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AI-Driven Marketing Interventions for Enhancing Entrepreneurial Behavior of MSMEs in Bojong Rangkas Tourism Village

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ABSTRACT

Digital transformation has become a key driver of competitiveness for micro, small, and medium enterprises (MSMEs), particularly within rural, tourism-based economies. This study examines the extent of AI marketing utilization and the level of entrepreneurial behavior among MSMEs in Bojong Rangkas Tourism Village, Indonesia. Using a descriptive quantitative approach, data were collected through a survey of 39 MSMEs operating in the village. The findings indicate that AI marketing and digital technology adoption are relatively high (67.2%), while entrepreneurial behavior remains at a moderate level (58.8%). Key strengths include the widespread use of online payment systems (75%) and active engagement with digital marketplaces (68.8%). However, weaknesses persist in human resource development, with training activities reported at only 50%. The study further identifies a conceptual linkage between digital adoption and the strengthening of entrepreneurial behavior, particularly in collaboration, organizational clarity, and innovation. These results highlight the need for integrated capacity-building programs that combine AI-based marketing skills with the development of entrepreneurial competencies.

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INTRODUCTION

The rapid advancement of artificial intelligence (AI) has significantly reshaped how micro and small enterprises operate, market their products, and engage with customers. AI-powered tools, ranging from automated content creation to intelligent customer analytics thave provided MSMEs with new capabilities to compete in an increasingly digital economy (Dwivedi et al., 2021). For rural and tourism-based communities, adopting AI marketing has become particularly essential as local businesses must differentiate their products, enhance visibility, and reach broader audiences.

In Indonesia, rural tourism villages have experienced accelerated digital transformation supported by improved internet penetration, accessible digital platforms, and government initiatives promoting digital inclusion. Despite this progress, the adoption of AI marketing remains uneven. Rural MSMEs often face persistent barriers, including low digital literacy, limited technological access, and constrained innovation capacity. In this context, strengthening entrepreneurial behavior—such as innovativeness, risk-taking, proactiveness, collaboration, and opportunity recognition- becomes crucial for converting technological potential into tangible business performance.

Bojong Rangkas Tourism Village represents a relevant case due to its growing tourism profile and reliance on local creative industries, including crafts, culinary products, and cultural activities. Although digital engagement is increasing, such as through social media promotion and online transactions, empirical evidence regarding AI marketing adoption and the strength of entrepreneurial behavior among MSMEs in this village remains scarce.

Existing literature highlights that AI marketing enhances efficiency, customer targeting, and engagement through automated content production, predictive analytics, and personalized communication. These capabilities are particularly beneficial for MSMEs with resource limitations. Parallel studies on entrepreneurial behavior emphasize the importance of innovation, adaptability, and proactive opportunity pursuit as determinants of business success in dynamic digital environments.

Meanwhile, the emerging field of digital entrepreneurship underscores how digital technologies, including AI, enable new forms of value creation, business model innovation, and market access for SMEs in both urban and rural contexts. However, the interplay between AI marketing adoption and entrepreneurial behavior in rural tourism settings remains underexplored, despite their potential to drive sustainable micro-enterprise growth.

Although digital transformation continues to advance within rural tourism settings, several critical gaps remain unaddressed. Empirically, there is still a limited understanding of the extent to which MSMEs in tourism villages adopt AI marketing tools, despite increasing digital accessibility. At the same time, knowledge about the strength and variation of entrepreneurial behavior among rural entrepreneurs remains scarce, even though such behavior plays a central role in leveraging digital technology for business growth. Moreover, the potential relationship between AI marketing utilization and entrepreneurial behavior has not been clearly examined within the context of rural tourism villages such as Bojong Rangkas. These gaps hinder the development of evidence-based strategies for strengthening digital entrepreneurship and enhancing the competitiveness of MSMEs in rural tourism ecosystems.

This study is designed to fill the identified gaps by generating a comprehensive understanding of AI marketing adoption and entrepreneurial behavior within Bojong Rangkas Tourism Village. Specifically, the research aims to assess how extensively local MSMEs utilize AI-based marketing tools in their promotional and business activities, while also evaluating the levels and characteristics of

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entrepreneurial behavior exhibited by these actors. Furthermore, the study seeks to identify existing gaps and explore the potential linkage between the use of AI marketing and the development of entrepreneurial behavior. Through this integrated approach, the research intends to produce insights that can inform more effective strategies for strengthening digital capabilities and entrepreneurial readiness in rural tourism MSMEs.

The study is expected to make two key contributions. First, it enriches the literature on digital entrepreneurship and rural innovation by providing empirical insights into the interaction between AI marketing and entrepreneurial behavior in tourism village contexts—an area still limited in existing research. Second, it offers actionable recommendations for strengthening the digital capabilities of rural MSMEs, assisting policymakers, tourism village managers, and development practitioners in designing targeted capacity-building programs and AI-supported marketing strategies to enhance the competitiveness of Bojong Rangkas Tourism Village.

LITERATURE REVIEW

AI Marketing and Digital Adoption Among MSMEs

AI-based marketing encompasses algorithmic systems that automate, personalize, and optimize marketing activities, offering substantial efficiency gains, particularly for micro, small, and medium enterprises (MSMEs) (Chatterjee et al., 2020). In the MSME context, AI technologies can be leveraged for customer segmentation, predictive analytics, automated social media content generation, market optimization, and data-driven digital payment integration. Aljabari et al. (2024) demonstrate that integrating AI into digital marketing strategies significantly enhances process and product innovation while improving MSMEs' understanding of customer behavior, ultimately strengthening market orientation and competitiveness. These findings align with Kumar et al. (2021), who assert that MSMEs adopting AI tend to experience sustained increases in visibility and customer engagement.

From a decision-making perspective, AI has become a strategic tool that assists MSMEs in formulating data-driven decisions and predictive scenario analyses. Jaboob et al. (2025) emphasize that digital leadership acts as a catalyst for encouraging AI utilization, leading to more precise strategic decisions and improved profitability. In the e-commerce setting, Aljarboa (2024) finds that AI adoption strengthens MSMEs' dynamic capabilities and contributes to enhanced business performance, particularly through improved market adaptability and a more responsive entrepreneurial orientation.

Determinants of AI adoption among MSMEs often center around perceived usefulness (PU) and perceived ease of use (PEOU). Enshassi et al. (2025) reveal that PU is the strongest driver of AI adoption in digital marketing, while PEOU, though influential, has a relatively weaker effect. Conversely, perceived barriers (PB) serve as major inhibitors, especially those related to organizational constraints, technological readiness, and market complexity. These findings are consistent with Abaddi (2025), who highlights the importance of government support and firm-level innovation capabilities as facilitating factors that mitigate risks associated with adopting emerging technologies, including AI.

AI adoption also offers substantial benefits for MSME digital marketing, particularly through enhanced campaign personalization and improved customer engagement. Magableh et al. (2024) report that AI marketing drives sustainable financial performance through customer engagement and data-driven decision-making. From an e-marketing strategy perspective, Jovanović et al. (2025) argue that AI enables MSMEs to design more effective and measurable campaigns through faster and more accurate

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data processing.

Nevertheless, significant challenges remain. Musa et al. (2025) note that implementation costs, limited technical skills, and system complexity are primary barriers preventing MSMEs from fully utilizing AI. Additionally, concerns related to data privacy, algorithmic bias, and other ethical risks are increasingly prominent (Jovanović et al., 2025). Addressing these challenges requires MSMEs to invest in human resource development through employee training and adopt phased implementation strategies that support adaptive learning and effective technology risk management.

Overall, the literature suggests that AI adoption in digital marketing offers substantial opportunities for MSMEs to enhance performance, efficiency, and innovation. However, these benefits can only be fully realized when MSMEs overcome structural, technical, and ethical barriers and receive adequate institutional support.

Entrepreneurial Behavior

Entrepreneurial behavior is traditionally understood to encompass innovation, proactiveness, risk-taking, autonomy, and competitive aggressiveness (Lumpkin & Dess, 1996). In the MSME context, this construct expands to include human resource practices, role clarity, managerial capability, and strategic decision-making quality. Innovation remains the central dimension, as the ability to generate new ideas and integrate them into business processes is crucial for ensuring enterprise sustainability. El-Sayed (2020) emphasizes that creativity is the fundamental driver of innovation, while Monfared et al. (2019) demonstrate that managerial and organizational creativity significantly contribute to the development of entrepreneurial behavior in transitional organizations.

Beyond innovation, proactiveness plays a critical role. It reflects an entrepreneur's ability to anticipate opportunities and act ahead of competitors. Gupta et al. (2016) show that managerial attention to proactiveness within entrepreneurial orientation directly enhances value creation. Leadership also shapes this behavior; Kim and Zhao (2024) find that paternalistic leadership promotes proactive behavior in start-up firms, subsequently improving team coordination and organizational performance. Risk-taking further defines entrepreneurial behavior. Antoncic (2020) links risk-taking tendencies to entrepreneurial personality traits, whereas Mushketova et al. (2024) highlight the importance of stress tolerance as a prerequisite for managing risks effectively.

Collaboration is equally vital, especially for enterprises that depend on teamwork or external partnerships. Xiao et al. (2022) explain that the quality of collaborative processes significantly influences team members' willingness to continue academic entrepreneurial collaborations. At a broader level, firms must develop flexible external collaborations to maximize innovation. Mingyang et al. (2020) note that coordination flexibility within innovation networks allows for greater autonomy and helps prevent firms from becoming locked into specific networks. These components align with organizational management, as the success of innovation and collaboration depends heavily on effective resource management.

Organizational management capability forms the foundation for entrepreneurial behavior. Marachly et al. (2019) illustrate how the ability to overcome structural and cognitive challenges gives rise to adaptive entrepreneurial behavior. Strong managerial capacity also enhances MSMEs' readiness to adopt digital technologies. This conclusion is reinforced by Bouncken et al. (2021), who show that entrepreneurial behavior—characterized by innovation, proactiveness, and organizational flexibility—significantly improves MSMEs' ability to leverage digital technologies effectively. Thus, entrepreneurial behavior not only drives business competitiveness but also serves as a prerequisite for digital transformation in

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technology-driven economies.

Digital Entrepreneurship in Rural Contexts

Rural MSMEs face various structural challenges, including limited digital skills, weak networks, and small local markets. However, digitalization offers significant opportunities to expand market access, facilitate new collaborations, and enhance competitiveness. Human capital is a decisive factor in the success of digital transformation. Kadiyono and Susanto (2025) show that psychological, social, intellectual, and emotional capital positively influence innovative entrepreneurial behavior, which in turn enhances MSME performance. In rural settings, such innovation becomes especially relevant when linked to the ability to leverage digital technologies to overcome geographical constraints.

Moreover, the literature emphasizes that digital literacy and entrepreneurial competence significantly influence the success of digital entrepreneurship. Mohamad et al. (2025) find that digital literacy and government support drive digital technology adoption in rural areas—an insight highly relevant for Indonesian MSMEs. The capability approach also suggests that digital technology does not automatically generate benefits; instead, outcomes depend on individuals' ability to recognize technology value and the presence of supportive social and environmental conditions (Fahmi & Savira, 2023). Challenges such as the digital divide persist, as only a small proportion of Indonesian MSMEs utilize digital platforms as part of their marketing strategies (Tambunan, 2024).

Resource and capability constraints also hinder digital technology utilization in many sectors. For instance, in the food and beverage industry, digital entrepreneurial marketing improves performance but is slowed by limited capital and digital competence (Nurbasari et al., 2026). Conversely, digitalization in rural contexts can stimulate social innovation. Fahmi and Arifianto (2022) show that rural communities employ collective learning to overcome adoption barriers, indicating that digitalization is not merely a technical process but also a social one.

Sector-specific patterns are also visible in rural MSME digital adoption. In the batik industry, digital technology strengthens entrepreneurship and facilitates both green and non-green innovation (Febrianda et al., 2025). However, vulnerable groups, such as rural women entrepreneurs, face distinct barriers, including ICT access costs and limited digital skills, which affect business sustainability (Gunawan, 2024). Consequently, policy strategies must integrate digital training, entrepreneurial skill strengthening, and organizational transformation, as recommended by Soetikno et al. (2025).

In this regard, the integration of AI marketing with the reinforcement of entrepreneurial behavior has the potential to transform rural MSMEs into adaptive, innovative, and competitive actors in the digital economy.

METHODS

Study Design and Framework

This study employed a quantitative descriptive design to assess the level of AI marketing adoption and entrepreneurial behavior among MSMEs in Bojong Rangkas Tourism Village. A descriptive approach was appropriate because it allows researchers to measure the existing conditions of the population systematically using numerical indicators, consistent with Creswell's (2014) framework for quantitative inquiry. The study framework was structured into two main constructs, AI marketing

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utilization and entrepreneurial behavior—operationalized through percentage-based indicators. This study assessed MSME innovation capacity and digital adoption across dimensions such as product innovation, process innovation, AI-based marketing, and organizational learning.

Before data collection, participants were informed about the aims of the study, their rights, data confidentiality, and the voluntary nature of participation. No personal identifiers were collected, and responses were aggregated to maintain privacy. The consent statement embedded in the questionnaire ensured that participants acknowledged their understanding of the study procedures before responding. All ethical principles in social research, autonomy, confidentiality protection, voluntary participation, and non-maleficence, were strictly followed.

Population, Sampling, and Recruitment Procedures

The study population consisted of all MSMEs operating in Bojong Rangkas Tourism Village. A total of 39 MSME owners participated in the study. Sampling was conducted using purposive sampling, targeting MSMEs actively engaged in business activities relevant to the tourism economy and capable of responding to questions on digital and entrepreneurial practices. Recruitment occurred through coordination with village authorities and MSME groups, followed by individual outreach to business owners. The questionnaire administered to respondents included multiple dimensions representing digital adoption and entrepreneurial indicators such as AI-assisted marketing (e.g., automated content design, AI-based advertising), digital bookkeeping, online payment utilization, HR practices, vision clarity, and collaboration with external actors.

The primary instrument used in this study was a structured questionnaire which developed for the PKM program in Bojong Rangkas Tourism Village. The questionnaire included 12 Likert-scale items across four dimensions: Product Innovation (P1–P3), Process Innovation (PR1–PR3), Marketing & AI Innovation (M1–M3), and Organizational & Learning Innovation (O1–O3). Additional objective indicators—such as the number of new products launched in the last 12 months, proportion of digital sales, and weekly promotional frequency—were included and converted into a standardized 1–5 scale. This instrument is consistent with validated measurement approaches in digital entrepreneurship research, as it captures behavioral, technological, and organizational dimensions relevant to MSME innovation.

Data were collected through on-site surveys conducted directly with the 39 MSME owners using the structured questionnaire. Enumerators visited each business location and assisted participants in completing the items to ensure clarity and accuracy, which is particularly effective in rural contexts with varying digital literacy. Each questionnaire required approximately 10–15 minutes to complete, consistent with the estimated response time stated in the instrument's introduction. Responses were checked immediately after completion to minimize data-entry errors. All data were then coded into numerical form and prepared for descriptive statistical analysis.

Data Analysis

The study applied descriptive statistical analysis, following Creswell's (2014) recommendation that descriptive methods are suitable for quantifying trends, tendencies, and overall conditions within a population. Percentage distributions were calculated for each indicator to determine the adoption level of AI marketing and entrepreneurial behavior. Mean scores were computed to classify overall variable categories (high, moderate, low). Further interpretative-conceptual analysis was conducted to explore potential linkages between AI usage and entrepreneurial behavior. Although the study did not employ

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inferential statistical testing due to its descriptive nature, the analytical framework enables future studies to build testable models and hypotheses on digital entrepreneurship in rural settings.

Multiple steps were taken to ensure methodological rigor and data reliability Data collection procedures were standardized, and double-entry verification was applied when coding responses. Triangulation was conducted through consistency checks between respondent answers and observational notes from field visits. These procedures align with Creswell's guidelines for enhancing reliability, validity, and transparency in quantitative research.

RESULT

Descriptive Findings: AI Marketing Utilization

The descriptive analysis of AI marketing utilization shows a relatively high adoption level with a mean score of 67.2%, confirming that MSMEs in Bojong Rangkas Tourism Village have embraced foundational digital tools. The most widely adopted indicator is digital payment systems (75%), which appears clearly in Figure 1, where the largest number of respondents selected the highest scale ("5"). This reflects strong readiness for cashless transactions, particularly important in tourism villages serving digitally savvy visitors.

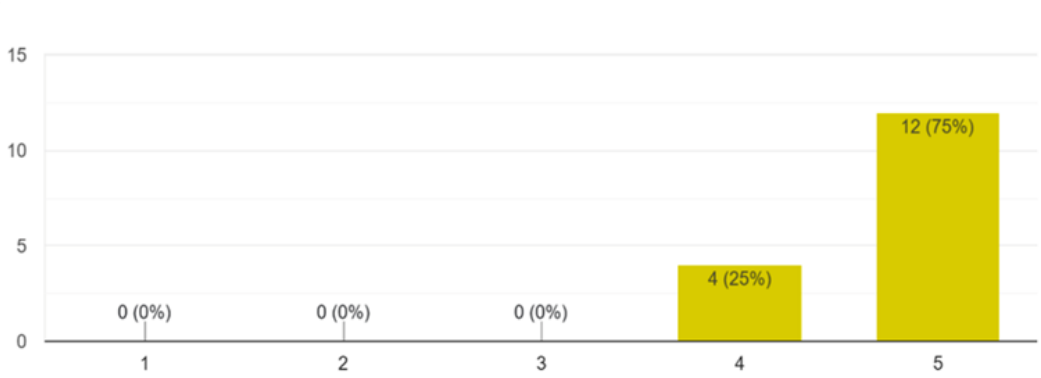

FIGURE 1. The Adoption of Digital Payment Systems

Descriptive Findings: Entrepreneurial Behavior

Entrepreneurial behavior scored 58.8%, categorized as moderate. The lowest-scoring component is employee training (50%), where responses cluster at scores 3 and 4, with no respondent rating training at the highest level ("5"). This confirms limited investment in human resource development.

Role clarity (62.5%) and understanding of business values (56.3%) show moderate internal alignment. Collaboration is the strongest aspect (68.8%), as evidenced in Figure 2., where the most respondents (68.8%) selected "5", indicating high engagement with external partners such as universities, banks, and local government.

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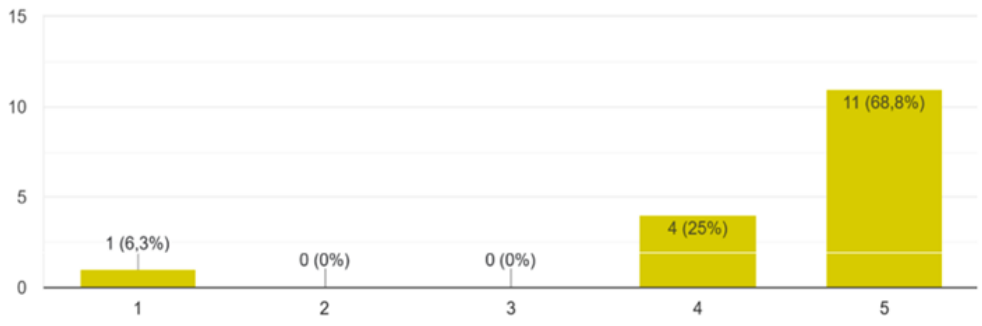

FIGURE 2. External Collaboration of MSMEs

Comparative Analysis: Digital Adoption vs. Entrepreneurial Capacity

A comparison of results demonstrates a gap between AI marketing adoption (67.2%) and entrepreneurial behavior (58.8%). While MSMEs demonstrate readiness in marketing-related digital technologies, their internal managerial capabilities appear weaker. This aligns with global evidence. Studies by Sharma (2025) in India show rural MSMEs typically adopt visible digital tools (social media and digital payment) faster than organizational capability development.

Thematic Findings Based on Visual and Quantitative Data

First, Strong Digital Momentum and Social Media Penetration. Data from the digital platform usage chart shows that 100% of respondents use WhatsApp and 50% use Instagram, which confirms strong momentum in digital engagement. This matches adoption trends in rural MSMEs globally, where social media acts as the entry point into digital commerce (Aljarboa, 2024).

Secondly, Weak Organizational and HR Capacity. The limited practices in recruitment, training, and financial management indicate underdeveloped managerial capability. Behavior change theories explain this gap:

COM-B Model → Capability (skills) remains low relative to available opportunity (technology access).

TPB → Perceived behavioral control (skills, confidence) is weaker than attitudes toward digital tools.

Social Cognitive Theory → Lack of training limits self-efficacy and advanced AI utilization.

Lastly, Collaboration as a Lever for Innovation. The collaboration indicator scores highest among all entrepreneurial variables, indicating strong social capital. This supports studies showing collective learning and networks as critical enablers of rural digital transformation (Xiao et al., 2022).

DISCUSSION

The findings demonstrate that MSMEs in Bojong Rangkas Tourism Village have achieved a relatively high level of AI-based marketing adoption, with an average score of 67.2%. This confirms that digital tools such as online payment systems, social media platforms, and automated content applications have significantly enhanced MSMEs' ability to improve visibility, streamline marketing activities, and serve digital-native consumers, echoing the observations of Dwivedi et al. (2021). In a tourism village context where business competitiveness relies heavily on product differentiation and cultural value propositions,

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leveraging these technologies becomes essential for expanding market reach and attracting new visitors. The descriptive results from the survey charts further show that digital engagement is already mainstream: for example, 100% of respondents reported using WhatsApp, and 50% reported using Instagram for business purposes, indicating strong digital penetration at the grassroots level.

The digital adoption patterns identified in this study also reflect broader structural shifts occurring in rural MSMEs across Indonesia, particularly the influence of wider internet penetration, increasing accessibility of digital platforms, and pro-inclusion government initiatives. The strong adoption of online payment systems (75%), signals a high level of transactional readiness, which is crucial for tourism destinations serving technologically savvy consumers. These findings align with evidence from rural enterprises in Kenya, Thailand, and Vietnam, where digital momentum often accelerates even in areas with infrastructural constraints when clear market incentives and external enablers are present.

Despite this progress, the study also reveals that entrepreneurial behavior remains at a moderate level, with an average score of 58.8%. The lowest-performing indicator, employee training (50%), and the relatively modest scores in organizational clarity highlight that internal capabilities have not progressed at the same pace as technological adoption.

The gap between high AI utilization and moderate entrepreneurial behavior reinforces theoretical arguments by Liguori and Pittz (2020), who assert that technology generates value only when combined with adaptive and innovative entrepreneurial behavior. Without strong opportunity recognition, calculated risk-taking, and creative problem-solving, AI adoption risks becoming superficial, restricted to basic operational enhancements rather than driving transformational change. The findings therefore, suggest that MSMEs in Bojong Rangkas are currently in an "instrumentally digital" stage but have not yet transitioned to becoming "strategically digital."

This capability gap is consistent with behavior change frameworks. The COM-B model suggests that while opportunity (access to digital tools) is high, capability (skills and organizational systems) and motivation (innovation culture) remain underdeveloped. The Theory of Planned Behavior (TPB) likewise indicates that low perceived behavioral control limits MSMEs' ability to translate positive attitudes toward AI into strategic entrepreneurial action. Social Cognitive Theory further supports the notion that limited training reduces self-efficacy, restricting MSMEs' ability to maximize the potential of AI for predictive analytics, automation, or data-driven decision-making. Evidence from the dataset—particularly the concentration of responses at basic to moderate levels in analytic and managerial indicators supports this interpretation.

Nonetheless, the high collaboration score (68.8%) offers a strategic opportunity. Collaboration emerges as the strongest entrepreneurial dimension among local MSMEs, indicating robust networks with community groups, universities, and local authorities. This supports the view of Xiao et al. (2022) and Fahmi and Arifianto (2022) that rural digital transformation is inherently a social process driven by networks, shared learning, and ecosystem dynamics. In the context of Bojong Rangkas, collaboration can function as a compensatory mechanism to offset internal capability gaps and accelerate the strengthening of entrepreneurial behavior.

Taken together, these findings reinforce the broader literature on digital entrepreneurship in rural environments, which highlights that technology access does not automatically lead to entrepreneurial development. Studies by Mohamad et al. (2025) and Nurbasari et al. (2026) similarly show that managerial capability gaps can inhibit technology's strategic value even when access is available. Thus, the present study's third objective is achieved: the results identify a clear gap and potential relationship between AI utilization and entrepreneurial behavior, revealing that technology is evolving faster than the

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internal capacity required to use it effectively.

Overall, MSMEs in Bojong Rangkas occupy a promising position to advance their AI-based marketing capabilities. However, the sustainability of this progress depends on strengthening entrepreneurial competencies, organizational systems, and human resource development. These findings underscore the study's theoretical contribution: digital capability alone is insufficient without a strong entrepreneurial foundation. Practically, the results suggest the importance of developing data-driven entrepreneurship training, deepening digital literacy, facilitating cross-sector collaboration, and implementing targeted technical mentoring programs to support the long-term resilience and competitiveness of rural tourism MSMEs.

CONCLUSION

This study set out to examine the extent of AI-based marketing adoption and the level of entrepreneurial behavior among MSMEs in Bojong Rangkas Tourism Village, to identify gaps and implications for rural digital transformation. The findings reveal a relatively high adoption of AI-driven and digital marketing tools, with an average utilization score of 67.2%, particularly in social media usage, digital payment integration, and basic automation. In contrast, entrepreneurial behavior remains at a moderate level of 58.8%, with weaker performance in employee training, managerial systems, and innovation capacity. This discrepancy highlights a structural gap in which technological progress outpaces the entrepreneurial and organizational capabilities needed to leverage AI strategically.

Several limitations should be acknowledged. The study relied on self-reported data, was conducted within a single tourism village, and employed a descriptive design that does not allow causal inference. These factors may limit the generalizability and depth of the findings.

The results suggest several practical implications. Strengthening human resource development, managerial competencies, and innovation practices is essential for enabling MSMEs to transition from basic digital use to strategic, value-creating AI integration. Training programs, capacity-building initiatives, and facilitated cross-actor collaboration can support MSMEs in enhancing their readiness for deeper digital transformation. Policymakers and local stakeholders should therefore prioritize structured entrepreneurship development, advanced digital literacy programs, and targeted mentoring tailored to the needs of tourism-based microenterprises.

Future research should explore causal relationships between AI adoption, entrepreneurial behavior, and business performance using longitudinal or mixed-method designs. Expanding the study to multiple tourism villages or integrating advanced analytical techniques—such as structural equation modeling would offer broader and more robust insights into rural digital entrepreneurship dynamics.

In conclusion, while AI-based marketing adoption in Bojong Rangkas has reached a promising level, the long-term sustainability of digital transformation will depend on strengthening entrepreneurial capabilities. Bridging the capability gap is therefore critical for ensuring that digital tools translate into meaningful innovation, competitiveness, and inclusive economic growth for rural tourism MSMEs.

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