marketing, entrepreneurship, and sustainability research, this study makes several contributions. First, it extends the literature on AI in marketing by positioning AI-driven marketing capabilities as a strategic resource that supports entrepreneurial learning and opportunity recognition. Second, the study contributes to entrepreneurship research by explaining how digital marketing intelligence and customer engagement mechanisms translate into entrepreneurial competitive advantage. Third, the paper advances research on sustainable entrepreneurship by demonstrating how digital marketing capabilities can enable ventures to generate sustainable value through continuous market learning and customer interaction.

The remainder of the paper is organized as follows. Section 2 reviews relevant literature on artificial intelligence in digital marketing, digital customer engagement, and entrepreneurial opportunity recognition. Section 3 presents the proposed conceptual framework and develops a set of research propositions explaining the mechanisms linking AI-driven marketing capabilities to sustainable entrepreneurial value creation. Section 4 discusses the theoretical, managerial, and policy implications of the framework, and Section 5 concludes by outlining directions for future research.

1. Background

1.1 Artificial Intelligence in Digital Marketing

Artificial intelligence (AI) technologies are increasingly transforming digital marketing practices by enabling firms to analyze large volumes of consumer data, automate marketing processes, and enhance decision-making capabilities (Davenport et al., 2020; Huang & Rust, 2021). AI-driven tools such as predictive analytics, recommendation systems, and chatbots allow firms to better understand consumer preferences and deliver personalized marketing experiences (Verhoef et al., 2021). These technologies enable organizations to optimize marketing strategies and improve customer interaction across digital platforms (Lemon & Verhoef, 2016).

Recent research highlights the growing role of AI in supporting data-driven marketing strategies. For example, Behera et al. (2024) argue that AI-enabled e-marketing tools significantly enhance customer engagement by enabling personalized interactions, predictive insights, and automated customer communication. Similarly, Abrokwah-Larbi and Awuku-Larbi (2024) find that AI applications in marketing positively influence the performance of SMEs by improving customer relationship management and marketing efficiency.

AI-driven marketing capabilities also support broader digital transformation processes. Dfouf et al. (2025) describe AI-based data-driven marketing as a catalyst for digital business transformation, enabling firms to

leverage customer data to improve strategic decision-making and marketing responsiveness. These findings suggest that AI-driven marketing capabilities can serve as an important strategic resource that enables firms to better interpret market signals and respond to changing consumer demands (Barney, 1991; Teece, 2007).

1.2 Digital Customer Engagement

Customer engagement has emerged as a central concept in contemporary marketing research, particularly in the context of digital environments where firms and consumers interact continuously through online platforms. Customer engagement refers to the level of cognitive, emotional, and behavioral involvement that customers exhibit toward a brand or organization (Brodie et al., 2011; Hollebeek et al., 2014).

Systematic reviews highlight the increasing importance of customer engagement in digital marketing ecosystems. Srivastava et al. (2025) emphasize that digital customer engagement plays a critical role in building long-term relationships between firms and consumers, thereby contributing to value creation and competitive advantage. Similarly, Rasul et al. (2024) trace the evolution of customer engagement in the digital era and demonstrate that digital technologies facilitate greater interaction, participation, and collaboration between firms and consumers.

Digital communication strategies also significantly influence engagement outcomes. Salonen et al. (2024) show that timely digital content delivered along the customer journey can enhance engagement in B2B markets by improving the relevance and effectiveness of communication. In addition, Duffett and Maraule (2024) demonstrate that digital communication cues, such as emojis in marketing messages, can influence Generation Z consumers' engagement and purchase intentions.

Furthermore, AI-driven digital marketing tools are increasingly used to foster deeper customer engagement. By enabling real-time interaction, personalization, and predictive communication, AI technologies allow firms to deliver more relevant and interactive customer experiences (Huang & Rust, 2021; Behera et al., 2024). These findings suggest that AI-driven marketing capabilities play a crucial role in enhancing customer engagement in digital markets.

1.3 Digital Technologies and Entrepreneurial Opportunity Recognition

Entrepreneurial opportunity recognition is a central concept in entrepreneurship research, referring to the process through which entrepreneurs identify and exploit new market opportunities (Shane & Venkataraman, 2000; Shepherd & DeTienne, 2005). In recent years, digital technologies have significantly influenced how entrepreneurs recognize opportunities and interpret market signals.

Digital technologies improve access to information and enable entrepreneurs to analyze large volumes of data related to consumer behavior and market trends. Kreuzer et al. (2022) argue that digital technologies enhance opportunity recognition by increasing entrepreneurs' ability to detect emerging market needs and identify potential opportunities. By leveraging digital data and analytics tools, entrepreneurs can better understand consumer preferences and respond to changing market conditions.

Similarly, Sedighi and Hashemi (2025) demonstrate that communication visibility in digital environments facilitates entrepreneurial opportunity identification. Digital platforms allow entrepreneurs to observe consumer interactions, feedback, and market conversations, which can provide valuable insights into emerging opportunities.

These findings suggest that digital marketing technologies not only support marketing activities but also contribute to entrepreneurial learning processes by enabling entrepreneurs to generate market intelligence and recognize new opportunities.

1.4 AI-Driven Marketing and Sustainable Entrepreneurial Advantage

Recent research has also begun to explore the relationship between AI-driven marketing capabilities and sustainable business performance. AI technologies can improve firms' ability to optimize resource allocation, enhance marketing efficiency, and support sustainable business strategies (Gündüzyeli, 2024).

Hazra et al. (2025) propose an integrated framework that links AI-enabled marketing strategies with green competitive advantage and financial efficiency. Their findings suggest that AI-driven marketing analytics enable firms to improve operational efficiency while supporting environmentally responsible business practices. Similarly, AI-powered marketing systems can facilitate sustainable marketing innovation by enabling firms to better understand consumer preferences and develop market-responsive strategies.

In the context of entrepreneurial ventures, these capabilities can contribute to long-term sustainability by improving market competitiveness and enabling firms to adapt to dynamic market environments. Sustainable entrepreneurship emphasizes the creation of economic value while simultaneously generating social and environmental benefits (Schaltegger & Wagner, 2011). By integrating AI-driven marketing intelligence with customer engagement strategies, entrepreneurs can create sustainable value that balances economic performance with social and environmental considerations.

1.5 Research Gap and Conceptual Framework Development

Although previous studies have examined the impact of AI technologies on digital marketing and customer engagement, limited research has explored how these capabilities contribute to sustainable entrepreneurship. Prior research has examined artificial intelligence in marketing (Davenport et al., 2020; Huang & Rust, 2021), digital customer engagement (Brodie et al., 2011; Hollebeek et al., 2014), and entrepreneurial opportunity recognition (Shane & Venkataraman, 2000). However, these research streams have largely evolved independently.

Existing studies typically focus on isolated relationships such as AI adoption and firm performance or digital marketing and customer engagement. However, the mechanisms through which AI-driven marketing capabilities enable entrepreneurs to generate sustainable value through market learning and customer engagement remain underexplored.

Addressing this gap, the present study proposes a conceptual framework that integrates AI-driven digital marketing capabilities, data-driven marketing intelligence, customer engagement, entrepreneurial competitive advantage, and sustainable value creation. The proposed framework aims to explain how AI technologies enable entrepreneurs to interpret market signals, engage customers more effectively, and ultimately achieve sustainable entrepreneurial growth. Table 1 summarizes the key contributions and limitations of prior studies and highlights how the present study addresses these gaps.

Entrepreneurial Learning in AI-Enabled Digital Markets

The process of entrepreneurial learning in digitally enabled markets is cyclical in nature whereby ventures consistently gather digital market signals, interpret them and adapt capabilities for value creation sustainably. Using AI-enabled tools like predictive analytics, recommendation engines and sentiment analysis, entrepreneurs can detect weak signals arising from interactions on consumer, social media and platform level. This helps increase market visibility (Kreuzer, Hanelt & Kolbe, 2022). The signals are interpreted as customer and competitor information, thus creating the foundation for opportunity recognition, which is a core concept in entrepreneurship (Shane & Venkataraman, 2000). The opportunities are validated by tests of the customer-facing responses like digital campaigns and prototypes, where engagement results lead to relational and informational resources that create competitive advantages (Brodie, Hollebeek, Jurić, & Ilić, 2011; Hollebeek, Glynn & Brodie, 2014). Ventures learn from the engagement responses and test their assumptions and capabilities in order to be in line with sustainability considerations (Schaltegger & Wagner, 2011). New studies highlight that AI is not just an efficiency marketing instrument but rather a dynamic capability which impacts entrepreneurial cognition and

learning and allows ventures to adapt and pursue economic, social and environmental outcomes (D'Angelo, Cavallo, Messeni Petruzzelli & Frattini, 2025; Bhatia, Sarumi & Giuggioli, 2025).

Table 1 : Research Gaps and contribution of this paper (adapter from prior literature)

Stream	**Main Focus**	**✓ Explains**	**✗ Misses**	**Contribution of this Paper**
AI in Marketing Analytics	Algorithmic bias, predictive analytics, personalization	✓ Enhances marketing analytics, efficiency, personalization (Akter et al., 2023; Yaiprasert & Hidayanto, 2023)	✗ Does not connect AI intelligence to entrepreneurial learning or sustainability	Provides technological capability base and highlights ethical/regulatory dimensions
Customer Engagement	Interaction, loyalty, co-creation	✓ Explains mechanisms of customer involvement and trust-building (Brodie et al., 2011; Hollebeek et al., 2014)	✗ Often treated as an outcome, not a learning input	Shows how engagement generates feedback loops and proprietary knowledge
Opportunity Recognition	Identifying and exploiting opportunities	✓ Explains entrepreneurial cognition, prior knowledge, foreign market knowledge (Shane & Venkataraman, 2000; Kreuzer et al., 2022; Mostafiz et al., 2023)	✗ Limited integration with AI-driven data streams and sustainability imperatives	Connects AI-enabled market intelligence to entrepreneurial discovery and export performance
Entrepreneurship Education & AI	AI-driven innovation, clustering, dynamic capabilities	✓ Shows how AI reshapes entrepreneurship education and student ventures (Zhang, 2025; Gong et al., 2025; Vecchiarini & Somia, 2023; Nuseir et al., 2020)	✗ Focuses on education contexts, less on venture-level sustainability outcomes	Demonstrates how AI enhances entrepreneurial learning routines and capability development
Dynamic Capabilities & Ecosystems	Ecosystem emergence, marketing technology, adaptive routines	✓ Explains how dynamic capabilities shape ecosystem formation and adaptation (Råve et al., 2026; Li et al., 2025)	✗ Case-based insights, less integration with AI-driven entrepreneurial learning	Provides umbrella theory for positioning AI-driven marketing as sensing, learning, and reconfiguring capability

Sustainable Entrepreneurship	Economic, social, environmental value creation	✓ Explains how ventures align innovation with sustainability and circular economy practices (Schaltegger & Wagner, 2011; Cai et al., 2026)	✗ Often treated as an end outcome, not embedded in opportunity recognition and learning	Provides normative anchor for embedding sustainability into the learning loop
Entrepreneurial Learning	Recursive sensing, interpreting, adapting	✓ Explains how ventures learn from feedback and uncertainty (D'Angelo et al., 2025; Bhatia et al., 2025)	✗ Underexplored in AI-driven markets	Central theoretical construct — explains how AI enables recursive market learning for sustainable value

2. Conceptual Framework

Building on the preceding literature review, this study proposes a multi-dimensional entrepreneurial learning framework that explains how AI-driven digital marketing capabilities contribute to sustainable entrepreneurial value creation. The framework integrates insights from digital marketing, entrepreneurship, and sustainability research to explain how technological capabilities enable entrepreneurial ventures to interpret market signals, engage customers, and generate long-term value.

Rather than conceptualizing entrepreneurial development as a simple linear sequence of cause–effect relationships, the framework views it as a dynamic and recursive learning system in which technological capability, market learning processes, and value creation outcomes continuously interact. This perspective is consistent with dynamic capability theory, which emphasizes the role of sensing, learning, and adapting capabilities in rapidly changing environments (Teece, 2007).

In digitally mediated markets, firms generate and analyze large volumes of customer data through online platforms, digital transactions, and social interactions. Artificial intelligence technologies allow firms to transform these data streams into actionable insights regarding consumer preferences, emerging trends, and market dynamics (Davenport et al., 2020; Huang & Rust, 2021). Consequently, AI-driven digital marketing systems do not merely automate marketing activities but function as strategic capabilities that support entrepreneurial learning and opportunity discovery.

The proposed framework is organized around three interrelated dimensions.

The first dimension is AI-driven digital marketing capability, which captures the technological ability of entrepreneurial ventures to deploy analytics systems, personalization algorithms, predictive marketing tools, chatbots, and automated communication technologies. These capabilities allow firms to collect and analyze large volumes of customer data and improve their responsiveness to changing market conditions (Davenport et al., 2020; Verhoef et al., 2021).

The second dimension is market learning intensity, which reflects the venture's ability to generate data-driven marketing intelligence, interpret customer signals, and develop meaningful customer engagement. Market learning emerges through continuous interaction between firms and consumers, allowing ventures to accumulate knowledge regarding consumer behavior and preferences (Brodie et al., 2011; Hollebeek et al., 2014).

The third dimension is entrepreneurial value creation, which refers to the extent to which technological capabilities and market learning processes translate into entrepreneurial competitive advantage and sustainable value creation.

This perspective aligns with the resource-based view of the firm, which suggests that firms achieve competitive advantage through the development of valuable and difficult-to-imitate capabilities (Barney, 1991).

Importantly, these three dimensions form a co-evolving system rather than independent constructs. AI-driven marketing capabilities enhance marketing intelligence and improve the firm's ability to detect market signals. Customer engagement generates behavioral data that enriches marketing intelligence and strengthens learning processes. Over time, these learning processes contribute to the development of entrepreneurial competitive advantage, which enables firms to reinvest in technological capability and pursue sustainability-oriented strategies.

Accordingly, the proposed framework can be interpreted as an entrepreneurial learning architecture characterized by interaction, reinforcement, and adaptation.

Legal & Policy Framework

The incorporation of AI-powered digital marketing within the entrepreneurial process is characterized by several legal and regulatory implications. For instance, data protection regulations such as GDPR (in the EU) and digital governance mechanisms in the US and India present legal requirements on how entrepreneurs should collect, process, and use consumer information. Moreover, problems relating to algorithmic biases, transparency, and accountability neccesitate the urgency of having regulatory oversight in order to prevent any potential harm to consumers or the creation of unfair competition.Hence, it becomes evident that from a business law perspective, these trends indicate the necessity of embedding compliance and sustainable governance into the entrepreneur learning system.

By situating AI-driven entrepreneurial learning within this broader legal-policy context, the framework emphasizes that sustainable value creation is not only an economic and social imperative but also a matter of regulatory compliance and responsible governance. The following section presents the core integrative model that illustrates these interactions.

2.1 Core Integrative Model

To capture the overall structure of the entrepreneurial learning system, the study proposes a core integrative model linking AI-driven marketing capability, data-driven marketing intelligence, opportunity recognition, customer engagement, entrepreneurial competitive advantage, and sustainable value creation.

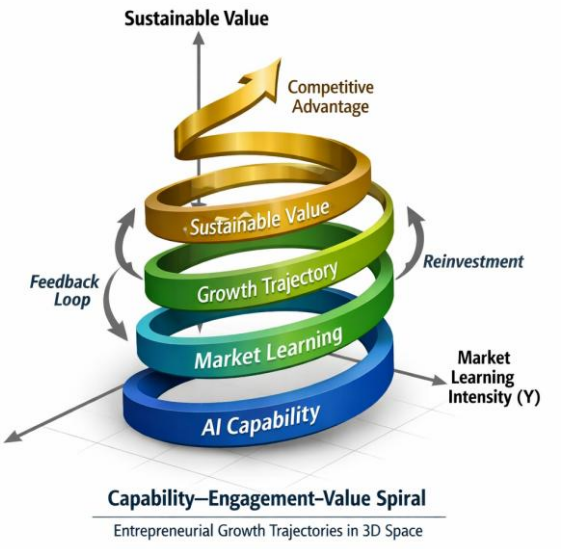

Figure 1: Core Integrative Model

Figure 1 presents the core integrative model of AI-driven entrepreneurial learning and sustainable value creation. It demonstrates how AI-enabled marketing capabilities generate data-driven intelligence that supports opportunity recognition, which in turn strengthens customer engagement. These mechanisms build competitive advantage and enable ventures to pursue sustainability-oriented strategies. The model highlights the recursive nature of entrepreneurial learning, showing that capability, engagement, and value creation continuously reinforce one another in dynamic digital markets.

The model suggests that AI-driven digital marketing capabilities enhance the venture's ability to generate data-driven marketing intelligence, which supports the identification of emerging market signals and entrepreneurial opportunities. Opportunity recognition represents a central process in entrepreneurship research, describing how entrepreneurs identify and exploit new market possibilities (Shane & Venkataraman, 2000; Shepherd & DeTienne, 2005).

Recognized opportunities are translated into customer-facing strategies that strengthen customer engagement. In digital markets, engagement reflects the cognitive, emotional, and behavioral interactions between firms and consumers that contribute to relational value creation and long-term customer relationships (Brodie et al., 2011; Hollebeek et al., 2014).

Sustained customer engagement contributes to the development of entrepreneurial competitive advantage, which enables firms to differentiate themselves from competitors and establish stronger market positions. Competitive advantage subsequently supports sustainable value creation, allowing firms to pursue strategies that generate economic, social, and environmental value simultaneously (Schaltegger & Wagner, 2011).

The model also incorporates dynamic feedback loops reflecting the recursive nature of entrepreneurial learning in digitally enabled markets. Customer engagement generates new behavioral data that enriches marketing intelligence. Entrepreneurial competitive advantage enables firms to reinvest in AI-driven marketing technologies, strengthening technological capability. Similarly, sustainable value creation provides additional resources that allow ventures to expand their digital capabilities and pursue further innovation.

Propositions from the Core Model

P1
AI-driven digital marketing capability positively influences data-driven marketing intelligence.

P2
Data-driven marketing intelligence positively influences entrepreneurial opportunity recognition.

P3
Entrepreneurial opportunity recognition positively influences customer engagement.

P4
Customer engagement positively influences entrepreneurial competitive advantage.

P5
Entrepreneurial competitive advantage positively influences sustainable value creation.

P6
Customer engagement positively reinforces data-driven marketing intelligence through feedback mechanisms.

P7
Entrepreneurial competitive advantage positively reinforces AI-driven digital marketing capability development.

P8
Sustainable value creation positively reinforces AI-driven digital marketing capability development over time.

2.2 Mechanism Model 1: Data-Driven Marketing Intelligence and Opportunity Recognition

Entrepreneurial opportunity recognition represents one of the most critical processes through which new ventures identify and exploit market opportunities. In traditional entrepreneurship research, opportunity recognition has been associated with prior knowledge, entrepreneurial cognition, and environmental scanning (Shane & Venkataraman, 2000; Shepherd & DeTienne, 2005). However, in digitally mediated markets, opportunity recognition increasingly relies on the analysis of large volumes of customer data and digital interaction patterns.

AI-driven marketing systems enable firms to transform raw customer data into data-driven marketing intelligence, which provides entrepreneurs with insights into consumer behavior, emerging trends, and unmet needs. Marketing intelligence therefore functions as an informational foundation that supports the opportunity recognition process.

Digital marketing platforms continuously generate large amounts of data through customer interactions, online transactions, browsing behavior, and social media engagement. When analyzed effectively, these data streams allow entrepreneurs to detect shifts in consumer preferences and identify gaps in existing offerings (Kreuzer et al., 2022).

Through predictive analytics, machine learning algorithms, and recommendation systems, firms can detect patterns within customer data and generate insights regarding potential market opportunities. These insights allow entrepreneurs to identify new value propositions and develop innovative products, services, or business models.

Consequently, data-driven marketing intelligence enhances entrepreneurial opportunity recognition by enabling entrepreneurs to detect market opportunities more quickly and accurately.

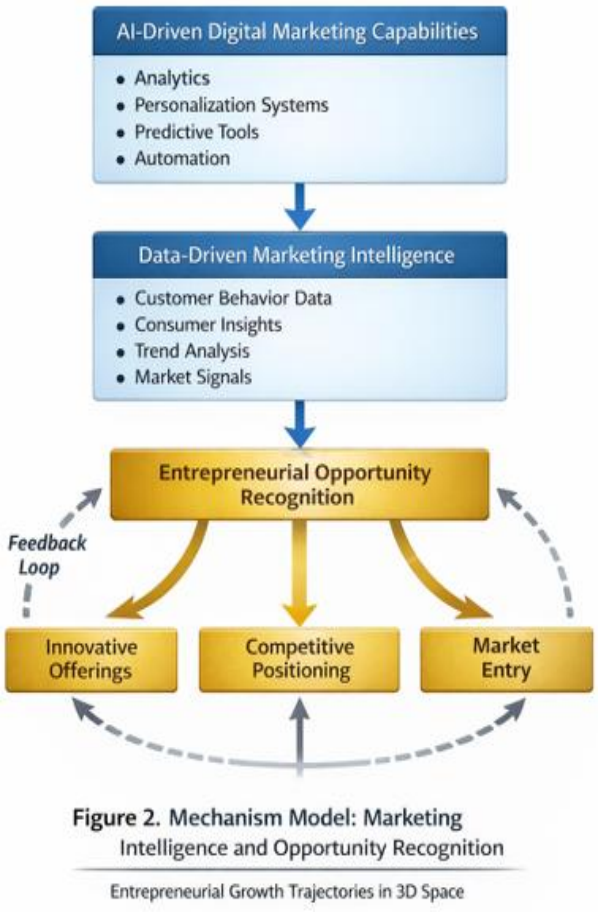

Figure 2. Mechanism Model: Marketing Intelligence and Opportunity Recognition

Entrepreneurial Growth Trajectories in 3D Space

Figure 2 illustrates the sub-components of the entrepreneurial learning system. It highlights how AI-driven marketing capability, market learning intensity, and sustainable value creation interact as reinforcing dimensions. This breakdown clarifies the internal logic of the framework and shows how each element contributes to the recursive learning cycle that underpins entrepreneurial advantage.

Research Propositions

P2a
Data-driven marketing intelligence positively influences market signal detection.

P2b
Market signal detection positively contributes to consumer insight generation.

P2c
Consumer insight generation positively influences opportunity identification.

P2d
Opportunity identification positively contributes to entrepreneurial opportunity recognition.

2.3 Mechanism Model 2: Customer Engagement and Entrepreneurial Competitive Advantage

Customer engagement has emerged as a central concept in digital marketing research, particularly in environments where firms and consumers interact continuously through online platforms and social media channels. Customer engagement refers to the cognitive, emotional, and behavioral involvement of customers in their interactions with a firm or brand (Brodie et al., 2011; Hollebeek et al., 2014).For entrepreneurial ventures, customer engagement represents an important mechanism through which relational interactions can be transformed into strategic assets. Rather than functioning solely as a marketing outcome, engagement generates several intermediate mechanisms that contribute to the development of entrepreneurial competitive advantage.First, customer engagement contributes to the development of brand trust. Frequent interactions between firms and customers increase familiarity and credibility, thereby reducing perceived risk and strengthening customer confidence in the brand.Second, engagement generates a customer knowledge advantage. Continuous interaction with customers allows firms to accumulate proprietary insights regarding consumer preferences, behaviors, and usage patterns that competitors may find difficult to replicate.Third, engagement can create switching costs, as customers develop emotional or functional ties to a brand that reduce their likelihood of switching to competing alternatives.Fourth, engagement can generate network effects within digital communities. As the number of engaged users increases, the value of the brand community or digital platform increases, strengthening the firm's competitive position.

These mechanisms collectively transform customer engagement into a strategic resource that contributes to entrepreneurial competitive advantage.

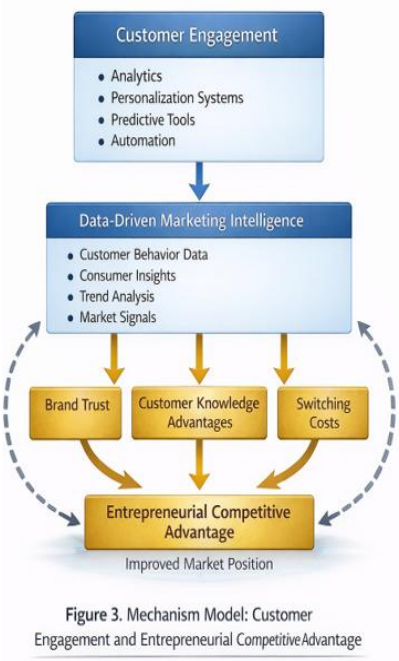

Figure 3. Mechanism Model: Customer Engagement and Entrepreneurial Competitive Advantage

Figure 3 positions AI-enabled sustainable entrepreneurship at the intersection of AI-driven marketing, entrepreneurship, and sustainability. By mapping overlapping domains, the figure emphasizes that sustainable entrepreneurial value emerges only when technological capability, opportunity recognition, and social–environmental responsibility are integrated. This theoretical positioning underscores the paper's contribution in bridging fragmented literatures.

Research Propositions

P4a
Customer engagement positively influences brand trust.

P4b
Customer engagement strengthens customer knowledge advantages.

P4c
Customer engagement increases switching costs.

P4d
Customer engagement strengthens network effects.

P4e
Brand trust, customer knowledge advantages, switching costs, and network effects positively contribute to entrepreneurial competitive advantage.

2.4 Mechanism Model 3: Entrepreneurial Competitive Advantage and Sustainable Value Creation

Sustainable entrepreneurship involves the creation of economic value while simultaneously generating social and environmental benefits (Schaltegger & Wagner, 2011; Cohen & Winn, 2007). Entrepreneurial ventures increasingly face pressure to balance financial performance with broader sustainability objectives.

However, the ability to pursue sustainability-oriented strategies often depends on the presence of entrepreneurial competitive advantage. Firms that achieve strong market positions possess greater resources and strategic flexibility to invest in innovation, implement sustainable practices, and build long-term stakeholder relationships.

Entrepreneurial competitive advantage can support sustainable value creation through several mechanisms.

First, firms with strong competitive positions often achieve greater resource efficiency, enabling them to optimize operational processes and reduce unnecessary marketing expenditures.

Second, competitive advantage supports the development of long-term customer relationships, which provide stable revenue streams that allow firms to pursue sustainability strategies that extend beyond short-term profit maximization.

Third, competitive advantage enables firms to respond effectively to growing consumer demand for ethical and sustainable products, allowing ventures to capture new market opportunities associated with sustainability-oriented consumption.

Through these mechanisms, entrepreneurial competitive advantage enables firms to generate sustainable value across economic, social, and environmental dimensions.

Minnesota Journal of Business Law and Entrepreneurship

Volume 2026, No. 3

ISSN: 1540-3270

Figure 4. Mechanism Model:
Competitive Advantage and Sustainable Value Creation

Figure 4 presents the integrative model linking AI-driven capability, data-driven intelligence, opportunity recognition, customer engagement, competitive advantage, and sustainable value creation. The flow demonstrates how AI technologies function not merely as efficiency tools but as dynamic capabilities that enable recursive entrepreneurial learning. This integrative view consolidates prior streams and advances a unified framework for sustainable entrepreneurship in digital markets.

Research Propositions

P5a
Entrepreneurial competitive advantage positively contributes to resource efficiency.

P5b
Entrepreneurial competitive advantage strengthens long-term customer relationships.

P5c
Entrepreneurial competitive advantage enhances responsiveness to sustainability-oriented consumer demand.

P5d
Resource efficiency, long-term customer relationships, and responsiveness to sustainability-oriented demand positively contribute to sustainable value creation.

2.5 Dynamic Feedback Loops and System Evolution

While the preceding subsections explain the individual mechanisms through which AI-driven marketing capabilities contribute to sustainable entrepreneurial value creation, the proposed framework should ultimately be understood as a **dynamic entrepreneurial learning system**. In digitally mediated markets characterized by rapid information flows and continuous customer interaction, the relationships described in the framework are inherently recursive.

Customer engagement generates new behavioral data that enriches marketing intelligence, improving the firm's ability to detect emerging market signals. Entrepreneurial competitive advantage enables ventures to reinvest resources in AI-driven marketing technologies, thereby strengthening technological capabilities and enhancing future market learning processes.

From a systems perspective, the framework can therefore be interpreted as a co-evolving capability–engagement–value system, in which entrepreneurial ventures gradually strengthen their strategic position through continuous learning and capability development.

2.6 Capability–Engagement–Value Surface

To formalize the relationships proposed in the framework, sustainable value creation can be conceptualized as a function of AI-driven marketing capability and market learning intensity:

$$SVC = \alpha + \beta_1 AIC + \beta_2 MLI + \beta_3 (AIC \times MLI)$$

where:

SVC = Sustainable Value Creation
AIC = AI-driven digital marketing capability
MLI = Market learning intensity

Market learning intensity itself arises from the interaction between data-driven marketing intelligence and customer engagement:

$$MLI = f(DMI, CE)$$

This formulation suggests that sustainable value creation is maximized when entrepreneurial ventures simultaneously develop strong AI-driven marketing capabilities and deep market learning processes.

2.7 Formal Representation of the 3D Entrepreneurial Learning System

The framework can further be visualized as a **three-dimensional entrepreneurial learning system** consisting of three axes:

X-axis: AI-driven digital marketing capability
Y-axis: Market learning intensity
Z-axis: Sustainable entrepreneurial value creation

Each entrepreneurial venture at time $t$can therefore be represented as a point in the three-dimensional space:

$$P_t(x_t, y_t, z_t)$$

where $x_t$represents AI capability, $y_t$represents market learning intensity, and $z_t$represents sustainable value creation.

Movement through this space reflects the venture's **developmental trajectory over time**, as firms strengthen their technological capabilities, deepen customer engagement, and generate greater sustainable value.

3. Implications for Theory, Practise and Policy

The conceptual framework developed in this study contributes to several streams of research, including digital marketing, entrepreneurship, and sustainability. By integrating these perspectives into a unified framework, the study offers theoretical insights into how AI-driven marketing capabilities can support sustainable entrepreneurial development. The proposed model also provides practical guidance for entrepreneurs and policy implications for supporting digital transformation in entrepreneurial ecosystems.

3.1 Theoretical Implications

This study makes several important theoretical contributions to the literature on digital marketing, entrepreneurship, and sustainable business development.

First, the study contributes to the **AI in marketing literature** by extending the role of artificial intelligence beyond marketing efficiency toward entrepreneurial value creation. Prior research has largely examined AI-driven marketing in terms of improved customer targeting, personalization, and marketing performance (Davenport et al., 2020; Huang & Rust, 2021). While these studies demonstrate the operational benefits of AI technologies, they typically focus on firm-level marketing outcomes rather than broader entrepreneurial processes. The present study advances this literature by conceptualizing AI-driven digital marketing capabilities as a strategic entrepreneurial resource that enables ventures to interpret market signals, generate marketing intelligence, and recognize entrepreneurial opportunities. By positioning AI capability as an enabling mechanism for entrepreneurial learning, the framework expands the theoretical understanding of how digital technologies shape opportunity recognition and venture development.

Second, the study contributes to entrepreneurship research by integrating digital marketing capabilities into the opportunity recognition process. Traditional entrepreneurship research emphasizes the role of prior knowledge, cognition, and environmental scanning in identifying entrepreneurial opportunities (Shane & Venkataraman, 2000; Shepherd & DeTienne, 2005). However, in digitally mediated markets, opportunity recognition increasingly relies on the analysis of large-scale customer data and digital interaction patterns. The proposed framework extends existing theory by demonstrating how data-driven marketing intelligence generated through AI-driven marketing systems supports entrepreneurial opportunity recognition. In doing so, the study introduces a digital marketing perspective into opportunity recognition research and highlights the importance of data analytics and customer interaction as sources of entrepreneurial insight.

Third, the study contributes to the customer engagement literature by explaining how engagement mechanisms translate into entrepreneurial competitive advantage. Existing studies conceptualize customer engagement primarily as a relational marketing construct that strengthens firm–customer relationships and enhances brand loyalty (Brodie et al., 2011; Hollebeek et al., 2014). While these studies recognize the strategic importance of engagement, they rarely explain the mechanisms through which engagement contributes to competitive advantage in entrepreneurial ventures. The present study addresses this gap by identifying four mechanisms—brand trust, customer knowledge advantage, switching costs, and network effects—through which customer engagement generates strategic resources that strengthen entrepreneurial competitive advantage. By unpacking these mechanisms, the study provides a clearer theoretical explanation of how engagement-driven interactions contribute to sustained competitive positioning in digital markets.

Fourth, the study contributes to the emerging literature on **sustainable entrepreneurship** by linking digital marketing capabilities with sustainable value creation. Sustainable entrepreneurship research emphasizes the importance of generating economic, social, and environmental value simultaneously (Schaltegger & Wagner, 2011). However, relatively little research explains how digital technologies enable entrepreneurial ventures to achieve these outcomes. The proposed framework demonstrates that AI-driven marketing capabilities can indirectly support sustainable entrepreneurship by improving resource efficiency, strengthening long-term customer relationships, and enabling firms to respond to growing demand for sustainable products. By linking technological capability with sustainability outcomes, the study provides a new perspective on how digital transformation can support sustainable entrepreneurial development.

Finally, the study contributes to theory by proposing a multi-dimensional entrepreneurial learning system that integrates technological capability, market learning, and value creation within a unified conceptual framework. Unlike traditional linear models of entrepreneurial development, the framework conceptualizes entrepreneurial growth as a dynamic and recursive process in which AI capability, customer engagement, and competitive advantage continuously reinforce one another. The study further formalizes this relationship through a Capability–Engagement–Value Surface, suggesting that sustainable value creation depends on the interaction between AI-driven marketing capability and market learning intensity. By introducing a three-dimensional representation of entrepreneurial development, the framework provides a novel theoretical lens for understanding how entrepreneurial ventures evolve in digitally enabled markets.

Together, these contributions advance the understanding of how AI-driven marketing technologies shape entrepreneurial learning processes and sustainable value creation. By integrating insights from digital marketing, entrepreneurship, and sustainability research, the study provides a theoretically grounded framework that explains how entrepreneurial ventures can leverage AI-enabled marketing capabilities to achieve long-term competitive and sustainability outcomes.

3.2 Managerial Implications for Entrepreneurs

The proposed framework offers several practical implications for entrepreneurs and small and medium-sized enterprises (SMEs).

First, the model highlights the strategic importance of investing in AI-driven marketing capabilities. Entrepreneurs should not view artificial intelligence merely as a technological innovation but as a strategic capability that enables deeper market understanding and more effective customer engagement.

Second, the framework emphasizes the importance of data-driven decision-making in entrepreneurial ventures. By leveraging digital analytics tools and customer data, entrepreneurs can identify emerging market opportunities and design more effective marketing strategies.

Third, the model demonstrates the value of customer engagement as a strategic asset. Entrepreneurs should actively cultivate meaningful interactions with customers through digital platforms, online communities, and feedback mechanisms. These interactions generate valuable knowledge and relational assets that can contribute to competitive advantage.

Fourth, the framework suggests that entrepreneurs should view sustainability not as a constraint but as an opportunity for value creation. Firms that develop strong customer relationships and market insights may be better positioned to respond to growing consumer demand for sustainable products and responsible business practices.

3.3 Policy Implications

The framework also has implications for policymakers seeking to support entrepreneurial ecosystems and digital transformation.

First, policymakers should encourage the adoption of AI and digital technologies among SMEs by investing in digital infrastructure, training programs, and technology adoption initiatives. Many entrepreneurial ventures lack the technical expertise and financial resources required to implement advanced analytics systems, and public support programs may help bridge this gap.

Second, governments and development agencies can promote data literacy and digital skills development among entrepreneurs. Training programs focused on data analytics, digital marketing, and AI tools can help entrepreneurs leverage digital technologies more effectively in their business strategies.

Third, policymakers should encourage the development of sustainability-oriented entrepreneurial ecosystems by supporting initiatives that integrate digital innovation with sustainable business practices. Policies that incentivize sustainable innovation and responsible production can help entrepreneurial ventures align economic growth with environmental and social objectives.

Finally, the framework suggests that policymakers should recognize the importance of digital platforms and data ecosystems in enabling entrepreneurial opportunity recognition and market participation. Supporting open innovation platforms and digital marketplaces may enhance the ability of entrepreneurial ventures to interact with customers and identify new market opportunities.

4.Proposed Reforms or Solutions

These findings imply that, apart from managerial and policy recommendations, legal and regulatory measures are necessary to incorporate artificial intelligence-based marketing as an integral part of sustainable entrepreneurship. Legislators need to reinforce legislation on data protection and algorithmic accountability in order to ensure that

small and medium-sized enterprises observe the provisions related to transparency and fairness. Judicial interpretation of disputes in areas of AI-enabled contracts, consumers' rights and competition law might be required in the course of time. Entrepreneurs must implement privacy by design measures as well as consider sustainability metrics in their AI-based marketing strategies. Business lawyers can be of much use in advising start-ups on regulatory compliance and governance in light of changing legal environment. Such legal reforms are quite possible due to global trends in digital governance and will bring many benefits.

4. Future Implications for Business Law and Entrepreneurship

As entrepreneurial ecosystems evolve, AI-driven digital marketing is shifting from a peripheral tool to a structural backbone**.** Ventures are beginning to operate through recursive data flows, predictive analytics, and algorithmic decision-making. What once felt experimental is becoming routine, and with that shift comes a new baseline**:** data literacy, compliance, and sustainability metrics are not optional extras but survival skills**.** This transformation signals a deeper embedding of regulatory compliance and ethical governance into the DNA of entrepreneurial ecosystems. The story of entrepreneurship in the digital age will be written not only in terms of innovation but also in terms of how ventures uphold consumer rights, fair competition, and sustainability in the face of technological acceleration.

Looking ahead, the convergence of generative AI, regtech platforms, algorithmic auditing tools, and blockchain-based compliance systems will redefine the terrain. These technologies represent the rise of self-regulating infrastructures — systems that can automate compliance and enhance transparency without constant human intervention. Yet they also open a new chapter of questions: Who bears liability when an algorithm makes a harmful decision? Who owns the intellectual property of AI-generated outputs? How do we govern data flows that cross borders seamlessly while laws remain stubbornly national? The answers will determine whether entrepreneurs can deploy AI responsibly while maintaining legitimacy in global markets.

This convergence also sets the stage for future research and legal development. Scholars must investigate how AI-enabled marketing interacts with antitrust law, consumer protection regimes, and digital competition policy. Comparative studies across jurisdictions — the EU's stringent GDPR, the US's sectoral approach, India's evolving digital governance — will illuminate how different legal architectures shape entrepreneurial competitiveness. Longitudinal studies of SMEs adopting AI while balancing sustainability and compliance will reveal the adaptive capacity of ecosystems under regulatory pressure**.** At the same time, new doctrines must emerge: algorithmic accountability frameworks, enforceable digital contracts, and sustainability-linked governance mechanisms**.**

Together, these trajectories suggest that the future of entrepreneurship is not simply technological. It is a juridical reconfiguration of entrepreneurial practice, where law and digital innovation co-evolve to shape the boundaries of responsibility, legitimacy, and sustainable growth.

5. Conclusion

The rapid development of artificial intelligence technologies is transforming digital marketing practices and creating new opportunities for entrepreneurial ventures. At the same time, entrepreneurs are increasingly expected to generate value that extends beyond economic performance to include social and environmental sustainability. Despite these developments, limited research has explored how AI-driven marketing capabilities contribute to sustainable entrepreneurial growth. Addressing this gap, the present study proposed a conceptual framework that explains how AI-enabled digital marketing capabilities can support sustainable value creation in entrepreneurial ventures.

The framework conceptualizes entrepreneurship as a multi-dimensional entrepreneurial learning system in which technological capabilities, market learning processes, and value creation outcomes interact dynamically. Specifically, the model suggests that AI-driven digital marketing capabilities enable firms to generate data-driven marketing intelligence, which supports entrepreneurial opportunity recognition. Recognized opportunities translate into stronger customer engagement, which generates relational and informational assets that contribute

to entrepreneurial competitive advantage. In turn, competitive advantage enables ventures to pursue sustainability-oriented strategies and generate sustainable value encompassing economic, social, and environmental outcomes.

By integrating insights from digital marketing, entrepreneurship, and sustainability research, the study contributes to the growing literature on AI-enabled entrepreneurship. The framework highlights the strategic role of AI technologies in enhancing entrepreneurial learning processes and demonstrates how customer engagement can function as a mechanism through which digital capabilities translate into competitive advantage and sustainable value creation. In doing so, the study provides a conceptual foundation for understanding how digital technologies can support sustainable entrepreneurial development in increasingly data-driven markets.

The proposed framework also offers directions for future research. First, empirical studies are needed to test the relationships proposed in the model and examine how AI-driven marketing capabilities influence entrepreneurial performance in different contexts. Second, future research could explore how contextual factors such as industry characteristics, digital infrastructure, and institutional environments shape the effectiveness of AI-driven marketing strategies in entrepreneurial ventures. Third, researchers may investigate how ethical considerations and responsible AI practices influence customer trust and engagement in digital marketing environments.

In conclusion, the study highlights the transformative potential of AI-driven digital marketing capabilities for entrepreneurial ventures. By enabling firms to generate deeper market insights, strengthen customer engagement, and develop sustainable competitive advantages, AI technologies can play a critical role in shaping the future of sustainable entrepreneurship. As digital technologies continue to evolve, understanding the mechanisms through which they influence entrepreneurial value creation will remain an important area of research and practice.

References

[1] Abrokwah-Larbi, K., & Awuku-Larbi, Y. (2024). The impact of artificial intelligence in marketing on the performance of business organizations: Evidence from SMEs in an emerging economy. *Journal of Entrepreneurship in Emerging Economies, 16*(4), 1090–1117. https://doi.org/10.1108/JEEE-07-2023-0215

[2] Akter, S., Sultana, S., Mariani, M., Wamba, S. F., Spanaki, K., & Dwivedi, Y. K. (2023). Advancing algorithmic bias management capabilities in AI-driven marketing analytics research. *Industrial Marketing Management, 114*, 243–261. https://doi.org/10.1016/j.indmarman.2023.02.004

[3] Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99–120. https://doi.org/10.1177/014920639101700108

[4] Behera, R. K., Bala, P. K., Rana, N. P., Algharabat, R. S., & Kumar, K. (2024). Transforming customer engagement with artificial intelligence e-marketing: An e-retailer perspective in the era of Retail 4.0. *Marketing Intelligence & Planning, 42*(7), 1141–1168. https://doi.org/10.1108/MIP-02-2023-0085

[5] Bhatia, R., Sarumi, O., & Giuggioli, M. (2025). Toward understanding the role of generative AI in entrepreneurship education: A systematic review. *Computers and Education: Artificial Intelligence, 9*, 100470. https://doi.org/10.1016/j.caeai.2025.100470

[6] Brodie, R. J., Hollebeek, L. D., Jurić, B., & Ilić, A. (2011). Customer engagement: Conceptual domain, fundamental propositions, and implications for research. *Journal of Service Research, 14*(3), 252–271. https://doi.org/10.1177/1094670511411703

[7] Cai, Z., Wang, Z., & Murad, M. (2026). AI-enabled decision making and social intrapreneurial opportunity identification in SMEs: The roles of circular economy application and pro-social environmental orientation. *Corporate Social Responsibility and Environmental Management*.

[8] Cohen, B., & Winn, M. I. (2007). Market imperfections, opportunity and sustainable entrepreneurship. *Journal of Business Venturing, 22*(1), 29–49. https://doi.org/10.1016/j.jbusvent.2004.12.001

[9] D'Angelo, V., Cavallo, A., Messeni Petruzzelli, A., & Frattini, F. (2025). Generative Artificial Intelligence in entrepreneurial education and practice: Emerging insights, the GAIN Framework, and research agenda. *International Entrepreneurship and Management Journal*. https://doi.org/10.1007/s11365-025-00987-2

[10] Davenport, T. H., Guha, A., Grewal, D., & Bressgott, T. (2020). How artificial intelligence will change the future of marketing. *Journal of the Academy of Marketing Science, 48*(1), 24–42. https://doi.org/10.1007/s11747-019-00696-0

[11] Duffett, R. G., & Maraule, M. (2024). Customer engagement and intention to purchase attitudes of Generation Z consumers toward emojis in digital marketing communications. *Young Consumers, 25*(5), 607–624. https://doi.org/10.1108/YC-03-2023-1704

[12] Gündüzyeli, B. (2024). Artificial intelligence in digital marketing within the framework of sustainable management. *Sustainability, 16*(23), 10511. https://doi.org/10.3390/su162310511

[13] Gong, Y., Wang, S., & Dong, Y. (2025). Integrating artificial intelligence in entrepreneurship education: Dynamic capabilities and marketing performance among student entrepreneurs. *The International Journal of Management Education, 23*(3), 101248. https://doi.org/10.1016/j.ijme.2025.101248

[14] Hazra, S., Rajpal, S., Goyal, N., & Jethwani, M. (2025). Leveraging AI for sustainable marketing and financial efficiency: An integrated framework for green competitive advantage. *European Economics Letters, 15*(3).

[15] Hollebeek, L. D., Glynn, M. S., & Brodie, R. J. (2014). Consumer brand engagement in social media: Conceptualization, scale development, and validation. *Journal of Interactive Marketing, 28*(2), 149–165. https://doi.org/10.1016/j.intmar.2013.12.002

[16] Huang, M.-H., & Rust, R. T. (2021). Artificial intelligence in service. *Journal of Service Research, 24*(1), 3–10. https://doi.org/10.1177/1094670520902266

[17] Kreuzer, M., Hanelt, A., & Kolbe, L. M. (2022). Digital technologies and entrepreneurial opportunity recognition: A review and research agenda. *Technological Forecasting and Social Change, 174*, 121134. https://doi.org/10.1016/j.techfore.2021.121134

[18] Lemon, K. N., & Verhoef, P. C. (2016). Understanding customer experience throughout the customer journey. *Journal of Marketing, 80*(6), 69–96. https://doi.org/10.1509/jm.15.0420

[19] Li, B., Teece, D. J., Baskaran, A., & Chandran, V. G. R. (2025). Dynamic knowledge management: A dynamic capabilities approach to knowledge management. *Technovation, 147*, 103316. https://doi.org/10.1016/j.technovation.2024.103316

[20] Mostafiz, M. I., Sambasivan, M., Goh, S. K., & Ahmad, P. (2023). Configuring foreign market knowledge and opportunity recognition capabilities to predict the performance of export-manufacturing firms. *Knowledge Management Research & Practice, 21*(2), 316–330. https://doi.org/10.1080/14778238.2022.2034567

[21] Nuseir, T., Basheer, M. F., & Aljumah, A. (2020). Antecedents of entrepreneurial intentions in smart city of Neom Saudi Arabia: Does the entrepreneurial education on artificial intelligence matter? *Cogent Business & Management, 7*(1), 1825041. https://doi.org/10.1080/23311975.2020.1825041

[22] Råve, A., Solem, B. A. A., & Kurtmollaiev, S. (2026). Dynamic capabilities in business ecosystem emergence: A marketing technology case study. *Management Decision*, 1–21.

[23] Rasul, T., Nair, S., Palamidovska-Sterjadovska, N., Ladeira, W. J., Santini, F. D. O., & Elgammal, I. (2024). The evolution of customer engagement in the digital era for business: A review and future research agenda. *Journal of Global Scholars of Marketing Science, 34*(3), 325–348. https://doi.org/10.1080/21639159.2023.2251234

[24] Salonen, A., Mero, J., Munnukka, J., Zimmer, M., & Karjaluoto, H. (2024). Digital content marketing on social media along the B2B customer journey: The effect of timely content delivery on customer engagement. *Industrial Marketing Management, 118*, 12–26. https://doi.org/10.1016/j.indmarman.2023.10.005

[25] Schaltegger, S., & Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: Categories and interactions. *Business Strategy and the Environment, 20*(4), 222–237. https://doi.org/10.1002/bse.682

[26] Sedighi, M., & Hashemi, N. (2025). Navigating the digital landscape: Communication visibility and entrepreneurial opportunity identification. *Journal of Entrepreneurship in Emerging Economies, 17*(3), 701–724.

[27] Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of Management Review, 25*(1), 217–226. https://doi.org/10.5465/amr.2000.2791611

[28] Shepherd, D. A., & DeTienne, D. R. (2005). Prior knowledge, potential financial reward, and opportunity identification. *Entrepreneurship Theory and Practice, 29*(1), 91–112.

[29] Srivastava, R., Gupta, P., Kumar, H., & Tuli, N. (2025). Digital customer engagement: A systematic literature review and research agenda. *Australian Journal of Management, 50*(1), 220–245.

[30] Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal, 28*(13), 1319–1350. https://doi.org/10.1002/smj.640

[31] Vecchiarini, M., & Somia, T. (2023). Redefining entrepreneurship education in the age of artificial intelligence: An explorative analysis. *The International Journal of Management Education, 21*(3), 100879. https://doi.org/10.1016/j.ijme.2023.100879

[32] Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research, 122*, 889–901. https://doi.org/10.1016/j.jbusres.2019.09.022

[33] Yaiprasert, C., & Hidayanto, A. N. (2023). AI-driven ensemble three machine learning to enhance digital marketing strategies in the food delivery business. *Intelligent Systems with Applications, 18*, 200235. https://doi.org/10.1016/j.iswa.2023.200235

[34] Zhang, H. (2025). AI-driven innovation and entrepreneurship education: A K-means clustering approach for Chinese university students. *Discover Artificial Intelligence, 5*(1), 127. https://doi.org/10.1007/s44163-025-00127-9