

Green Marketing Model in Developing Bidadari Waterfall Nature Tourism in Canti Village, South Lampung Regency

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Abstract: This study aims to develop and test an integrated, local wisdom-based green marketing model for sustainable nature tourism at Bidadari Waterfall in Canti Village, South Lampung Regency. Unlike prior studies treating green marketing, digital marketing, environmental awareness, regulation, and local wisdom separately, this research integrates them into a unified explanatory model and positions digital marketing as a mediating variable between green marketing and sustainable tourism. Quantitative explanation was applied using Structural Equation Modeling–Partial Least Squares SEM-PLS. Data were collected from 154 respondents comprising residents, Pokdarwis administrators, and domestic tourists through purposive sampling. The research instrument was adapted from previous studies and contextualized to village-based waterfall tourism. The results show that environmental awareness regulation and local wisdom have significant positive effects on green marketing, with local wisdom being the strongest determinant. This indicates the importance of cultural values and community-based ecological ethics in shaping sustainable tourism marketing. Green marketing influences digital marketing and sustainable tourism, while digital marketing partially mediates the relationship. These findings confirm that sustainable tourism development requires an integrated approach combining ecological awareness, regulatory support, local culture, green value creation, and digital communication. The study contributes to the green marketing literature by integrating local wisdom and digital mediation and proposes the Canti Green Tourism Marketing Model.

Keywords: *Environmental awareness, Regulation, Local wisdom, Green marketing*

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INTRODUCTION

Nature based tourism has emerged as a significant component of regional development due to its ability to generate economic, social, and environmental advantages for surrounding communities. Tourist destinations such as waterfalls, coastal areas, mountains, forests, and rural landscapes can support job creation, encourage the growth of micro and small businesses, improve local revenue, and enhance community involvement in tourism-related activities. In developing areas, nature tourism is therefore not merely a form of recreation but also an important strategy for promoting inclusive and sustainable development at the local level (Grilli et al., 2021).

However, the development of nature tourism also presents complex challenges. The increasing number of tourists, infrastructure development, changes in tourist behavior, and competition among destinations may create pressure on the natural environment. If tourism is not managed properly, it can lead to environmental degradation, waste problems, damage to natural landscapes, and the weakening of local socio-cultural values.



Therefore, the development of nature tourism must be directed not only toward increasing tourist visits, but also toward maintaining environmental quality, strengthening community welfare, and preserving local identity (Bahja & Hancer, 2021).

Sustainable tourism is a relevant approach to address these challenges because it emphasizes a balance between economic benefits, environmental conservation, and socio-cultural preservation. In the context of rural nature tourism, sustainability requires the active involvement of various stakeholders, including local communities, tourism awareness groups, village governments, tourists, and destination managers. Sustainable tourism cannot be achieved through physical development alone, but must be supported by responsible governance, environmental awareness, local participation, and appropriate marketing strategies (Nugroho & Numata, 2022; Wu et al., 2023).

One strategic approach to supporting sustainable tourism development is green marketing. In tourism, green marketing refers to the process of creating, communicating, and delivering tourism value based on environmental responsibility. Green marketing is not limited to promoting environmentally friendly destinations; it also includes developing green tourism products, conservation-based services, responsible visitor management, and sustainability-oriented destination branding. Through green marketing, tourism destinations can build a positive image, increase tourist trust, and encourage responsible tourism behavior (Qureshi & Mehraj).

The implementation of green marketing is increasingly important in nature-based destinations because their attractiveness depends directly on environmental quality. A waterfall destination, for example, will lose its tourism value if the surrounding environment is polluted, access is poorly managed, waste is uncontrolled, or local communities are excluded from tourism benefits. Therefore, green marketing must be understood not merely as a promotional tool, but as a strategic approach that connects environmental protection, community participation, destination competitiveness, and sustainable tourism outcomes (Apaza-Panca et al., 2024; Majeed et al., 2022).

In the current digital era, green marketing also needs to be supported by digital marketing. Digital platforms such as social media, websites, online maps, digital storytelling, and visual content allow tourism managers to communicate sustainability values to a wider audience. Digital marketing can introduce tourists to environmental rules, local culture, responsible behavior, waste reduction, and conservation messages before they visit the destination. Thus, digital marketing functions not only as a promotional medium but also as an educational and persuasive communication channel that can strengthen sustainable tourism practices (Khan et al., 2022; Veseli et al., 2025).

In addition to environmental and technological dimensions, the development of sustainable nature tourism is strongly influenced by regulation and local wisdom. Regulation provides formal direction, standards, and legitimacy for destination management, including rules related to visitor behavior, waste management, tariffs, conservation areas, and institutional coordination. Meanwhile, local wisdom reflects community values, norms, traditions, and ecological ethics that guide the relationship between humans and nature. In village-based tourism, local wisdom can become a source of authenticity, social legitimacy, and destination differentiation (Mahrinasari et al., 2024).

Bidadari Waterfall in Canti Village, South Lampung Regency, is one of the nature tourism destinations that has strong potential to be developed as a sustainable tourism attraction. The destination offers natural beauty, a rural atmosphere, and opportunities

for community-based tourism development. However, its empirical condition shows that the destination has not been managed optimally. Several problems remain, including the absence of a clear tariff system, limited supporting facilities, weak waste management, inadequate directional signs, limited visitor amenities, and the lack of structured digital promotion. These conditions indicate that the main problem is not only related to infrastructure but also to the absence of an integrated green marketing model that connects environmental awareness, regulation, local wisdom, digital communication, and sustainable tourism development.

Previous studies have widely examined green marketing, digital marketing, environmental awareness, local wisdom, and sustainable tourism. However, most of these studies tend to examine these variables separately or focus only on direct relationships between green marketing and tourism outcomes. Green marketing is often treated as a general promotional strategy, while local wisdom is frequently positioned only as a cultural background rather than as an antecedent of green marketing. In addition, digital marketing is often discussed as a tool for increasing destination visibility, but its mediating role in strengthening the relationship between green marketing and sustainable tourism remains underexplored. This highlights a research gap regarding how green marketing is shaped and implemented in village-based waterfall tourism destinations by integrating environmental, institutional, socio-cultural, and digital dimensions (Upadhyay et al., 2022).

Given this gap, the novelty of this study lies in the development of an integrated, local wisdom-based green marketing model for sustainable nature tourism. This study does not merely retest common variables in a different location. However, it offers a model that positions environmental awareness, regulation, and local wisdom as antecedents of green marketing. In contrast, digital marketing is examined as a mediating mechanism between green marketing and sustainable tourism. Therefore, this study aims to develop and test an integrated green marketing model for Bidadari Waterfall, Canti Village, South Lampung Regency. Specifically, this study analyzes the effects of environmental awareness, regulation, and local wisdom on green marketing, examines the influence of green marketing on digital marketing and sustainable tourism, and evaluates the mediating role of digital marketing in the relationship between green marketing and sustainable tourism. Therefore, the research model is as follows:

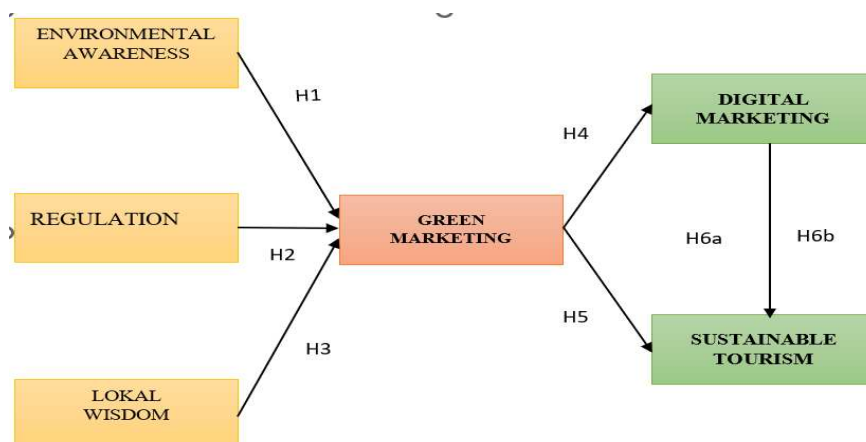


Figure 1. Conceptual Framework of the Study on the Green Marketing Model for Developing Sustainable Nature Tourism in Bidadari Waterfall, Canti Village, South Lampung Regency

This study is grounded in Stakeholder Theory, which explains that the sustainability of an organization or tourism destination depends on its ability to manage relationships with stakeholders who influence or are influenced by its activities. In the context of nature-based tourism, these stakeholders include local communities, tourists, tourism awareness groups, village governments, destination managers, local business actors, and environmental institutions. Although each stakeholder may have different interests, sustainable tourism can only be achieved when these interests are integrated into responsible and collaborative destination governance (Wu et al., 2023). Stakeholder Theory is therefore relevant to the development of Bidadari Waterfall because the destination's sustainability cannot be understood solely from the perspective of tourist arrivals or promotional activities. It is also determined by the interaction between environmental awareness, regulatory support, local wisdom, green marketing, digital marketing, and the participation of the stakeholders involved in managing and using the destination.

This study is also supported by the Natural Resource-Based View, which argues that environmental capabilities and the responsible management of natural resources can become sources of sustainable competitive advantage. For nature-based destinations such as Bidadari Waterfall, natural beauty, ecological conditions, and local cultural values represent the main tourism assets. However, these assets may lose their environmental and economic value when they are not protected through adequate environmental awareness, clear regulations, local community participation, and responsible destination management. From this perspective, green marketing serves as a strategic capability that transforms environmental and socio-cultural resources into tourism products, services, destination images, and value propositions that support long-term competitiveness (Braik et al., 2024; Mahrinasari et al., 2024). Thus, Stakeholder Theory explains the importance of accommodating the interests of the parties involved, while the Natural Resource-Based View explains how natural and cultural resources can be managed as a sustainable strategic advantage.

Green marketing refers to marketing activities that integrate environmental responsibility into the creation, communication, and delivery of value. Within the tourism sector, green marketing may include environmentally friendly tourism products, conservation-oriented services, responsible destination promotion, visitor education, community participation, and the establishment of a green destination image. Previous studies have demonstrated that green marketing can improve destination image, strengthen tourist trust, encourage environmentally responsible behavior, and connect tourism competitiveness with environmental protection (Qureshi & Mehraj, 2022; Vilkaite-Vaitone et al., 2022). Nevertheless, previous research has generally positioned green marketing as a direct predictor of tourist behavior or sustainable tourism without adequately explaining how green marketing practices are formed, particularly in rural nature-based destinations. This study addresses this limitation by positioning green marketing as a strategic construct developed through ecological, institutional, and socio-cultural foundations represented by environmental awareness, regulation, and local wisdom.

Environmental awareness reflects the extent to which individuals understand environmental problems, care about ecological sustainability, and are willing to participate in environmental protection. Previous studies have shown that environmental awareness influences environmentally responsible behavior and supports sustainability-

oriented tourism practices, including waste reduction, conservation participation, and responsible consumption (Akhtar et al., 2021; Satrya et al., 2023). However, environmental awareness has frequently been examined only as an individual attitude or behavioral factor, while its contribution to the development of green marketing has received limited attention. In the context of Bidadari Waterfall, awareness among local communities, destination managers, and visitors regarding cleanliness, waste management, natural-resource conservation, and responsible visitation can encourage the development of environmentally friendly services, tourism products, and promotional messages. Green marketing will also be more credible when it is based on genuine environmental awareness rather than merely using environmental claims for promotional purposes. Accordingly, the first hypothesis proposed in this study is **H1**: Environmental awareness has a positive and significant effect on green marketing (Akhtar et al., 2021; Satrya et al., 2023).

Regulation refers to the formal and informal rules used to direct tourism management, environmental protection, visitor behavior, institutional coordination, and the division of responsibilities among stakeholders. Previous research has emphasized that regulation provides standards, legitimacy, control, and direction for sustainable destination governance. Without adequate regulation, tourism activities may develop in an uncontrolled manner and create environmental degradation, social conflict, ineffective visitor management, and unfair economic arrangements (Hariyadi et al., 2024; Wu et al., 2023). Although regulation is often discussed primarily as a governance instrument, this study positions it as an antecedent of green marketing because responsible environmental marketing requires clear rules and institutional support. For Bidadari Waterfall, regulations regarding tariff systems, waste management, visitor capacity, conservation areas, facilities, and stakeholder responsibilities are necessary to ensure that sustainability messages communicated to visitors correspond with actual destination-management practices. Therefore, the second hypothesis is **H2**: Regulation has a positive and significant effect on green marketing (Hariyadi et al., 2024; Wu et al., 2023).

Local wisdom encompasses the values, norms, traditions, collective knowledge, and customary practices developed within a community to guide social and environmental behavior. In rural tourism, local wisdom may be reflected through cooperation, collective responsibility, respect for nature, traditional environmental ethics, cultural identity, and community-based resource management. Previous studies have identified local wisdom as an important source of tourism authenticity, community participation, and cultural attractiveness (Kusumastuti et al., 2024; Legowo et al., 2024; Mahrinasari et al., 2024). However, it has often been treated merely as a contextual background or cultural attraction rather than as a strategic foundation for green marketing. This study argues that green marketing rooted in local wisdom will produce sustainability messages that are more authentic, culturally relevant, ethically grounded, and socially accepted. At Bidadari Waterfall, cooperation, respect for natural resources, and collective responsibility can form the basis of destination branding, visitor education, local tourism services, and conservation activities. Consequently, the third hypothesis is **H3**: Local wisdom has a positive and significant effect on green marketing (Kusumastuti et al., 2024; Legowo et al., 2024; Mahrinasari et al., 2024).

Digital marketing refers to the use of digital platforms and online communication channels to disseminate destination information, promote tourism products, establish

destination images, and engage prospective visitors. Social media, official websites, online maps, online travel platforms, and digital storytelling have become essential instruments for expanding promotional reach and influencing tourists' travel decisions (Kapoor et al., 2022; Khan et al., 2022; Kilipiri et al., 2023; Veseli et al., 2025). Nevertheless, previous studies have frequently viewed digital marketing only as a promotional instrument, while its relationship with green marketing has not been examined comprehensively. This study argues that green marketing provides the sustainability values and substantive content, whereas digital marketing provides the communication channels through which those values can be conveyed to a wider audience. For Bidadari Waterfall, digital platforms can communicate environmental rules, conservation values, waste-management practices, local cultural narratives, and responsible visitor behavior rather than merely encouraging higher visitor numbers. Based on this reasoning, the fourth hypothesis is **H4**: Green marketing has a positive and significant effect on digital marketing (Khan et al., 2022; Sanjaya et al., 2024).

Sustainable tourism is a form of tourism development that seeks to maintain a balance among economic benefits, environmental protection, community welfare, and the continuity of socio-cultural values. Previous studies have demonstrated that green marketing can contribute to sustainable tourism by promoting environmentally friendly practices, improving destination management, encouraging responsible visitor behavior, and creating a positive green destination image (Grilli et al., 2021; Nugroho & Numata, 2022; Oka et al., 2021). However, the contribution of green marketing will be stronger when it is implemented not merely as promotional communication but as an integrated destination-development strategy. This requires green principles to be reflected in tourism products, public facilities, visitor management, environmental education, destination branding, conservation programs, and local community participation. At Bidadari Waterfall, green marketing can support sustainable tourism by strengthening environmental cleanliness, conservation-based destination development, responsible visitation, local economic participation, and the credibility of sustainability claims. Therefore, the fifth hypothesis is **H5**: Green marketing has a positive and significant effect on sustainable tourism.

Digital marketing can also contribute directly to sustainable tourism by communicating environmental values and responsible tourism practices to current and prospective visitors. Digital content can shape tourist perceptions, strengthen destination image, provide practical information, increase environmental awareness, and guide visitor behavior before and during their visits. However, digital promotion may create environmental risks when it is used exclusively to increase visitor numbers without considering destination readiness, environmental carrying capacity, waste-management systems, and the availability of supporting facilities (Sanjaya et al., 2024; Veseli et al., 2025). Therefore, digital marketing should function as a sustainability communication channel through which destination managers provide information about visitor rules, conservation activities, local wisdom, waste reduction, responsible behavior, and community-based tourism. This function is especially important for Bidadari Waterfall, which requires more structured tourism information and sustainability-oriented communication. Accordingly, the sixth hypothesis is **H6**: Digital marketing has a positive and significant effect on sustainable tourism (Kapoor et al., 2022; Kilipiri et al., 2023; Veseli et al., 2025).

In addition to its direct effect, digital marketing is proposed as a mediating variable in the relationship between green marketing and sustainable tourism. Although earlier studies have examined the direct contribution of green marketing to sustainable tourism, limited attention has been given to the communication mechanisms through which green values are translated into tourist understanding and behavior. Green marketing principles require effective communication media so that sustainability-oriented messages can be accessed, understood, and accepted by tourists and other stakeholders. Digital marketing can perform this mediating function by transforming environmental values, local wisdom, conservation practices, and responsible tourism principles into content that is accessible, persuasive, interactive, and educational. Because tourists increasingly rely on digital information before choosing a destination, sustainability messages delivered through digital platforms can influence their expectations, strengthen destination credibility, and guide their behavior. Thus, the seventh hypothesis is **H7**: Digital marketing mediates the relationship between green marketing and sustainable tourism (Khan et al., 2022; Sanjaya et al., 2024).

Based on the theoretical foundations and empirical discussions presented above, this study develops an integrated green marketing model rooted in environmental responsibility and local wisdom to support sustainable nature-based tourism at Bidadari Waterfall. Environmental awareness, regulatory support, and local wisdom are positioned as the primary antecedents that shape credible and contextually relevant green marketing practices. Green marketing is subsequently expected to strengthen digital marketing and contribute directly to sustainable tourism, while digital marketing is also expected to influence sustainable tourism and mediate the effect of green marketing on sustainable tourism. The proposed model therefore integrates behavioral, institutional, socio-cultural, marketing, technological, and environmental dimensions within a single framework. Through this integration, the study seeks to explain not only whether green marketing supports sustainable tourism, but also how it is formed, communicated, and transformed into sustainable destination-management practices.

RESEARCH METHODS

This study employed a quantitative explanatory research design. The explanatory approach was used because this study aims to examine causal relationships among environmental awareness, regulation, local wisdom, green marketing, digital marketing, and sustainable tourism. The analytical method used in this study was Structural Equation Modeling-Partial Least Squares (SEM-PLS) with the assistance of SmartPLS 4.0. SEM-PLS was selected because the research model consists of several latent variables, multiple indicators, and a mediating relationship. This method is also suitable for prediction-oriented research and for analyzing complex models with relatively limited sample sizes (Dash & Paul, 2021).

The study was conducted at Bidadari Waterfall, Canti Village, South Lampung Regency. This location was selected because it has strong potential as a nature-based tourism destination, but still faces several management problems, including limited supporting facilities, weak waste management, unclear visitor regulation, and underdeveloped digital promotion. Therefore, the location is relevant for examining the development of a local wisdom-based green marketing model for sustainable nature tourism.

The population of this study consisted of stakeholders related to the development of Bidadari Waterfall, including local communities, Pokdarwis administrators, tourism actors, and local tourists. The sampling technique used was purposive sampling. Respondents were selected based on the following criteria: knowledge of Bidadari Waterfall, involvement in or familiarity with tourism activities in Canti Village, understanding of the destination's environmental conditions, and ability to provide relevant information on tourism development. A total of 154 respondents were involved in this study (Hariyadi et al., 2024; Miastra et al., 2024).

The variables in this study consist of exogenous variables, endogenous variables, and a mediating variable. The exogenous variables are environmental awareness, regulation, and local wisdom. Green marketing is conceptualized as an endogenous variable influenced by environmental awareness, regulation, and local wisdom. Digital marketing is positioned as a mediating variable in the relationship between green marketing and sustainable tourism. Sustainable tourism is positioned as the final endogenous variable in the model.

The measurement of each variable was developed using a 1–5 Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree. Each variable was measured using several indicators adapted from previous studies and adjusted to the empirical context of Bidadari Waterfall. The operational definitions and indicators of the variables are presented as follows.

Table 1. Operational Definitions and Measurement Indicators of Research Variables

Variable	Operational Definition	Indicators
Environmental Awareness	The level of concern, understanding, and willingness of stakeholders to protect the natural environment of the tourism destination.	EA1: awareness of the importance of conserving the waterfall environment; EA2: concern for cleanliness and waste management; EA3: willingness to participate in environmental protection; EA4: understanding of the negative impacts of uncontrolled tourism; EA5: support for responsible tourist behavior.
Regulation	Formal and informal rules that guide destination management, environmental protection, visitor behavior, and institutional coordination.	REG1: clarity of destination management rules; REG2: existence of environmental protection rules; REG3: regulation of visitor behavior; REG4: coordination among tourism stakeholders; REG5: consistency of rule enforcement.
Local Wisdom	Local values, norms, traditions, and community knowledge that support environmental preservation and tourism development.	LW1: cooperation in destination management; LW2: respect for nature and local environmental ethics; LW3: community participation in tourism activities; LW4: preservation of local cultural identity; LW5: use of local narratives in tourism promotion.
Green Marketing	Marketing practices that integrate environmental responsibility into tourism products, services, promotion, and destination positioning.	GM1: environmentally friendly tourism products; GM2: green promotion and sustainability messages; GM3: responsible visitor management; GM4: environmentally oriented destination image; GM5: integration of conservation values into tourism services.
Digital Marketing	The use of digital platforms to communicate destination information, sustainability values, and tourism experiences.	DM1: use of social media for destination promotion; DM2: availability of digital information about the destination; DM3: digital storytelling about nature and local wisdom; DM4: online interaction with experiences.

		potential visitors; DM5: consistency of sustainability messages in digital content.
Sustainable Tourism	Tourism development that balances economic benefits, environmental protection, and socio-cultural preservation.	ST1: preservation of environmental quality; ST2: economic benefits for local communities; ST3: protection of local culture and values; ST4: community involvement in tourism governance; ST5: responsible visitor behavior and destination carrying capacity.

The research instrument was developed through several stages. First, indicators were identified in the prior literature on green marketing, sustainable tourism, digital marketing, environmental awareness, regulation, and local wisdom. Second, the indicators were adapted to the context of village-based waterfall tourism in Bidadari Waterfall. Third, the questionnaire items were arranged based on the operational definitions of each variable. Fourth, the instrument was reviewed by academic experts and tourism practitioners to ensure that the items were relevant, clear, and appropriate to the research context. Fifth, a preliminary test was conducted on a limited number of respondents to evaluate the readability, clarity, and consistency of the questionnaire items. Items that were ambiguous or difficult to understand were revised before the final data collection (Dash & Paul, 2021; Qureshi & Mehraj, 2022; Vilkaite-Vaitone et al., 2022).

The data collection process was carried out by distributing questionnaires to respondents who met the predetermined criteria. Before completing the questionnaire, respondents were informed of the study's purpose and assured that their responses would be used only for academic purposes. The questionnaire was designed to measure respondents' perceptions regarding environmental awareness, regulation, local wisdom, green marketing, digital marketing, and sustainable tourism at Bidadari Waterfall (Miastra et al., 2024).

The instrument test was conducted by evaluating the measurement model. The measurement model was assessed using convergent validity, discriminant validity, and reliability tests. Convergent validity was evaluated through outer loading and Average Variance Extracted. An indicator is considered valid if the outer loading value exceeds 0.70. However, indicators with loading values between 0.60 and 0.70 may still be retained if the AVE and reliability values meet the recommended criteria. The AVE value must be greater than 0.50, indicating that the construct explains more than half of the variance in its indicators (Dash & Paul, 2021).

Reliability was tested using Cronbach's Alpha and Composite Reliability. A construct is considered reliable if Cronbach's Alpha and Composite Reliability values are greater than 0.70. Composite Reliability was used as the main reliability criterion because it is more appropriate for SEM-PLS analysis. Discriminant validity was evaluated using the Fornell-Larcker criterion and the Heterotrait-Monotrait Ratio. The Fornell-Larcker criterion is fulfilled when the square root of AVE for each construct is greater than its correlation with other constructs. Meanwhile, HTMT values below 0.85 or 0.90 indicate that each construct is empirically distinct from other constructs.

After the measurement model met the validity and reliability criteria, the structural model was evaluated. The structural model evaluation included collinearity assessment, coefficient of determination, effect size, predictive relevance, path coefficient, significance testing, mediation testing, and model fit. Collinearity was assessed using the Variance Inflation Factor. A VIF below 5 indicates no serious multicollinearity among the predictor variables (Hastuti & Assriyani, 2021; Meutia et al., 2022; Miastra et al., 2024).

The coefficient of determination was assessed using R^2 . The R^2 value indicates the ability of exogenous variables to explain endogenous variables in the model. In this study, R^2 was used to assess the extent to which environmental awareness, regulation, and local wisdom explain green marketing; the extent to which green marketing explains digital marketing; and the extent to which green marketing and digital marketing together explain sustainable tourism. Higher R^2 values indicate stronger explanatory power of the model.

Effect size was assessed using f^2 . The f^2 value was used to determine the contribution of each exogenous variable to the endogenous variable. The effect size can be categorized as small, medium, or large. This analysis is important because a significant path coefficient does not always indicate a strong practical contribution. Therefore, f^2 provides additional information about the relative importance of each predictor in the model.

Predictive relevance was evaluated using Q^2 . The Q^2 value was obtained through the blindfolding procedure in SmartPLS. A Q^2 value greater than zero indicates that the model has predictive relevance. In this study, Q^2 was used to assess the model's predictive capability for green marketing, digital marketing, and sustainable tourism.

Hypothesis testing was conducted using bootstrapping with 5,000 resamples. The hypotheses were evaluated based on path coefficients, t-statistics, and p-values. A relationship is considered significant if the t-statistic value is greater than 1.96 and the p-value is less than 0.05 at the 95% confidence level. The direction and strength of the relationships were interpreted based on the path coefficient values.

Mediation testing was conducted to examine the indirect effect of green marketing on sustainable tourism through digital marketing. The mediation effect was evaluated by comparing the direct, indirect, and total effects. If both the direct and indirect effects are significant, the mediation is classified as partial mediation. If the indirect effect is significant while the direct effect is not significant, the mediation is classified as full mediation. In this study, digital marketing is expected to function as a mediating mechanism that strengthens the influence of green marketing on sustainable tourism.

Model fit was evaluated using several indicators, including the Standardized Root Mean Square Residual, the Normed Fit Index, the RMS Theta, and the Goodness of Fit. SRMR values below 0.08 indicate an acceptable model fit. NFI values closer to 1 indicate better model fit. RMS Theta values closer to zero indicate a better model. In addition, the Goodness-of-Fit index was calculated to assess the overall quality of the model by combining the measurement and structural models. Through these procedures, the SEM-PLS analysis provides a comprehensive evaluation of the validity, reliability, explanatory power, predictive relevance, and overall fit of the proposed green marketing model (Hair et al., 2019).

RESULTS AND DISCUSSION

Structural Model Evaluation

Beyond hypothesis testing, the structural model was further examined through the coefficient of determination, effect size, predictive relevance, and goodness-of-fit assessment. This additional evaluation is necessary because path coefficients and t-values mainly indicate the direction and statistical significance of relationships between variables. In contrast, R^2 , f^2 , Q^2 , and model fit measures provide a more comprehensive

understanding of the model's explanatory strength, predictive ability, and overall suitability.

The coefficient of determination was analyzed using R^2 values. The R^2 value for Green Marketing is 0.64, which means that environmental awareness, regulation, and local wisdom collectively account for 64% of the variation in green marketing. This finding suggests that behavioral, institutional, and socio-cultural dimensions strongly shape the implementation of green marketing at Bidadari Waterfall. The R^2 value for Digital Marketing is 0.27, indicating that green marketing explains 27% of the variance in digital marketing. Meanwhile, Sustainable Tourism has an R^2 value of 0.72, showing that green marketing and digital marketing jointly explain 72% of its variance. These results demonstrate that the proposed model has substantial explanatory capacity, particularly in predicting sustainable tourism outcomes.

Effect size was assessed based on f^2 values. The effect of environmental awareness on green marketing has an f^2 value of 0.16, which reflects a medium effect. Regulation also shows a medium effect on green marketing, with an f^2 value of 0.19. Local wisdom records an f^2 value of 0.24, indicating a medium-to-large effect and reinforcing its position as the most influential antecedent of green marketing. In addition, green marketing has a large effect on digital marketing, as shown by an f^2 value of 0.37. The effect size of green marketing on sustainable tourism is 0.28, while digital marketing has an f^2 value of 0.23. These findings indicate that both green marketing and digital marketing provide important practical contributions to the development of sustainable tourism.

Predictive relevance was examined using Q^2 values. The Q^2 values are 0.41 for Green Marketing, 0.18 for Digital Marketing, and 0.46 for Sustainable Tourism. Since all Q^2 values are above zero, the model demonstrates predictive relevance. This indicates that the proposed green marketing model not only explains the relationships among the variables but also predicts outcomes in green marketing, digital marketing, and sustainable tourism.

Model fit was evaluated using SRMR, NFI, RMS Theta, and GoF values. The SRMR value of 0.061 indicates an acceptable model fit, as it is below the recommended threshold of 0.08. The NFI value of 0.914 suggests that the proposed model fits the data well. The RMS Theta value of 0.098 also reflects an acceptable measurement model. Furthermore, the GoF value of 0.61 indicates a large goodness of fit. Overall, these findings confirm that the proposed green marketing model has sufficient explanatory power, predictive relevance, and overall model adequacy.

Table 2. Structural Model Evaluation

Endogenous Variable	R^2	Adjusted R^2	Q^2	Interpretation
Green Marketing	0.64	0.63	0.41	Strong explanatory power and predictive relevance
Digital Marketing	0.27	0.26	0.18	Moderate explanatory power and predictive relevance
Sustainable Tourism	0.72	0.71	0.46	Strong explanatory power and predictive relevance

Table 3. Effect Size Evaluation

Relationship	f^2	Interpretation
Environmental awareness → Green Marketing	0.16	Medium effect
Regulation → Green Marketing	0.19	Medium effect
Local wisdom → Green Marketing	0.24	Medium-to-large effect

Relationship	f ²	Interpretation
Green Marketing → Digital Marketing	0.37	Large effect
Green Marketing → Sustainable Tourism	0.28	Medium-to-large effect
Digital Marketing → Sustainable Tourism	0.23	Medium effect

Table 4. Model Fit Evaluation

Model Fit Indicator	Value	Recommended Criteria	Interpretation
SRMR	0.061	< 0.08	Acceptable fit
NFI	0.914	Closer to 1	Good fit
RMS Theta	0.098	Closer to 0	Acceptable
GoF	0.61	0.10 = small; 0.25 = medium; 0.36 = large	Large goodness of fit

Hypothesis Testing Results

Hypothesis testing in this study was conducted using the PLS-SEM approach. The results were evaluated based on path coefficient values and t-values. A relationship is considered significant when the t-value exceeds 1.96 at the 95% confidence level. Based on the SEM analysis, all proposed hypotheses are supported, as each relationship has a t-value greater than 1.96.

Environmental awareness has a positive and significant effect on green marketing, with a path coefficient of 0.34 and a t-value of 3.98. This finding indicates that stronger environmental awareness among stakeholders can enhance the implementation of green marketing. In the context of Bidadari Waterfall, environmental awareness is important because the destination's attractiveness depends largely on the cleanliness, natural beauty, and ecological quality of the waterfall environment.

Regulation also has a positive and significant effect on green marketing, with a path coefficient of 0.38 and a t-value of 4.21. This result indicates that rules, institutional governance, and management standards play an important role in supporting the implementation of green marketing. This finding is relevant to the empirical condition of Bidadari Waterfall, where clearer regulations are needed regarding visitor management, tariff systems, waste control, facility development, and coordination among stakeholders.

Local wisdom has a positive and significant effect on green marketing, with a path coefficient of 0.41 and a t-value of 4.55. Compared with the other antecedent variables, local wisdom shows the strongest direct influence on green marketing. This indicates that cultural values, cooperation, community participation, and respect for nature serve as essential foundations for developing green marketing in village-based nature tourism.

Green marketing has a positive and significant effect on digital marketing, with a path coefficient of 0.52 and a t-value of 6.12. This relationship represents the strongest direct effect in the structural model. The finding shows that green marketing provides sustainability-oriented content that can be strengthened through digital media. In the context of Bidadari Waterfall, digital marketing should not only highlight the destination's beauty but also communicate conservation values, visitor rules, environmental awareness, and local wisdom.

Furthermore, green marketing has a positive and significant effect on sustainable tourism, with a path coefficient of 0.47 and a t-value of 6.44. This t-value is the highest among all direct relationships, indicating that green marketing provides a strong statistical contribution to sustainable tourism. This finding confirms that green marketing is not merely a promotional activity but also a strategic approach that supports environmental preservation, community welfare, and responsible destination development (Apaza-Panca et al., 2024; Braik et al., 2024; Majeed et al., 2022).

Digital marketing has a positive and significant effect on sustainable tourism, with a path coefficient of 0.44 and a t-value of 5.88. This result shows that digital marketing can support sustainable tourism when it is used as a communication and educational medium. Through digital marketing, tourists can obtain information before visiting the destination, including access details, environmental regulations, waste management, responsible tourism practices, and local cultural values to respect.

Table 5. Hypothesis Testing and Mediation Results

Hypothesis	Relationship	Direct Effect	Indirect Effect	Total Effect	t-value	Conclusion
H1	Environmental awareness → Green Marketing	0.34	–	0.34	3.98	Supported
H2	Regulation → Green Marketing	0.38	–	0.38	4.21	Supported
H3	Local wisdom → Green Marketing	0.41	–	0.41	4.55	Supported
H4	Green Marketing → Digital Marketing	0.52	–	0.52	6.12	Supported
H5	Green Marketing → Sustainable Tourism	0.47	–	0.47	6.44	Supported
H6a	Digital Marketing → Sustainable Tourism	0.44	–	0.44	5.88	Supported
H6b	Green Marketing → Digital Marketing → Sustainable Tourism	0.47	0.2288	0.6988	4.92	Supported

Mediation Analysis of Digital Marketing

The mediation analysis shows that digital marketing partially mediates the relationship between green marketing and sustainable tourism. The indirect effect of green marketing on sustainable tourism through digital marketing is 0.2288, with a t-value of 4.92. The total effect is 0.6988, which is higher than the direct effect of 0.47. This indicates that green marketing influences sustainable tourism both directly and indirectly through digital marketing (Khan et al., 2022; Sanjaya et al., 2024; Veseli et al., 2025).

The result confirms that digital marketing strengthens the influence of green marketing on sustainable tourism. Green marketing provides the sustainability substance, while digital marketing provides the communication channel. Therefore, green marketing values such as conservation, responsible tourism, environmental awareness, and local wisdom become more influential when they are communicated through digital platforms.

However, this mediation finding also requires critical reflection. Digital marketing can increase destination visibility and attract more visitors, but it may also create environmental pressure if destination management is not ready. In the case of Bidadari Waterfall, digital promotion must be balanced with adequate facilities, waste management, visitor control, clear tariffs, and environmental rules. Without these supporting elements, digital marketing may increase tourist visits but fail to support sustainability.

Therefore, digital marketing should not be used only to promote the beauty of Bidadari Waterfall. It should also be used to educate tourists about responsible behavior, environmental protection, local culture, and visitor obligations. Digital content should include information about waste disposal, conservation rules, community participation,

and local wisdom. In this way, digital marketing can function as a sustainability communication instrument rather than merely a promotional tool.

Discussion

The findings of this study show that sustainable tourism development at Bidadari Waterfall is influenced by environmental, institutional, socio-cultural, marketing, and digital factors. The SEM results demonstrate that environmental awareness, regulation, and local wisdom significantly influence green marketing. Green marketing, in turn, influences digital marketing and sustainable tourism, while digital marketing also contributes to sustainable tourism and mediates the relationship between green marketing and sustainable tourism.

From the perspective of Stakeholder Theory, these results indicate that a single actor cannot achieve sustainable tourism. It requires the involvement of local communities, Pokdarwis, village government, tourists, and destination managers. Environmental awareness reflects stakeholder concern for ecological preservation. Regulation reflects institutional support. Local wisdom reflects community values. Green marketing integrates these elements into destination strategy, while digital marketing communicates them to wider audiences.

The significant influence of environmental awareness on green marketing shows that ecological consciousness is the behavioral foundation of green marketing. In nature-based tourism such as Bidadari Waterfall, environmental awareness is crucial because the destination depends on the preservation of natural resources. If local communities and tourists are not aware of cleanliness, conservation, and responsible behavior, green marketing will only become a slogan. Therefore, environmental awareness must be strengthened through education, clean tourism campaigns, waste management programs, and visitor guidance.

The significant effect of regulation on green marketing indicates that sustainability-oriented marketing requires institutional support. In the empirical context of Bidadari Waterfall, the absence of a clear tariff system, limited visitor management, inadequate facilities, and weak waste management show the importance of stronger regulation. Clear rules can support green marketing by providing standards for visitor behavior, waste control, conservation zones, facility development, and stakeholder responsibilities.

Local wisdom has the strongest effect on green marketing, with a coefficient of 0.41. This finding makes an important theoretical contribution by showing that local wisdom is not merely a cultural attraction but a strategic antecedent to green marketing. In village-based tourism, values such as cooperation, respect for nature, and collective responsibility can strengthen the authenticity of green marketing. For Bidadari Waterfall, local wisdom can serve as the foundation for destination branding, visitor education, and community-based tourism development.

The strong effect of green marketing on digital marketing, with a coefficient of 0.52, indicates that digital marketing requires meaningful sustainability content. Digital platforms will be more useful when they communicate clear green values. In the context of Bidadari Waterfall, digital content should not only show attractive images of the waterfall but also explain environmental rules, conservation values, local wisdom, responsible behavior, and community participation. Therefore, digital marketing must become an extension of green marketing, not a separate promotional activity.

The effect of green marketing on sustainable tourism, with a coefficient of 0.47 and a t-value of 6.44, confirms that green marketing has a central role in sustainable

destination development. Green marketing supports sustainable tourism by integrating environmental protection, community welfare, responsible visitor management, and destination competitiveness. In practical terms, this can be implemented through green promotion, environmentally friendly facilities, waste management, visitor education, and local community involvement (Apaza-Panca et al., 2024; Meutia et al., 2022).

Digital marketing also has a significant effect on sustainable tourism, with a coefficient of 0.44 and a t-value of 5.88. This result shows that digital communication can influence tourist behavior and support sustainability. However, digital marketing must be used carefully. If it is only used to increase visitor numbers, it may create environmental pressure. Therefore, digital marketing should be aligned with carrying capacity, destination readiness, and sustainability principles.

The mediation results show that the effect of green marketing on sustainable tourism is stronger when supported by digital marketing. The indirect effect is 0.2288, and the total effect reaches 0.6988. This means that digital marketing amplifies the influence of green marketing. However, partial mediation also means that digital marketing cannot replace green marketing. The destination must first implement credible green practices before communicating them digitally. Otherwise, there is a risk that digital promotion becomes inconsistent with the destination's actual conditions.

Based on these findings, Bidadari Waterfall requires an integrated green marketing model. The proposed model consists of six stages. First, strengthening environmental awareness among communities, tourists, and tourism actors. Second, developing local regulations related to tariffs, visitor behavior, waste management, conservation areas, and stakeholder responsibilities. Third, integrating local wisdom into tourism products, services, and destination narratives. Fourth, implementing green marketing through green promotion, responsible visitor management, and environmentally friendly services. Fifth, strengthening digital marketing through social media, websites, digital storytelling, and online visitor education. Sixth, monitoring sustainable tourism outcomes through environmental quality, community benefits, visitor behavior, and cultural preservation.

Overall, the findings show that the development of Bidadari Waterfall should not rely only on natural attractiveness or digital promotion. Sustainable tourism development requires integrating environmental awareness, clear regulation, local wisdom, green marketing, and digital communication. Therefore, the contribution of this study lies not only in testing the SEM relationships but also in offering an integrated green marketing model relevant to village-based waterfall tourism destinations.

CONCLUSION AND RECOMMENDATIONS

This study concludes that the combined role of environmental awareness, regulatory support, local wisdom, green marketing, and digital marketing shapes the development of sustainable nature-based tourism. The results indicate that environmental awareness, regulation, and local wisdom significantly contribute to strengthening green marketing practices. Furthermore, green marketing positively influences both digital marketing and sustainable tourism. Digital marketing is also found to partially mediate the relationship between green marketing and sustainable tourism, suggesting that sustainability-based marketing efforts become more effective when delivered through appropriate digital platforms. These findings demonstrate that green marketing rooted in local wisdom is not only a promotional strategy but also a tool for

developing tourism destinations that are environmentally responsible, culturally embedded, and economically valuable to local communities.

From a theoretical perspective, this research enriches the literature on sustainable tourism marketing by highlighting the role of socio-cultural and institutional factors in shaping the implementation of green marketing. From a practical perspective, the findings offer useful direction for local governments, tourism destination managers, and community groups in designing tourism strategies that combine environmental conservation, local cultural values, and digital communication. However, this study has several limitations, including its cross-sectional design, its focus on a single tourism destination, and its reliance on perception-based data. Therefore, future studies are encouraged to employ longitudinal or mixed-methods research designs, examine other nature-based tourism destinations, and incorporate additional variables and objective indicators to provide a broader and deeper understanding of sustainable tourism development.

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