



**INTEGRATION OF GREEN MARKETING AND DIGITAL STRATEGY ON
THE COMPETITIVENESS OF CASSAVA-BASED SMEs IN SUMENEP
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Abstract

Micro, Small, and Medium Enterprises (MSMEs) based on local products play a strategic role in regional economic development; however, they continue to face competitiveness challenges, particularly in rural areas. Increasing consumer awareness of environmental issues and the acceleration of digital transformation require MSMEs to adopt sustainable and adaptive marketing strategies. This study aims to examine the effect of green marketing and digital marketing strategies on the sustainable competitiveness of cassava-processing MSMEs in Banasarep Village, Sumenep Regency, and to develop a Smart Eco-MSME model as an integrative approach. This study employs a quantitative approach using Structural Equation Modeling–Partial Least Squares (SEM-PLS). Data were collected through a structured questionnaire with a five-point Likert scale administered to 30 cassava-processing MSMEs selected using purposive sampling. Data analysis involved outer model evaluation, inner model assessment, and hypothesis testing through bootstrapping procedures. The results indicate that green marketing has a positive and significant effect on the



sustainable competitiveness of MSMEs. Digital marketing strategies also show a positive and significant effect, with a stronger influence than green marketing. Simultaneously, green marketing and digital marketing explain 67.2% of the variance in sustainable competitiveness. These findings suggest that integrating environmental values with digital technology utilization can create long-term competitive advantages for MSMEs. This study concludes that the Smart Eco-MSME model is effectively applicable to cassava-processing MSMEs in rural areas. Policy implications highlight the importance of local government support in enhancing digital literacy, promoting green marketing practices, and developing a sustainable MSME ecosystem based on local resources.

Keywords: Green Marketing, Digital Marketing, Competitiveness, MSMEs, Smart Eco-MSME



INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) play a strategic role in economic development, particularly in developing countries such as Indonesia. MSMEs contribute significantly to job creation, income distribution, and the utilization of local resources. From a sustainable development perspective, MSMEs are not only expected to drive economic growth but also to generate social value and support environmental preservation (Delmas & Vanessa Cuerel Burbano, 2011; OCDE, 2019; Schaltegger et al., 2016).

However, market globalization, changing consumer behavior, and increasing sustainability demands present new challenges for MSMEs. Business actors are required to develop adaptive and innovative strategies in order to maintain long-term competitiveness, especially amid increasingly complex competition (Surapto & Handayani, 2025).

One of the major changes influencing MSME strategies is the growing consumer awareness of environmental issues. Consumers increasingly consider sustainability, environmental safety, and producers' social responsibility in their purchasing decisions. This condition encourages firms to adopt green marketing strategies as a means of differentiation and competitive advantage (Handayani et al., 2025; Peattie & Andrew Crane, 2025; Sanny et al., 2024).

Green marketing encompasses all marketing activities aimed at minimizing negative environmental impacts, including the selection of raw materials, production processes, packaging design, and marketing communication. Numerous studies have shown that the implementation of green marketing can enhance brand image, consumer trust, and sustainable competitive advantage, including in the MSME sector (Ichsan, 2025; Leonidou et al., 2013; Nuryakin & Maryati, 2022).

On the other hand, digital technology development has fundamentally transformed the marketing landscape. Digital marketing enables MSMEs to reach wider markets at relatively low cost, improve promotional efficiency, and strengthen real-time interactions with consumers. Digital transformation has therefore become a key factor in enhancing MSME performance and competitiveness in the digital economy era (Kraus et al., 2022; Tiago & Veríssimo, 2014).

Several studies indicate that the use of social media, marketplaces, and other digital platforms positively affects sales growth, brand visibility, and the financial sustainability of MSMEs. Digital marketing provides opportunities for MSMEs to compete with larger firms through more innovative and flexible



marketing strategies (Atika, 2023; Deku et al., 2024; May et al., 2025; Wardana & Satya Fauziah, 2021).

Despite the proven strategic benefits of green marketing and digital marketing when applied separately, their integrated implementation remains relatively limited, particularly among MSMEs in rural and peripheral areas. In fact, integrating these two approaches has the potential to create greater value by communicating sustainability commitments more broadly, transparently, and credibly to consumers (Sari & Sofia, 2025; Rachmawati et al., 2023; Telah et al., 2025).

The integration of green marketing and digital marketing enables MSMEs to communicate their environmental commitments more effectively through digital media. Information regarding the use of local raw materials, sustainable production processes, and environmental responsibility can enhance social legitimacy, consumer trust, and ultimately strengthen product competitiveness (Nurhadi et al., 2025; Porter & Kramer, 2011; Shiratina et al., 2025).

Sumenep Regency has significant potential for the development of MSMEs based on local products, particularly cassava-based enterprises. Cassava is an abundant local commodity with high economic value when processed innovatively. However, most cassava-processing MSMEs in this region still face limitations in marketing strategies and the utilization of digital technology.

In addition, the adoption of environmentally friendly practices among cassava-processing MSMEs remains suboptimal. The continued use of conventional plastic packaging, limited eco-innovation, and insufficient communication of sustainability values hinder the development of a competitive and sustainable product image. These conditions highlight the need for a marketing approach that simultaneously integrates sustainability and technology (Mirfaqo et al., 2024; Sulistiyani et al., 2025; Sulistiyani, 2024).

Based on this background, the present study focuses on analyzing the implementation and impact of sustainable marketing strategies on the competitiveness of cassava-processing MSMEs in Sumenep Regency. Specifically, the study examines the level of green marketing and digital marketing adoption among cassava-based MSMEs and analyzes the effect of each strategy on MSME competitiveness. Furthermore, this study investigates the simultaneous impact of integrating green marketing and digital marketing strategies in enhancing the competitiveness of cassava-processing MSMEs in Sumenep Regency.



LITERATURE REVIEW

Micro, Small, and Medium Enterprises (MSMEs) are productive business units that play a strategic role in the national economy, particularly in job creation, poverty alleviation, and regional economic development. In Indonesia, MSMEs are defined based on asset and turnover criteria as regulated under Law Number 20 of 2008. From a sustainable development perspective, MSMEs are not only expected to improve economic performance but also to contribute to social and environmental dimensions (BPS, 2023; OCDE, 2019).

Green marketing is defined as all marketing activities designed to minimize negative environmental impacts while emphasizing sustainability values in products, processes, and marketing communication. (Peattie & Crane, 2025) emphasize that green marketing consists of several dimensions, including green product, green price, green promotion, and green place (Ramadan & Sa'adah, 2025). The implementation of green marketing has been proven to enhance brand image, build consumer trust, and create sustainable green competitive advantage, particularly for MSMEs based on local products.

Digital marketing refers to marketing activities that utilize digital technologies, the internet, social media, and online platforms to reach, interact with, and build relationships with consumers. According to (Suharyanto et al., 2023) and (Sa'adah et al., 2023) digital marketing enables small businesses to improve marketing efficiency, expand market reach, and strengthen consumer engagement. For rural MSMEs, digital marketing serves as a strategic tool to overcome geographical and resource limitations.

Competitiveness is defined as a firm's ability to maintain long-term competitive advantage through the simultaneous creation of economic, social, and environmental value (Morisson & Fikri, 2025).

Smart Eco-MSMEs represent an integrative concept that combines the utilization of digital technology (smart) with environmental sustainability principles (eco) in MSME development. This model emphasizes the synergy between green marketing and digital marketing to create competitiveness based on local potential. The concept aligns with the Marketing 5.0 paradigm, which highlights the use of technology to create human-centered and sustainable value (Kotler & Keller, 2021; Suharyanto et al., 2023; Sulistiyani et al., 2025).

RESEARCH METHOD

This study employs a quantitative approach using Structural Equation Modeling–Partial Least Squares (SEM-PLS) to analyze the relationships among



latent variables simultaneously. SEM-PLS was selected due to its ability to handle complex models with relatively small sample sizes and its flexibility regarding data normality assumptions, making it suitable for MSME research (Hair et al., 2021).

The research population includes all cassava-processing MSMEs located in Sumenep Regency. The sampling technique used is purposive sampling, with criteria that the MSMEs are actively producing cassava-based products, have been operating for at least one year, and have engaged in digital marketing activities. Based on these criteria, the sample consists of thirty cassava-processing MSMEs located in Banasarep Village, Sumenep Regency.

Data collection was conducted using a structured questionnaire developed based on the research variable indicators. The questionnaire employed a five-point Likert scale ranging from strongly disagree to strongly agree. The questionnaires were distributed to respondents via Google Forms and printed questionnaires, adjusted to the conditions and preferences of the MSME respondents.

Data analysis was carried out using the SEM-PLS method through two main stages: outer model and inner model evaluation. The outer model assessment aimed to test the validity and reliability of the research instruments using indicators such as factor loading values, Average Variance Extracted (AVE), Composite Reliability, and Cronbach's Alpha. Subsequently, the inner model assessment was conducted to analyze the structural relationships among latent variables by examining the R-square (R^2) values, path coefficients, effect size (f^2), and predictive relevance (Q^2).

Hypothesis testing in this study was performed using the bootstrapping technique, with a t-statistic threshold of at least one point nine six and a p-value threshold of at most zero point zero five to determine the significance of the relationships among variables. All data analysis processes were conducted using SmartPLS version four or WarpPLS software, which supports comprehensive and accurate SEM-PLS analysis.

RESULTS AND DISCUSSION

Convergent Validity Test (Loading Factor)

The results of the descriptive statistical test on the independent variables, moderated dependent variables can be seen in the following table:



Table 1.
Descriptive Analysis Results

Variables	Indicator	Test Result
Green Marketing	X1.1	0.742
	X1.2	0.781
	X1.3	0.764
	X1.4	0.718
	X1.5	0.756
	X1.6	0.734
Digital Marketing	X2.1	0.812
	X2.2	0.785
	X2.3	0.798
	X2.4	0.764
	X2.5	0.772
Daya Saing	X3.1	0.821
	X3.2	0.794
	X3.3	0.808
	X3.4	0.786
	X3.5	0.801

Source: Data Processed (2026)

The green marketing indicators, digital marketing indicators, and competitiveness indicators all show loading values above the recommended threshold, indicating that each indicator is able to represent its latent construct strongly and consistently; therefore, the measurement model is considered valid and suitable for further analysis using SEM-PLS.

Average Variance Extracted (AVE) Test

Table 2
Result Average Variance Extracted (AVE) Test

Variables	AVE
Green Marketing	0.562
Digital Marketing	0.614
Competitiveness	0.637

Source: Data Processed (2026)

The AVE test results indicate that green marketing, digital marketing, and competitiveness meet the convergent validity criterion, meaning that each construct is able to explain more than half of the variance of its indicators and



that the measurement model is appropriate for use in SEM-PLS structural analysis.

Convergent Validity (Loading Factor) Test

Table 3

Result Convergent Validity (Loading Factor) Test

Variables	Cronbach's Alpha	Composite Reliability
Green Marketing	0.821	0.864
Digital Marketing	0.846	0.887
Competitiveness	0.859	0.901

Source: Data Processed (2026)

The reliability test results show that all constructs have Cronbach's Alpha and Composite Reliability values above the accepted threshold, confirming that the research instruments are reliable, internally consistent, and suitable for use in SEM-PLS structural model testing.

Discriminant Validity (HTMT) Test

Table 4

Result Discriminant Validity (HTMT) Test

Variables	Green Marketing	Digital Marketing	Competitiveness
Green Marketing			
Digital Marketing	0.683		
Competitiveness	0.721	0.758	

Source: Data Processed (2026)

The discriminant validity test using the HTMT criterion indicates that all inter-construct values are below the recommended threshold, confirming that each construct has adequate conceptual distinctiveness and that discriminant validity in the research model is achieved.

INNER MODEL (Structural Model)

R-Square (R²) Test

Table 5

R-Square (R²) Test Results

Variable Endogen	R ²
Competitiveness	0.672

Source: Data Processed (2026)

The inner model evaluation shows that the R-square value indicates green marketing and digital marketing jointly explain a substantial proportion of the variation in the competitiveness of cassava-based MSMEs in Desa



Banasarep, reflecting strong explanatory power of the model and suitability for a relatively small sample size (Hair et al., 2021).

Path Coefficient and Hypothesis (Bootstrapping) Test

Table 6

Result Path Coefficient & Hypothesis (Bootstrapping) Test

Relationship	Coefficient	T-Stat	P-Value	Decision
Green Marketing → Competitiveness	0.356	2.214	0.027	Accepted
Digital Marketing → Competitiveness	0.482	3.104	0.002	Accepted

Source: Data Processed (2026)

The bootstrapping path coefficient results indicate that green marketing has a positive and significant effect on MSME competitiveness (coefficient = 0.356, T-statistic = 2.214, P-value = 0.027), leading to the acceptance of the first hypothesis (H1), while digital marketing also shows a positive and significant effect on competitiveness (coefficient = 0.482, T-statistic = 3.104, P-value = 0.002), thus supporting the second hypothesis (H2).

Effect Size (f²) Test

Table 7

Result Effect Size (f²) Test

Relationship	f ²	Decision
Green Marketing → Competitiveness	0.158	Sedang
Digital Marketing → Competitiveness	0.273	Sedang–Kuat

Source: Data Processed (2026)

The effect size (f²) analysis shows that green marketing has a moderate effect on competitiveness (f² = 0.158), while digital marketing exerts a moderate-to-strong and more dominant influence (f² = 0.273) in enhancing the competitiveness of cassava-processing MSMEs in rural areas.

Predictive Relevance (Q²)

Table 8.

Predictive Relevance (Q²)

Variable Endogen	Q ²
Competitiveness	0.412

Source: Data Processed (2026)

In addition, the predictive relevance (Q²) value of 0.412 confirms that the model has good predictive capability, while also indicating that the integration



of green marketing and digital marketing is a key factor in building MSME competitiveness, with digital marketing acting as the main driving force for cassava-processing MSMEs in Banasarep Village, Sumenep Regency.

Discussion

The results of the SEM-PLS analysis indicate that green marketing has a positive and significant effect on the competitiveness of cassava-processing MSMEs in Banasarep Village, Sumenep Regency, suggesting that the implementation of environmentally friendly marketing principles across product, price, promotion, and distribution aspects is able to create added value and sustainable competitive advantage. This finding is relevant to the characteristics of MSMEs in Sumenep Regency, which are still predominantly based on local resources with limited production scale (BPS, 2023). Green product practices, such as the use of safe local cassava raw materials and production processes with minimal waste, have been shown to strengthen sustainability-based product positioning, in line with the findings of (Budiono et al., 2023; Dafit & Ismail, 2025; Sofyan & Fitriani, 2023) and supporting a green economy orientation in local food MSMEs (Jubaedah et al., 2022; Ramadan & Sa'adah, 2025). In addition, green promotion that emphasizes transparency and environmental concern enhances consumer trust and loyalty, as highlighted by (Leonidou et al., 2013) and (Fraj et al., 2011) although its impact remains moderate due to limitations in sustainability awareness, production resources, and policy support for rural MSMEs (Ainurrokhim et al., 2025; Akbar & Wijaya, 2024; Amalia et al., 2025).

Furthermore, the digital marketing strategy is proven to have a stronger positive and significant effect on MSME competitiveness compared to green marketing, confirming that the use of digital technology is a key factor for cassava-processing MSMEs in rural areas. Marketing digitalization enables MSMEs to overcome geographical constraints and expand market access efficiently without relying on conventional channels (Morisson & Fikri, 2025; Sa'adah et al., 2023). The use of social media and marketplaces increases the visibility of local products, while digital content that showcases production processes, product uniqueness, and local cassava values enhances perceived quality, trust, and customer loyalty, which ultimately strengthens business competitiveness. These findings are consistent with (Suharyanto et al., 2023) and (Taiminen & Karjaluoto, 2015) are further reinforced by (Dwivedi et al., 2021), who emphasize the strategic role of social media in building long-term relationships with consumers, while also supporting dynamic capability theory related to MSMEs' adaptive capabilities in a dynamic business environment.



The integration of green marketing and digital marketing demonstrates very strong results, as reflected by an R^2 value of 0.672, indicating that both strategies simultaneously explain a substantial proportion of the variation in MSME competitiveness, thereby emphasizing the importance of synergy between sustainability orientation and digital technology utilization. This finding aligns with the concept of Marketing 5.0, which integrates technology and human values (Kotler & Keller, 2021). The Smart Eco-MSME model developed in this study positions green marketing as a creator of sustainability value and digital marketing as an accelerator for delivering that value widely and efficiently, in line with the triple bottom line concept (Saadah et al., 2024). This finding is also supported by (Rahman et al., 2024). Overall, this study confirms that the integration of green marketing and digital marketing is an effective strategy for enhancing the competitiveness of cassava-processing MSMEs in rural areas, particularly in Sumenep Regency, while also enriching the literature that has largely focused on urban contexts and large-scale industries.

CONCLUSION

The findings indicate that green marketing and digital marketing simultaneously serve as key determinants of rural MSME competitiveness, with green marketing contributing to value creation, product differentiation, and the strengthening of consumer trust and loyalty, although its implementation remains constrained by limited awareness and resources. In contrast, digital marketing demonstrates a more dominant influence through market expansion, enhanced consumer interaction, and the strengthening of local product image based on digital technology. The strong predictive capability of the model confirms that the integration of these two strategies represents an effective approach to building sustainable MSME competitiveness. Accordingly, the policy implication is the need for an active role of local governments and relevant stakeholders in formulating integrated policies that support the strengthening of green marketing literacy, mentoring in environmentally friendly production practices, and facilitation of digital marketing adoption through training, assistance, and the provision of digital infrastructure, so that the Smart Eco-MSME model can be optimally implemented to enhance the competitiveness and sustainability of MSMEs based on local potential in Sumenep Regency.

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