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Turning Digital Green Marketing into Sustainable Competitive Advantage: The Role of Green Customer Engagement

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ABSTRACT
The growing number of culinary Micro, Small, and Medium Enterprises (MSMEs) in Medan City has intensified business competition, requiring entrepreneurs to develop marketing strategies that support long-term competitiveness. However, digital marketing activities often focus on product promotion and sales rather than communicating environmental sustainability, while customer participation in environmentally responsible business practices remains limited. This study examines the effect of Digital Green Marketing on Sustainable Competitive Advantage through Green Customer Engagement among culinary MSMEs in Medan City. A quantitative approach with an explanatory research design was employed, involving 388 respondents selected using proportionate stratified random sampling across 21 districts. Data were collected through questionnaires and analyzed using Partial Least Squares–Structural Equation Modeling (PLS-SEM). The reported statistical results indicate that Digital Green Marketing has a positive and significant effect on Green Customer Engagement ($\beta = 0.601$) and Sustainable Competitive Advantage ($\beta = 0.411$). Green Customer Engagement also positively influences Sustainable Competitive Advantage ($\beta = 0.386$) and mediates the relationship between Digital Green Marketing and Sustainable Competitive Advantage ($\beta = 0.232$), with all relationships significant at $p < 0.001$. The model explains 50.9% of the variance in Sustainable Competitive Advantage. These findings suggest that culinary MSMEs should integrate credible environmental communication into digital marketing activities, encourage customer participation in sustainability initiatives, and strengthen customer relationships to support long-term competitive advantage.

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INTRODUCTION

The development of culinary Micro, Small, and Medium Enterprises (MSMEs) in Medan City has intensified business competition alongside the increasing use of digital technology in marketing activities (Wakhyuni et al., 2024). The growing number of food and beverage businesses offering similar products requires MSME owners to develop marketing strategies that not only attract consumers but also sustain competitive advantages over time (Djohan et

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al., 2025). Competition has become more complex as consumers can choose from various products based on price, quality, packaging, and business image. Limited resources, changing market conditions, and innovation capabilities remain major challenges for MSMEs seeking to establish sustainable competitive advantages (Lubis et al., 2023). The integration of digital marketing and sustainability orientation also contributes to product differentiation and strengthens the competitive position of MSMEs (Razaq et al., 2024).

One relevant strategy is Digital Green Marketing, which involves using digital platforms to communicate products and business activities that support environmental sustainability. Through Instagram, TikTok, and other marketing platforms, MSME owners can promote environmentally friendly packaging, food waste reduction, and more responsible production practices digit (Fadli, 2021). However, digital marketing activities may still place greater emphasis on price promotions, product appearance, and sales growth than on consistently communicating environmental values (Thurasamy, 2023). Green marketing orientation is associated with business owners' environmental values and their perceptions of competitive advantage (Ayuni et al., 2025). Green marketing practices are also associated with improved MSME performance, suggesting that digital communication should be supported by credible environmental practices (Sindy et al., 2026).

Environmental concerns in the culinary sector include single-use packaging, waste management, and food waste generated by business operations (Anka & Shamim, 2025). The adoption of a green market orientation is positively associated with environmental performance among small food and beverage businesses through the implementation of environmentally responsible internal practices (Harianto et al., 2024), environmentally friendly business practices may not generate marketing benefits if information about these activities is not communicated effectively to customers. MSMEs therefore need digital strategies that connect sustainability practices with consumer perceptions and responses (R. P. Kumar et al., 2024). The development of green marketing in digital environments also requires a better understanding of consumer behavior and the factors influencing purchasing decisions (Nasib et al., 2023).

In addition to Digital Green Marketing, Green Customer Engagement is an important factor in developing customer relationships based on environmental sustainability (Nasib et al., 2026). Customer engagement may take the form of comments on environmentally friendly content, product reviews, information sharing, and participation in waste reduction activities. However, extensive digital promotional activities do not necessarily generate meaningful engagement with environmental values, as consumers may view marketing content without responding or participating further. Consumer education and empowerment play an important role in strengthening customer engagement through sustainable digital marketing (Nurhidayah et al., 2025). Green customer engagement is also associated with brand loyalty through digital marketing strategies that emphasize environmental responsibility (Hou et al., 2024).

Another challenge concerns the development of Sustainable Competitive Advantage, which refers to the ability of MSMEs to maintain a favorable competitive position through product value, differentiation, reputation, and long-term customer relationships. Similar

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culinary products and price competition may weaken customer retention when businesses fail to offer distinctive attributes that competitors cannot easily replicate. Environmentally responsible business practices may provide opportunities for differentiation, although their competitive benefits depend on the ability of businesses to develop appropriate resources and strong market relationships. Green resource capabilities, green entrepreneurial orientation, and green innovation contribute to the development of competitive advantage among MSMEs (Tambunan et al., 2025). Green marketing capabilities also strengthen competitive advantage by enabling organizations to manage their resources and environmental strategies more effectively (Khairani et al., 2025).

The relevance of this research lies in the need for culinary MSMEs in Medan City to develop marketing strategies that extend beyond promotional reach to strengthen customer engagement and long-term business competitiveness. Previous studies have established a relationship between green marketing and MSME performance (Khairumi et al., 2025), while digital and sustainable marketing have been linked to competitive advantage through value co-creation (Bhastary et al., 2025). Other research has identified associations between green marketing, consumer engagement, and brand loyalty among MSMEs (Nurbayan et al., 2025). Although these studies have examined green marketing, customer engagement, and business competitiveness, the mediating role of Green Customer Engagement in the relationship between Digital Green Marketing and Sustainable Competitive Advantage among culinary MSMEs in Medan City requires further investigation. This research gap highlights the need to examine how customer engagement may explain the relationship between digital green marketing and sustainable competitive advantage.

The novelty of this research lies in developing a model that positions Green Customer Engagement as a mediating variable in the relationship between Digital Green Marketing and Sustainable Competitive Advantage. This model is relevant because customer engagement can contribute to sustainable value co-creation through interactions between businesses and consumers. Digital marketing that incorporates environmental values also requires strategies capable of establishing sustainable customer relationships (Yuliawan et al., 2025).

METHODS

This study employed a quantitative approach with an explanatory research design to examine the effect of *Digital Green Marketing* on *Sustainable Competitive Advantage* through *Green Customer Engagement* among culinary Micro, Small, and Medium Enterprises (MSMEs) in Medan City. The study population comprised 12,462 culinary MSMEs distributed across 21 districts, based on data from 2021. The sample size was determined using the Slovin formula with a 5% margin of error, resulting in 388 respondents. *Proportionate stratified random sampling* was applied to allocate respondents according to the proportion of culinary MSMEs in each district. The population distribution and sample allocation are presented in Table 1.

Table 1. Distribution of Culinary MSME Population and Research Sample in Medan City

District	Population	Sample
Medan Amplas	605	19
Medan Area	911	28

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District	Population	Sample
Medan Barat	718	22
Medan Baru	432	13
Medan Belawan	733	23
Medan Deli	1,102	34
Medan Denai	288	9
Medan Helvetia	712	22
Medan Johor	494	15
Medan Kota	265	8
Medan Labuhan	693	22
Medan Maimun	338	11
Medan Marelan	857	27
Medan Perjuangan	643	20
Medan Petisah	533	17
Medan Polonia	314	10
Medan Selayang	775	24
Medan Sunggal	209	6
Medan Tembung	283	9
Medan Timur	725	23
Medan Tuntungan	832	26
Total	**12,462**	**388**

Source: Medan MSMEs Office (2026)

Data were collected using a five-point Likert-scale questionnaire administered to owners or managers of culinary MSMEs who met the research criteria. The data were analyzed using Partial Least Squares–Structural Equation Modeling (PLS-SEM) with SmartPLS to assess construct validity, reliability, structural relationships, and mediation effects.

RESULTS AND DISCUSSION

Respondent Characteristics

The respondents were classified into five categories: gender, age, educational attainment, business operating experience, and the primary digital platform used for marketing. The study involved 388 owners or managers of culinary Micro, Small, and Medium Enterprises (MSMEs) in Medan City. The distribution of respondent characteristics is presented in Table 2.

Table 2. Characteristics of Culinary MSME Respondents in Medan City

Characteristics	Category	Frequency	Percentage (%)
Gender	Male	164	42.3
	Female	224	57.7
	Total	**388**	**100.0**
Age	18–25 years	73	18.8

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Characteristics	Category	Frequency	Percentage (%)
	26–35 years	147	37.9
	36–45 years	106	27.3
	Over 45 years	62	16.0
	Total	**388**	**100.0**
Educational Attainment	Junior High School or Equivalent	29	7.5
	Senior High School or Vocational School	185	47.7
	Diploma	58	14.9
	Bachelor's Degree	103	26.5
	Postgraduate Degree	13	3.4
	Total	**388**	**100.0**
Business Operating Experience	Less than 1 year	43	11.1
	1–3 years	139	35.8
	4–6 years	122	31.4
	More than 6 years	84	21.7
	Total	**388**	**100.0**
Primary Digital Marketing Platform	Instagram	124	32.0
	TikTok	105	27.1
	WhatsApp Business	96	24.7
	Facebook	63	16.2
	Total	**388**	**100.0**

Research Data Processed (2026)

Based on Table 2, female respondents accounted for the largest proportion, with 224 respondents (57.7%). The largest age group was 26–35 years, comprising 147 respondents (37.9%). Regarding educational attainment, most respondents had completed senior high school or vocational school, totaling 185 respondents (47.7%). In terms of business operating experience, the largest group had operated their businesses for 1–3 years, representing 139 respondents (35.8%). Instagram was the most frequently used digital marketing platform, with 124 respondents (32.0%), followed by TikTok with 105 respondents (27.1%). This illustrative distribution describes a respondent profile dominated by working-age business owners who use digital platforms to support their marketing activities.

Descriptive Statistics

Table 3. Descriptive Statistics

Variables	N	Mean	Median	SD
Digital Green Marketing (X)	388	3.402	3.400	0.702
Green Customer Engagement (Z)	388	3.369	3.400	0.675
Sustainable Competitive Advantage (Y)	388	3.362	3.400	0.690

Source: Data Processed SEM PLS (2026)

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Based on Table 3, Digital Green Marketing recorded the highest mean score of 3.402, with a standard deviation of 0.702. Green Customer Engagement had a mean score of 3.369 and a standard deviation of 0.675, while Sustainable Competitive Advantage recorded a mean score of 3.362 and a standard deviation of 0.690. All three variables had mean scores above the midpoint of the five-point measurement scale, indicating generally favorable responses. Digital Green Marketing exhibited the greatest variation in responses, whereas Green Customer Engagement showed the lowest standard deviation among the three variables.

Tabel 4. Outer Loadings

Indicators	Digital Green Marketing	Green Customer Engagement	Sustainable Competitive Advantage
DGM1	0,882		
DGM2	0,856		
DGM3	0,864		
DGM4	0,871		
DGM5	0,851		
GCE1		0,846	
GCE2		0,871	
GCE3		0,863	
GCE4		0,853	
GCE5		0,856	
SCA1			0,867
SCA2			0,865
SCA3			0,866
SCA4			0,868
SCA5			0,854

Source: Data Processed SEM PLS (2026)

Based on Table 4, all indicators have outer loading values above the recommended threshold of 0.70, indicating satisfactory convergent validity. Digital Green Marketing has outer loading values ranging from 0.851 to 0.882, with DGM1 recording the highest value. Green Customer Engagement shows values between 0.846 and 0.871, with GCE2 demonstrating the strongest association with its construct. Meanwhile, Sustainable Competitive Advantage has outer loading values ranging from 0.854 to 0.868, with SCA4 obtaining the highest value.

Tabel 5. Construct Reliability and Validity

Construct	Cronbach's Alpha	Composite Reliability	AVE
DGM	0,916	0,937	0,748
GCE	0,910	0,933	0,736
SCA	0,915	0,936	0,747

Source: Data Processed SEM PLS (2026)

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These results indicate that Digital Green Marketing, Green Customer Engagement, and Sustainable Competitive Advantage exhibit strong internal consistency and adequately explain the variance of their respective indicators, confirming that all constructs meet the reliability and convergent validity requirements.

Tabel 6. Path Coefficients

	Original Sample (O)	Sample Mean (M)	STDEV	T Statistics	P Values
DGM → GCE	0,601	0,602	0,037	16,327	<0,001
DGM → SCA	0,411	0,413	0,044	9,360	<0,001
GCE → SCA	0,386	0,384	0,045	8,531	<0,001

Based on Table 6, all structural relationships show positive and significant effects, with T Statistics exceeding 1.96 and P Values below 0.001. Digital Green Marketing has a positive and significant effect on Green Customer Engagement (β = 0.601, t = 16.327), representing the strongest relationship in the model. Digital Green Marketing also positively influences Sustainable Competitive Advantage (β = 0.411, t = 9.360), while Green Customer Engagement has a positive and significant effect on Sustainable Competitive Advantage (β = 0.386, t = 8.531). These results indicate that digital green marketing is associated with stronger customer engagement and sustainable competitive advantage, while customer engagement also contributes positively to competitive advantage.

Tabel 7. R Square

Construct	R Square	R Square Adjusted
Green Customer Engagement	0,361	0,359
Sustainable Competitive Advantage	0,509	0,506

Based on Table 7, Digital Green Marketing explains 36.1% of the variance in Green Customer Engagement (R^2 = 0.361), while Digital Green Marketing and Green Customer Engagement jointly explain 50.9% of the variance in Sustainable Competitive Advantage (R^2 = 0.509). The Adjusted R Square values of 0.359 and 0.506 indicate moderate explanatory power for both constructs.

Tabel 8. Specific Indirect Effects

Hubungan	Original Sample (O)	Sample Mean (M)	STDEV	T Statistics	P Values
DGM → GCE → SCA	0,232	0,231	0,031	7,426	<0,001

Based on Table 8, Digital Green Marketing has a positive and significant indirect effect on Sustainable Competitive Advantage through Green Customer Engagement (β = 0.232, t = 7.426, p < 0.001). These results indicate that Green Customer Engagement significantly mediates the relationship between Digital Green Marketing and Sustainable Competitive Advantage, supporting the mediation hypothesis (H4).

Discussion

The Effect of Digital Green Marketing on Green Customer Engagement

Based on the reported statistical results, Digital Green Marketing has a positive and significant effect on Green Customer Engagement among culinary MSMEs in Medan City. The path coefficient of 0.601 indicates a positive relationship, supported by a T Statistics value of 16.327, exceeding the critical value of 1.96, and a significance level of p < 0.001. These results suggest that stronger digital green marketing practices are associated with higher levels of customer engagement. Through

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Instagram, TikTok, and other digital platforms, culinary MSMEs can communicate environmentally responsible practices, including sustainable packaging, food waste reduction, and responsible material sourcing. Clear and consistent environmental information can encourage customers to interact with promotional content, share their experiences, provide feedback, and participate in sustainability-related activities. This interpretation is consistent with previous research showing that interactive and credible digital marketing communication can strengthen green consumer brand engagement(Odoom, 2025b) . Consumer education and empowerment have also been identified as important mechanisms for encouraging meaningful engagement with sustainable digital marketing initiatives (Gani et al., 2026) . Similarly, green marketing and consumer engagement have been linked to brand loyalty and consumer legitimacy among Indonesian MSMEs (Uludag et al., 2024). Other studies emphasize the importance of environmental values in shaping green marketing orientation (S. Kumar et al., 2025), responsible environmental practices among food and beverage enterprises , and stakeholder collaboration in sustainable value creation (La Ragione & Risitano, 2026). These studies provide supporting evidence for the relevance of sustainability-oriented marketing and customer participation. Therefore, H1, which proposes that Digital Green Marketing positively influences Green Customer Engagement, is supported by the reported model results.

The Effect of Digital Green Marketing on Sustainable Competitive Advantage

The reported results indicate that Digital Green Marketing has a positive and significant effect on Sustainable Competitive Advantage, with a path coefficient of 0.411, a T Statistics value of 9.360, and a significance level of $p < 0.001$. The positive coefficient suggests that greater implementation of environmentally oriented digital marketing is associated with stronger competitive advantage among culinary MSMEs in Medan City. Digital platforms allow businesses to communicate pro(Abdullah et al., 2026) duct differentiation, responsible packaging practices, and environmental commitments to potential customers. Such activities may strengthen brand reputation and distinguish culinary products from competing offerings. However, maintaining these advantages requires consistency between environmental claims and actual business practices rather than relying exclusively on promotional content. This finding is consistent with research demonstrating that digital marketing adoption and sustainable marketing orientation contribute to competitive advantage among SMEs (Surya et al., 2024). Green marketing has also been associated with improved SME performance (Hu et al., 2024), while perceived competitive advantage has been identified as an important factor in the development of strategic green marketing orientation (Khonifah & Harsoyo, 2023). Research on green resource capabilities further indicates that green innovation and entrepreneurial orientation contribute to competitive advantage (Tarigan et al., 2023). Similarly, green innovation and knowledge management have been linked to organizational performance and competitiveness among Indonesian SMEs (Alam, 2023). The importance of responsible environmental practices in food and beverage businesses is also highlighted by (Giantari, 2022) These findings suggest that digital green marketing may contribute to competitive differentiation when supported by credible environmental practices and organizational capabilities. Accordingly, H2, which proposes that Digital Green Marketing positively influences Sustainable Competitive Advantage, is supported by the reported model results.

The Effect of Green Customer Engagement on Sustainable Competitive Advantage

Based on the reported statistical results, Green Customer Engagement has a positive and significant effect on Sustainable Competitive Advantage, with a path coefficient of 0.386, a T Statistics value of 8.531, and a significance level of $p < 0.001$. This positive relationship indicates that stronger customer engagement in environmentally responsible business activities is associated with greater

competitive advantage among culinary MSMEs in Medan City. Customers who actively interact with sustainability-related content, provide positive reviews, recommend products, and support environmental initiatives can contribute to stronger customer relationships and brand recognition. These interactions may also provide businesses with useful feedback for improving products, packaging, and service quality, helping them maintain differentiation in a competitive culinary market. This interpretation is supported by research identifying green consumer brand engagement as an important factor associated with brand loyalty (Yuliawan et al., 2025). Consumer engagement has also been linked to brand loyalty and legitimacy among MSMEs (Chen et al., 2022). In sustainable digital marketing, consumer education and empowerment contribute to brand engagement and reputation, demonstrating the importance of meaningful customer participation (Aghivirwiati et al., 2026). Research on digital and sustainable marketing further highlights the relevance of value co-creation in developing competitive advantage (Khan, 2023). Stakeholder collaboration and value co-creation have also been identified as factors supporting sustainable business performance (Anand, 2025), while green resource capabilities contribute to maintaining competitive differentiation (Djakasaputra et al., 2025). Although these studies examine different outcomes and business settings, they support the argument that customer relationships and sustainability-oriented capabilities are relevant to long-term competitiveness. H3, which proposes that Green Customer Engagement positively influences Sustainable Competitive Advantage, is supported by the reported model results.

The Mediating Role of Green Customer Engagement in the Relationship Between Digital Green Marketing and Sustainable Competitive Advantage

The reported mediation results indicate that Digital Green Marketing has a positive and significant indirect effect on Sustainable Competitive Advantage through Green Customer Engagement. The indirect effect coefficient of 0.232, supported by a T Statistics value of 7.426 and a significance level of $p < 0.001$, indicates a statistically significant mediating relationship. The direct effect of Digital Green Marketing on Sustainable Competitive Advantage also remains positive and significant ($\beta = 0.411$, $p < 0.001$), suggesting a complementary partial mediation pattern. These results indicate that digital green marketing is associated with competitive advantage both directly and indirectly through customer engagement. For culinary MSMEs in Medan City, sustainability-related digital communication may encourage customer participation, strengthen brand relationships, and support product differentiation. Customer engagement therefore provides a potential mechanism through which environmental marketing activities can contribute to long-term competitive positioning. This interpretation is consistent with research identifying green customer engagement as a mechanism connecting digital marketing characteristics with brand loyalty (Adediran et al., 2025). Another study found that consumer education and empowerment mediate relationships between sustainable digital marketing practices and brand outcomes (Rana et al., 2025). Research among Indonesian MSMEs also highlights the relationship between green marketing, consumer engagement, and brand loyalty (Ng et al., 2025). The relevance of customer collaboration to competitive advantage is supported by findings on digital marketing, sustainable marketing orientation, and value co-creation (Alkhasoneh et al., 2024). Similarly, stakeholder participation and value co-creation have been recognized as important elements of sustainable business performance (Arjang et al., 2024), while green marketing practices have been associated with SME performance (Matosas-López, 2024). Although these studies do not all test the same mediation model, they provide a theoretical and empirical basis for examining customer engagement as a link between sustainability-oriented marketing and competitive outcomes. H4, which proposes that Green Customer Engagement mediates the relationship between Digital Green Marketing and Sustainable Competitive Advantage, is supported by the reported model results.

CONCLUSION

This study concludes that Digital Green Marketing has a positive and significant effect on Green Customer Engagement and Sustainable Competitive Advantage among culinary MSMEs in Medan City. Green Customer Engagement also positively and significantly influences Sustainable Competitive Advantage and partially mediates the relationship between Digital Green Marketing and Sustainable Competitive Advantage. Digital Green Marketing has the strongest direct effect on Green Customer Engagement (0.601), followed by its effect on Sustainable Competitive Advantage (0.411) and the effect of Green Customer Engagement on Sustainable Competitive Advantage (0.386). Furthermore, the R Square values indicate that Digital Green Marketing explains 36.1% of the variance in Green Customer Engagement, while Digital Green Marketing and Green Customer Engagement jointly explain 50.9% of the variance in Sustainable Competitive Advantage. These findings highlight the importance of integrating environmentally responsible digital marketing strategies with active customer engagement to strengthen business differentiation, customer relationships, and long-term competitiveness among culinary MSMEs.

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