

Ecotourism and Digital Marketing: Bridging the Gap Between Travelers and Sustainable Practices

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Abstract

This study aims to explore the interrelationships between digital marketing strategies—such as social media, search engine optimization, and mobile applications—and their impact on ecotourism, environmental conservation, and education. Employing a quantitative research design, a structured questionnaire was distributed to 460 travelers visiting key ecotourism destinations in Indonesia, with data analyzed using structural equation modeling (SEM). The findings reveal significant positive relationships between digital marketing strategies and ecotourism outcomes, particularly in enhancing destination image and promoting environmental conservation, although issues of discriminant validity were noted among certain constructs. The study underscores the importance of distinct and well-defined constructs in digital marketing strategies for ecotourism, recommending that stakeholders develop unique marketing approaches to enhance effectiveness. This research contributes to the existing literature by providing empirical evidence of the impact of digital marketing on ecotourism outcomes and highlights the need for clear construct definitions, offering valuable insights for policymakers and practitioners in fostering sustainable tourism development.

Keywords: blogging, destination image, ecotourism, search engine optimisation, social media

1. Introduction

Ecotourism is widely recognized as a viable alternative to conventional tourism due to its capacity to harmonize economic development, environmental preservation, and community welfare (Akhtar et al., 2021). It primarily targets relatively undisturbed natural areas, focusing on environmental protection rather than mass tourism in built environments (Fang et al., 2018). Sustainable tourism development seeks to address the shortcomings of mass tourism, which often exerts detrimental effects on local resources and ecosystems (Roblek et al., 2021). When appropriately managed, ecotourism can enhance awareness of tourism's cultural, environmental, and social impacts (Dahal et al., 2020). Given these considerations, ecotourism is regarded as a responsible alternative that aligns with ecological principles. According to The International Ecotourism Society, ecotourism entails responsible travel to natural destinations that contribute to environmental conservation, foster local economic development, and incorporate educational components to enrich the travel experience (Alam et al., 2024).

Despite its potential, operationalizing successful ecotourism remains challenging due to the need to integrate diverse ecological, social, and economic dimensions. Existing research predominantly emphasizes traditional marketing approaches. For example, Le et al. (2019) explored the impact of online marketing on Iranian ecotourism businesses, highlighting the relevance of digital outreach. Digital marketing—through tools such as mobile applications, social media, search engines, and blogs—has emerged as a strategic channel for engaging target audiences and raising awareness about ecotourism destinations (Tariq et al., 2022). Notably, tourists' perceptions of a destination, or its "destination image," play a pivotal role in shaping their travel behavior and decisions. This image encompasses beliefs, ideas, and impressions associated with a location (Bui et al., 2022).

While the link between ecotourism behavior and digital marketing has been acknowledged (López-Bonilla et al., 2020; Mele et al., 2019), limited research has examined mediating variables influencing this relationship. The concept of destination image serves as a critical intermediary, as it connects ecotourism behavior with digital marketing outcomes. Consequently, efforts to promote ecotourism must integrate findings from such studies to enhance destination branding and public awareness (Quoquab et al., 2021). Attributes of the destination significantly affect ecotourism appeal and visitor numbers.

Enhancing ecotourism through digital marketing and strategic destination image development is imperative to increasing environmental consciousness and tourist engagement. Public perception is central to influencing on-site tourist behavior, underscoring the importance of environmentally responsible promotional strategies. However, much of the current research remains focused on conventional methods (Sisriany & Furuya, 2024), creating a gap in understanding the digital dimensions of ecotourism.

This study addresses that gap by integrating digital marketing strategies and destination image into the framework of the Theory of Planned Behaviour (TPB), a theory developed to understand and predict human action (Ajzen, 2020). Unlike previous studies, this research applies TPB to examine how environmental attitudes, subjective norms, and perceived behavioral control influence ecotourism behavior. Furthermore, it conceptualizes goals as behavioral intentions and ecotourism practices as actual behaviors. Focusing on the Indonesian tourism sector, the study explores the tri-dimensional model of ecotourism—environmental conservation, education, and community development—while analyzing the mediating role of destination image between ecotourism behavior and digital marketing strategies.

2. Literature Review

Previous research has provided limited insight into the integration of ecotourism and digital marketing, with much of the focus remaining on conventional approaches (Ruhanen, 2019). While online platforms have been utilized to communicate messages related to ecotourism at nature-based sites, few studies have explored advanced digital strategies or incorporated mediating variables. For example, studies like Varkaris & Neuhofer (2017) included social media but overlooked intervention mechanisms in shaping tourist behavior. The Theory of Planned Behaviour (TPB), an extension of the Theory of Reasoned Action (Ajzen, 2020), has proven effective in explaining various pro-environmental behaviors, including ecological and low-carbon activities (Appel et al., 2020; Choi et al., 2019). This study employs TPB to examine the influence of environmental attitudes, subjective norms, and perceived behavioral control on ecotourism behavior, while positioning destination image as a mediating variable. The model's theoretical contribution lies in integrating digital marketing strategies within the TPB framework to explain ecotourism engagement in natural settings.

Digital Marketing Strategy and Ecotourism. Travel blogs have become a popular medium through which individuals share comprehensive travel experiences, including visa applications, ticket and accommodation bookings, local customs, activity recommendations, and travel advice (Yoo et al., 2018). With the growing influence of digital content, online reviews increasingly shape tourists' destination choices (Kim & Han, 2023). However, most studies have focused on major platforms like Facebook, Instagram, YouTube, LinkedIn, and Twitter, while alternative social media channels remain underexplored (Moro & Rita, 2018; Yoo et al., 2018). Additionally, the widespread adoption of smartphones has driven the popularity of mobile apps in enhancing visitor experiences, although their usability often depends on environmental factors such as lighting, time, and connectivity (Chatzopoulos et al., 2017). Meanwhile, search engines play a vital role in destination marketing by helping users navigate ecotourism options and enabling businesses to engage prospective travelers effectively.

H1: Ecotourism behaviour has a positive effect on blogging.

H2: Search engine optimisation has a positive effect on ecotourism behaviour.

H3: Mobile apps have a positive effect on ecotourism behaviour

H4: Social media has a positive effect on ecotourism behaviour

Online travel blogs and user-generated content serve as valuable resources for evaluating destination performance and understanding tourist behavior, perceptions, and expectations (Alrawadieh et al., 2018). However, inconsistencies in blog portrayals may lead to mismatched tourist expectations (Lojo et al., 2020). To address this, tourism marketers must account for the dynamic nature of online information searches, leveraging search engine optimization (SEO) to enhance visibility and develop effective communication strategies (Marine-Roig, 2017). Websites now serve as primary platforms for destination branding and are the first reference point for travelers (Tolica et al., 2017). Additionally, mobile applications enable tourism businesses to deliver personalized and innovative experiences, fostering long-term visitor engagement (Kuo et al., 2019). Smartphones support strategic marketing efforts, while social media facilitates direct communication with travelers, shaping decision-making and enhancing destination awareness (Sheng, 2019).

H5: Blogging has a positive effect on destination image.

H6: Search engine optimisation has a positive effect on destination image.

H7: Mobile apps have a positive effect on destination image.

H8: Social media has a positive effect on destination image

H9: Destination image has a positive effect on ecotourism behaviour.

The Mediating Role of Destination Image between Digital Marketing Strategy and Ecotourism. Tourism communities, supported by personal travel reviews and bloggers, play a vital role in encouraging ecotourism (Pham & Khanh, 2021). Digital marketing strategies are essential for promoting ecotourism destinations; however, there are limited instances where tourism events are strategically utilized to enhance destination reputation. This often contradicts conservation goals, necessitating alternative marketing approaches such as social media and targeted promotions to support economic development (Li et al., 2021). Ecotourism appeals to environmentally conscious travelers seeking to appreciate and preserve nature. Tourists increasingly rely on technology to access ecotourism information, making search engine optimization critical, especially for remote destinations (Chi, 2021). The widespread use of mobile phones in tourism is significant (Pan & Chen, 2019), and mobile apps improve destination image and foster pro-ecotourism behavior (Chai-Arayalert, 2020). Social media further enhances destination personalization, promotes environmental awareness, and facilitates meaningful interactions between tourists and destinations (Correia & and Kozak, 2022).

H10: Destination image mediates the relationship between blogs and ecotourism behaviour.

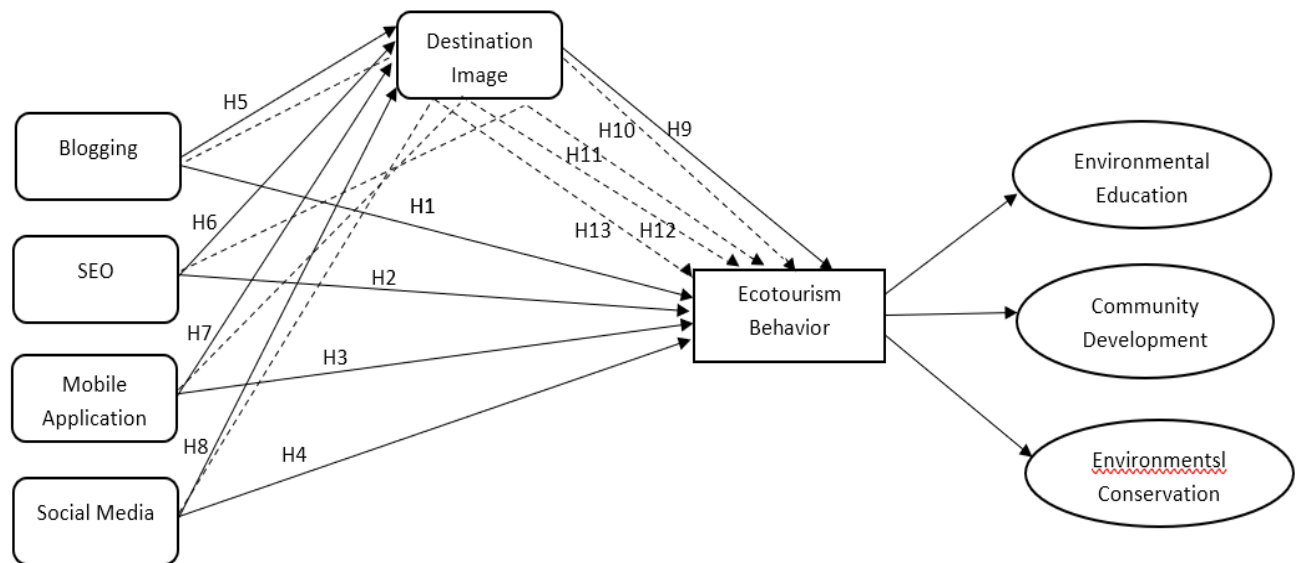
H11: Destination image mediates the relationship between search engine optimisation.

H12: Destination image mediates the relationship between mobile apps and ecotourism behaviour.

H13: Destination image mediates the relationship between social media and green tourism behaviour

Instead, the current research examines a number of new relationships found in current knowledge and creates a conceptual framework from previous research. The conceptual framework developed from previous literature is depicted in Figure 1.

Figure 1. Research Framework



3. Research Method

Sample and Data Collection. In the initial phase, a purposive sampling strategy was employed to target tourists engaged through digital marketing efforts. In December 2023, Indonesia recorded 11.68 million foreign tourist arrivals—a 98.3% increase from the previous year. Three key regions—Bali, North Sumatra, and Lombok—were selected due to their high visitor volumes. Subsequently, a random sampling technique was used to obtain a representative sample. Following Hair et al. (2019), the ideal sample size should be at least ten times the number of indicators. A total of 500 questionnaires were distributed, yielding 460 valid responses (over 90% response rate). Data were collected via Google Forms from tourists staying at hotels, visiting attractions, and camping in designated areas. Selected destinations included Lake Toba, Samosir Island, Sibea-bea

Jesus Statue, Kuta Beach, Wenara Wana, Uluwatu Temple, Nusa Penida, Senggigi Beach, Merese Hill, and Sesaot Park—chosen for their popularity among domestic and international tourists.

Data Analysis. This study presents methodological advancements in examining the relationship between digital marketing strategies and ecotourism behavior. Utilizing Partial Least Squares Structural Equation Modeling (PLS-SEM), the research effectively captures complex interrelationships among constructs such as digital marketing strategies, destination image, and sustainable tourism outcomes. PLS-SEM was selected for its robustness in predictive modeling and handling non-normal data distributions common in behavioral research (Hult et al., 2021). Discriminant validity was established using the Heterotrait-Monotrait Ratio (HTMT), ensuring clear construct differentiation (Hair et al., 2024). Bootstrapping with 5,000 subsamples enhanced accuracy, particularly for mediating effects. Importance-Performance Map Analysis (IPMA) was applied to assess the effectiveness of digital marketing elements, revealing, for instance, a performance gap in social media. A combination of purposive and random sampling ensured representative data from Indonesia's leading ecotourism sites. Mediation analysis confirmed destination image as a key mechanism linking digital marketing and sustainable tourist behavior.

Sample Characteristics. The demographic profile of the respondents includes key variables such as preferred digital marketing platforms, travel location, gender, and age. Data were collected from tourists visiting three major ecotourism regions in Indonesia: North Sumatra (19.13%), Bali (51.52%), and West Nusa Tenggara (29.35%). Regarding digital marketing platforms, respondents reported using Instagram (40.21%), YouTube (22.17%), Facebook (19.13%), Twitter (6.52%), SEO (4.35%), blogging (4.35%), and mobile apps (3.27%). The sample consisted of 310 male (67.39%) and 150 female (32.61%) respondents. Age distribution was as follows: 18–24 years (13.91%), 25–29 years (31.30%), 30–35 years (41.95%), and over 36 years (12.84%). The study focused on travelers to popular destinations such as Lake Toba, Samosir Island, Uluwatu Temple, and Nusa Penida, emphasizing the role of digital marketing strategies in influencing travel behavior across these ecotourism hotspots.

4. Finding and Discussion

External Model Assessment. An outside stacking value of greater than 0.70 is required for a review to pass the genuineness and determined nature tests, including joined realness, Cronbach's $\alpha > 0.70$, composite stability > 0.60 , and standard assortment detached (AVE) > 0.50 . These standards show that the appraisal is uncommon (Hult et al., 2021). Table 1 displays the outcomes of evaluating the external model. Cronbach $\alpha > 0.70$, composite immovability > 0.60 , and joined credibility values > 0.50 were all found. These qualities demonstrated a phenomenal class

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and recommended the stretch guidelines. In this manner, all components have extraordinary legitimacy and reliability.

Evaluation of the Internal Model. Based on the analysis presented in Tables 1 and 2, the measurement model demonstrates strong validity and reliability across all constructs. Each construct exhibits high loading factor values, confirming that individual indicators contribute significantly to their respective constructs. For example, the Blogging construct has loadings ranging from 0.785 to 0.876, with a Cronbach's Alpha (CA) of 0.899, Composite Reliability (CR) of 0.925, and Average Variance Extracted (AVE) of 0.713—indicating excellent internal consistency and convergent validity. Similarly, SEO shows outstanding reliability, with loadings between 0.930 and 0.950, a CA of 0.954, CR of 0.967, and AVE of 0.879. Other constructs such as Mobile Applications, Social Media, Destination Image, and Ecotourism also exhibit strong measurement properties. The R^2 values for Community Development (0.864), Destination Image (0.958), Ecotourism (0.796), Environmental Conservation (0.800), and Environmental Education (0.776) demonstrate high explanatory power, confirming the model's substantial predictive relevance.

Table 1. Analyses of the External Model

Construct / Item	Loadings	Alpha	CR	AVE
Blogging		0.899	0.925	0.713
BLO1	0,785			
BLO2	0,876			
BLO3	0,848			
BLO4	0,844			
Search Engine Optimization		0.954	0.967	0.879
SEO1	0,950			
SEO2	0,930			
SEO3	0,936			
SEO4	0,933			
Mobile Applications		0.872	0.908	0.663
MA1	0,733			
MA2	0,848			
MA3	0,829			
MA4	0,835			
MA5	0,822			

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Social Media		0.928	0.939	0.608
SM1	0,813			
SM2	0,749			
SM3	0,841			
SM4	0,836			
SM5	0,826			
SM6	0,758			
SM7	0,717			
SM8	0,744			
SM9	0,735			
SM10	0,764			
Destination Image		0.915	0.931	0.628
DI1	0,772			
D12	0,843			
D13	0,834			
DI4	0,801			
DI5	0,767			
DI6	0,828			
DI7	0,722			
DI8	0,768			
Ecotourism		0.958	0.962	0.631
ETC1	0,818			
ETC2	0,831			
ETC3	0,812			
ETC4	0,765			
ETC5	0,783			
ETC6	0,831			
ETC7	0,738			
ETCD1	0,776			
ETCD2	0,823			
ETCD3	0,794			
ETCD4	0,806			
ETEE1	0,792			

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ETEE2	0,704			
ETEE3	0,851			
ETEE4	0,781			

Table 2. Determination Coefficient (R^2)

Variable	R^2	R Square Adjusted
Community Development	0,864	0,864
Destination Image	0,958	0,958
Ecotourism	0,796	0,794
Environmental Conservations	0,800	0,799
Environmental Education	0,776	0,776

Based on the F-Square analysis presented in Table 3, the effects of independent variables on dependent variables within the PLS-SEM model can be meaningfully assessed. Ecotourism exhibits a strong and significant influence on key outcomes. Notably, it has a major effect on Community Development ($F^2 = 6.342$), Environmental Conservation ($F^2 = 3.988$), and Environmental Education ($F^2 = 3.465$), indicating its central role in driving sustainable outcomes. Blogging and Search Engine Optimization also show moderate effects on Destination Image, with F^2 values of 0.309 and 0.595, respectively. However, Blogging has minimal influence on Ecotourism ($F^2 = 0.009$), and Destination Image shows no significant effect ($F^2 = 0.000$). In contrast, Mobile Applications ($F^2 = 0.361$) and Social Media ($F^2 = 0.168$) significantly contribute to Ecotourism. Yet, the effect of Mobile Applications on Community Development remains marginal ($F^2 = 0.027$).

Table 3. F-Square (Effect Size)

Variable	Community Development	Destination Image	Ecotourism	Environmental Conservations	Environmental Education
Blogging		0,309	0,009		
Destination Image			0,000		
Ecotourism	6,342			3,988	3,465
Mobile Applications		0,027	0,361		
Search Engine Optimization		0,595	0,105		
Social Media		0,446	0,168		

The analysis using the Fornell-Larcker criterion, as shown in Table 4, confirms that each construct in the model demonstrates adequate discriminant validity. This method ensures that each construct shares greater variance with its own indicators than with other constructs. Diagonal values in the table represent the square root of the Average Variance Extracted (AVE) for each construct. For discriminant validity to be established, these values must exceed the inter-construct correlations. The results show that all constructs meet this requirement. For example, the Blogging construct (BLO) has a square root AVE of 0.844, which is higher than its correlations with constructs such as ETCD and DI. Similarly, Destination Image (DI) and Ecotourism (ET) have square root AVEs of 0.793 and 0.795, respectively, each surpassing their correlations with other constructs. Constructs such as ETCD, ETC, ETEE, MA, SEO, and SM also demonstrate satisfactory discriminant validity.

Table 4. Fornell-Larcker Criterion

Variable	BLO	ETCD	DI	Ecotourism	ETC	ETEE	MA	SEO	SM
BLO	0,844								
ETCD	0,698	0,861							
DI	0,905	0,773	0,793						
Ecotourism	0,726	0,929	0,793	0,795					
ETC	0,638	0,699	0,656	0,894	0,892				
ETEE	0,632	0,896	0,746	0,881	0,599	0,891			
MA	0,755	0,822	0,882	0,835	0,700	0,765	0,815		
SEO	0,716	0,585	0,877	0,638	0,570	0,571	0,845	0,937	
SM	0,901	0,821	0,949	0,844	0,707	0,782	0,858	0,787	0,780

The Q-Square (Q^2) analysis results presented in Table 5 reveal that the model's predictive relevance varies across constructs. Q^2 values indicate the model's capacity to predict observed outcomes, with higher values reflecting stronger predictive accuracy. The model demonstrates substantial predictive power for Community Development ($Q^2 = 0.636$), Destination Image ($Q^2 = 0.597$), Environmental Conservation ($Q^2 = 0.632$), and Environmental Education ($Q^2 = 0.607$), suggesting effective prediction for these constructs. In contrast, constructs such as Blogging (BLOG), Mobile Applications (MA), Search Engine Optimization (SEO), and Social Media (SM) exhibit Q^2 values of 0.000, indicating no predictive relevance. This implies that the model does not adequately explain the variance within these constructs. Overall, the findings suggest that the model's

predictive strength is construct-specific, demonstrating high relevance for certain dependent variables while offering limited predictive utility for others.

Table 5. Relevance Predictive of the Q-Square (Q^2)

Variable	SSO	SSE	$Q^2 (=1-SSE/SSO)$
Blogging	2350,000	2350,000	
Community Development	1880,000	685,178	0,636
Destination Image	3760,000	1515,076	0,597
Ecotourism	7050,000	3574,852	0,493
Environmental Conservations	3290,000	1211,920	0,632
Environmental Education	1880,000	739,524	0,607
Mobile Applications	2350,000	2350,000	
Search Engine Optimization	1880,000	1880,000	
Social Media	4700,000	4700,000	

Construct Testing. The diagrammatic representation that follows is a representation of the structural equation model that is depicted in this study:

Figure 2. Construct Testing Model

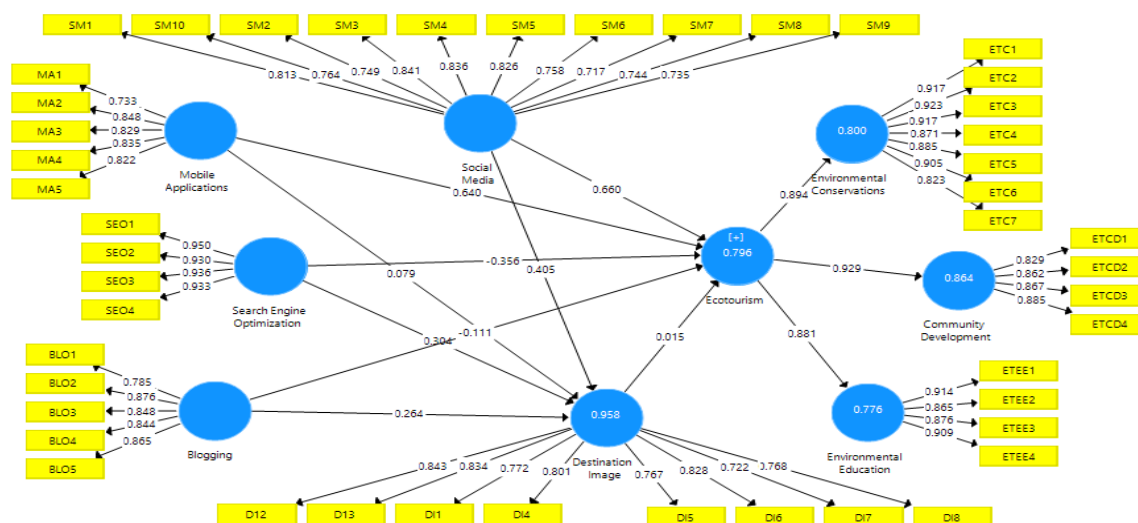


Table 6 presents the Heterotrait-Monotrait Ratio (HTMT) results, which assess the discriminant validity of constructs within the model. HTMT values below 0.85 typically indicate satisfactory discriminant validity. However, the Blogging construct shows extremely high HTMT values with Destination Image (0.999) and Social Media (0.987), suggesting considerable overlap and a potential lack of construct distinction. Similarly, Destination Image also displays a high HTMT value with Social Media (0.907), reinforcing this concern. Ecotourism shows strong correlations with Environmental Conservation (0.943) and Mobile Applications (0.914), indicating possible construct redundancy. In contrast, Community Development exhibits acceptable HTMT values with constructs like Blogging (0.784) and Environmental Education (0.633). Furthermore, Mobile Applications demonstrate high HTMT values with Search Engine Optimization (0.923) and Social Media (0.848), while SEO and Social Media also share an elevated HTMT value (0.951). Overall, several constructs in the model exhibit insufficient discriminant validity, warranting further refinement to ensure conceptual distinction and measurement reliability.

Tabel 6. Heterotrait-Monotrait Ratio (HTMT)

Variable	BLOG	ETCD	DI	Ecotourism	ETC	ETEE	MA	SEO	SM
BLOG									
ETCD	0,784								
DI	0,999	0,860							
Ecotourism	0,783	1,003	0,845						
ETC	0,689	0,760	0,701	0,943					
ETEE	0,699	0,994	0,817	0,928	0,633				
MA	0,852	0,940	0,983	0,914	0,767	0,859			
SEO	0,773	0,637	0,935	0,668	0,597	0,612	0,923		
SM	0,987	0,907	1,028	0,894	0,753	0,848	0,951	0,831	

Tables 7 and 8 present the results of the multicollinearity and model fit assessments. Variance Inflation Factor (VIF) values are used to detect multicollinearity among independent variables, with values above 5 typically indicating a serious concern. The Blogging construct shows notably high VIF values with Destination Image (23.965) and Ecotourism (7.049), suggesting significant overlap and redundancy. Similarly, Community Development (VIF = 5.384) and Mobile Applications (VIFs = 5.560 with Ecotourism and 5.411 with Blogging) also display high multicollinearity. Search Engine Optimization and Social Media exhibit elevated VIFs with several constructs, further confirming this issue. Model fit indices in Table 9 also indicate poor fit, with an SRMR value of 0.118 exceeding the recommended threshold of 0.08, and high d_ULS values (25.768 and 27.126). The Chi-Square result is infinite, and the NFI is unavailable, complicating

interpretation. Overall, these findings underscore the need for model refinement to address multicollinearity and improve fit.

Tabel 7. Inner VIF Values

Variable	ETCD	DI	Ecotourism	ETC	ETEE
BLOG		5,384	7,049		
ETCD					
DI			23,965		
Ecotourism	1,000			1,000	1,000
ETC					
ETEE					
MA		5,411	5,560		
SEO		3,714	5,925		
SM		8,799	12,720		

Tabel 8. Fit Summary

	Saturated Model	Estimated Model
SRMR	0,115	0,118
d_UIS	25,768	27,126
d_G	n/a	n/a
Chi-Square	infinite	infinite
NFI	n/a	n/a

Overall, including the results from Table 7 and Table 8 in the research article not only shows the depth of the analysis performed but also helps in providing recommendations for future model improvements. This will strengthen the integrity and transparency of the research, and allow for a more informative discussion regarding the validity of the proposed model.

Hypothesis Test Results. The p-value and t-statistic are used to evaluate hypotheses. Figure 2 displays the bootstrapping results obtained through the SmartPLS 3.0 method. The diagram illustrates the impact of external factors on the 46 indicators.

Figure 3. Bootstrapping Results

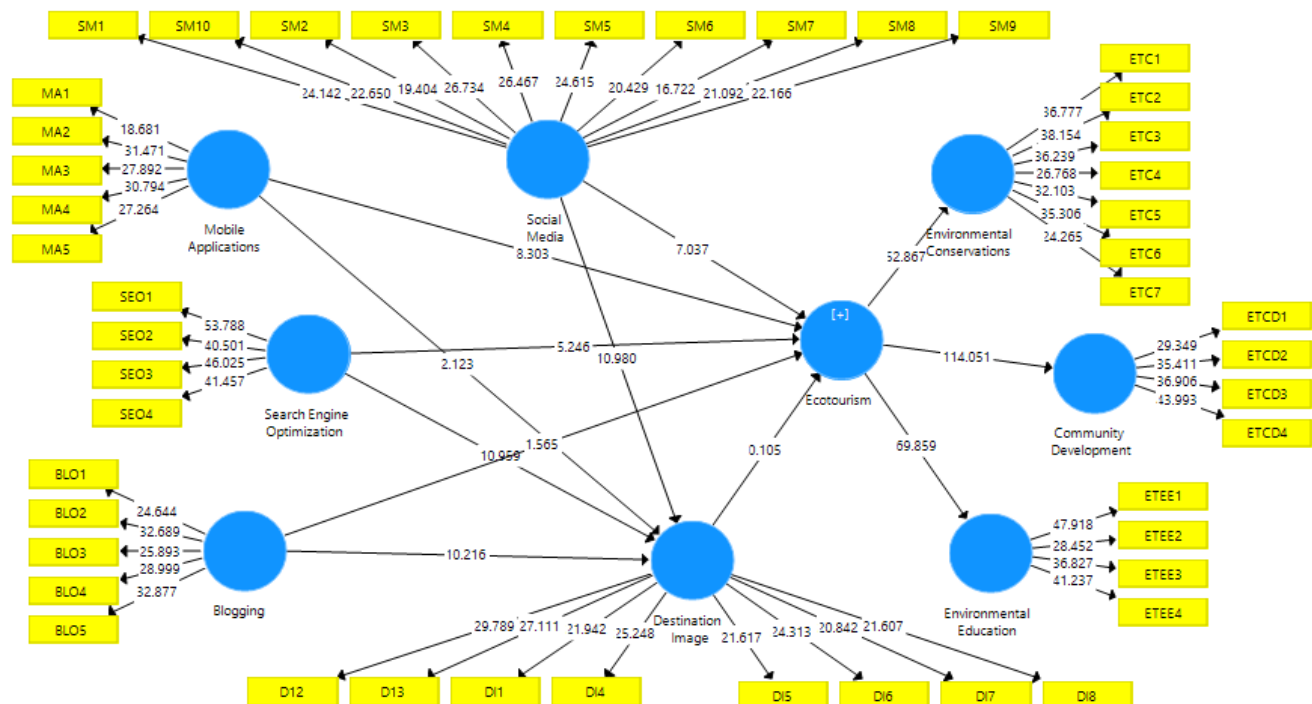


Table 9 presents the structural relationships between constructs in the PLS-SEM model. Blogging shows a positive and significant effect on Destination Image ($\beta = 0.264$, $T = 10.216$, $p < 0.001$), indicating that greater blogging activity enhances destination perceptions. However, its relationship with Ecotourism is negative and non-significant ($\beta = -0.111$, $T = 1.565$, $p = 0.118$), suggesting minimal influence. Similarly, Destination Image has no significant effect on Ecotourism ($\beta = 0.015$, $p = 0.917$). In contrast, Ecotourism significantly impacts Community Development ($\beta = 0.929$, $T = 114.051$), Environmental Conservation ($\beta = 0.894$, $T = 52.867$), and Environmental Education ($\beta = 0.881$, $T = 69.859$), all at $p < 0.001$, highlighting its critical role in sustainability. Mobile Applications positively influence both Destination Image ($\beta = 0.079$, $p = 0.034$) and Ecotourism ($\beta = 0.640$, $p < 0.001$). While SEO enhances Destination Image ($\beta = 0.402$, $p < 0.001$), it negatively impacts Ecotourism ($\beta = -0.356$, $p < 0.001$). Social Media exerts a strong, significant influence on both Destination Image and Ecotourism, reinforcing its strategic relevance in digital tourism promotion.

Table 9. Bootstrapping Effect Results

Construct	Original Sample (O)	T Statistics (O/STDEV)	P Values
BLOG -> DI	0,264	10,216	0,000*
BLOG -> Ecotourism	-0,111	1,565	0,118
DI -> Ecotourism	0,015	0,105	0,917
Ecotourism -> ETCD	0,929	114,051	0,000*
Ecotourism -> ETC	0,894	52,867	0,000*
Ecotourism -> ETEE	0,881	69,859	0,000*
MA -> DI	0,079	2,123	0,034
MA -> Ecotourism	0,640	8,303	0,000*
SEO -> DI	0,304	10,959	0,000*
SEO -> Ecotourism	-0,356	5,246	0,000*
SM -> DI	0,405	10,980	0,000*
SM -> Ecotourism	0,660	7,037	0,000*

* means significant at 5%

Table 10 summarizes the specific indirect effects within the PLS-SEM model, focusing on how constructs influence Community Development, Environmental Conservation, and Environmental Education through various mediation pathways. The indirect effect of Blogging on Community Development via Ecotourism is negative ($\beta = -0.104$, $p = 0.119$) and statistically insignificant, as is the more complex pathway through Destination Image and Ecotourism ($\beta = 0.004$, $p = 0.916$). Similarly, Mobile Applications ($\beta = 0.001$, $p = 0.924$), SEO ($\beta = 0.004$, $p = 0.917$), Destination Image ($\beta = 0.014$, $p = 0.917$), and Social Media ($\beta = 0.006$, $p = 0.918$) do not exhibit significant indirect effects via Destination Image and Ecotourism. However, significant mediation effects are observed when Mobile Applications ($\beta = 0.595$, $p < 0.001$) and Social Media ($\beta = 0.614$, $p < 0.001$) are mediated directly by Ecotourism, positively contributing to Community Development. Conversely, SEO has a significant negative indirect effect ($\beta = -0.331$, $p < 0.001$). Similar patterns emerge in pathways toward Environmental Conservation and Education, confirming the central mediating role of Ecotourism.

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Table 10. Explicit Aberrant Impacts

Construct	Original (O)	Sample	T (O/STDEV)	Statistics	P Values
BLOG -> Ecotourism -> ETCD	-0,104		1,561		0,119
Blogging -> DI -> Ecotourism -> ETCD	0,004		0,105		0,916
MA -> DI -> Ecotourism -> ETCD	0,001		0,095		0,924
SEO -> DI -> Ecotourism -> ETCD	0,004		0,104		0,917
DI -> Ecotourism -> ETCD	0,014		0,105		0,917
SM -> DI -> Ecotourism -> ETCD	0,006		0,103		0,918
MA -> Ecotourism -> ETCD	0,595		8,254		0,000*
SEO -> Ecotourism -> ETCD	-0,331		5,223		0,000*
SM -> Ecotourism -> ETCD	0,614		7,047		0,000*
BLOG -> DI -> Ecotourism	0,004		0,106		0,916
MA -> DI -> Ecotourism	0,001		0,095		0,924
SEO -> DI -> Ecotourism	0,005		0,104		0,917
SM -> DI -> Ecotourism	0,006		0,103		0,918
BLOG -> Ecotourism -> ETC	-0,100		1,561		0,119
BLOG -> DI -> Ecotourism -> ETC	0,004		0,105		0,916
MA -> DI -> Ecotourism -> ETC	0,001		0,095		0,924
SEO -> DI -> Ecotourism -> ETC	0,004		0,104		0,917
DI -> Ecotourism -> ETC	0,014		0,105		0,917
SM -> DI -> Ecotourism -> ETC	0,005		0,103		0,918
MA -> Ecotourism -> ETC	0,572		8,152		0,000*
SEO -> Ecotourism -> ETC	-0,318		5,221		0,000*
SM -> Ecotourism -> ETC	0,591		7,039		0,000*
BLOG -> Ecotourism -> ETEE	-0,098		1,553		0,121
BLOG -> DI -> Ecotourism -> ETEE	0,004		0,105		0,916
MA -> DI -> Ecotourism -> ETEE	0,001		0,094		0,925
SEO -> DI -> Ecotourism -> ETEE	0,004		0,104		0,917

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DI -> Ecotourism -> ETEE	0,013	0,104	0,917
SM -> DI -> Ecotourism -> ETEE	0,005	0,103	0,918
MA -> Ecotourism -> ETEE	0,564	8,479	0,000*
SEO -> Ecotourism -> ETEE	-0,313	5,202	0,000*
SM -> Ecotourism -> ETEE	0,582	7,034	0,000*

* means significant at 5%

Table 11 The Importance-Performance Map Analysis (IPMA) results for the construct Ecotourism highlight key insights into the relative contributions of digital marketing variables. Among the variables analyzed, social media exhibits the highest importance (0.673) and performance (69.904), indicating its critical role in promoting ecotourism. On the other hand, Search Engine Optimization (SEO) shows a negative importance (-0.358) and the lowest performance (68.580), suggesting a need for further optimization to enhance its impact. Mobile Applications, with an importance of 0.639 and a performance of 69.454, demonstrate significant potential in driving sustainable tourism outcomes.

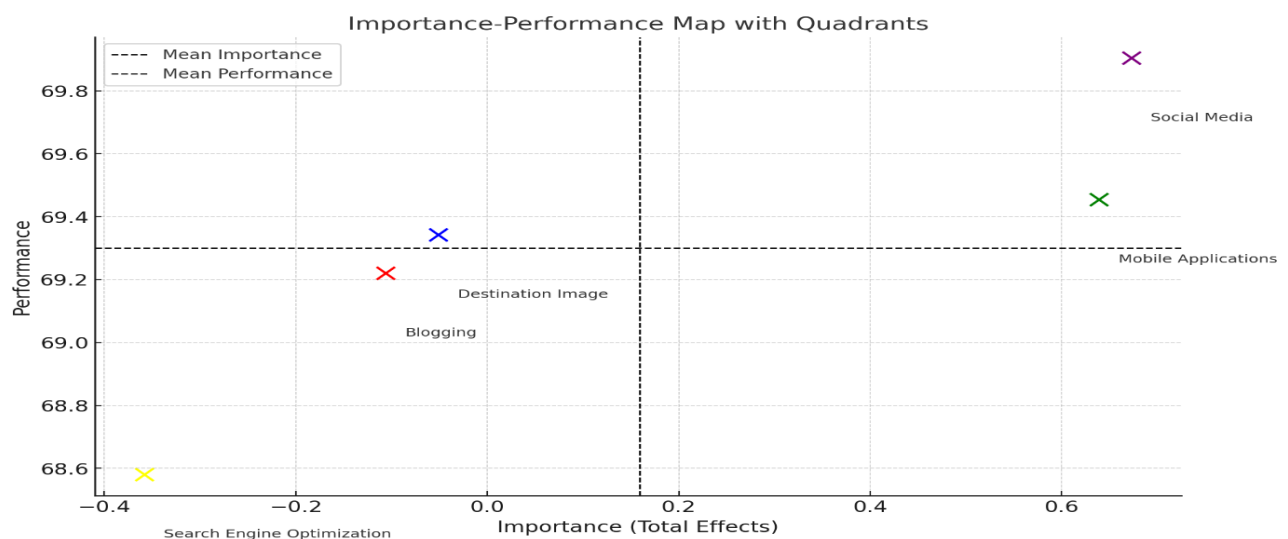
Table 11. IPMA

Variable	Ecotourism	Performances
Blogging	-0.106	69.220
Destination Image	-0.051	69.342
Mobile Applications	0.639	69.454
Search Engine Optimization	-0.358	68.580
Social Media	0.673	69.904

The Importance-Performance Map Analysis (IPMA) categorizes constructs based on their relative Importance (x-axis) and Performance (y-axis), using mean values as quadrant dividers. Social Media falls into Quadrant I (high Importance: 0.673, high Performance: 69.904), signifying its critical strategic role in promoting ecotourism. Mobile Applications, located in Quadrant II (high Importance: 0.639, lower Performance: 69.454), represent a high-potential area requiring optimization. Search Engine Optimization (SEO) appears in Quadrant III (low Importance: -0.358, low Performance: 68.580), suggesting limited relevance to ecotourism and a lower priority for resource allocation. In Quadrant IV, Destination Image and Blogging demonstrate high performance (69.342 and 69.220, respectively) but low importance (-0.051 and -0.106), indicating minimal strategic impact despite solid performance. These insights suggest prioritizing improvements in Mobile Applications and maintaining social media engagement. Conversely, the

underperformance and low importance of SEO highlight a need for reevaluation to align it more effectively with sustainable tourism objectives.

Figure 4. IPMA Quadrant



This study provides meaningful insights into the intersection of digital marketing strategies and sustainable ecotourism, offering both theoretical and practical contributions. The findings reveal that social media, search engine optimization (SEO), and mobile applications significantly influence destination image, which in turn shapes ecotourism behavior. These digital tools not only enhance travelers' perceptions but also promote environmental conservation and community development—key pillars of sustainable tourism. The results align with previous research highlighting the role of digital engagement in tourism (Akhtar et al., 2021; Yoo et al., 2018), yet this study advances the literature by empirically validating the mediating role of destination image within the Theory of Planned Behavior (TPB) framework (Ajzen, 2020).

Theoretically, this study extends TPB by integrating modern digital marketing variables and linking them to sustainable behavioral outcomes. Destination image is confirmed as a critical mediator, reinforcing its influence in shaping environmentally responsible travel intentions (Bui et al., 2022; Chi, 2021). This research also reveals the nuanced effects of digital strategies—while social media and mobile apps positively influence ecotourism, SEO demonstrates a negative effect, indicating a need for strategic refinement.

Practically, the study underscores the importance of customizing digital tools to user behavior and cultural context. For example, Indonesian tourists prioritize mobile accessibility, whereas Brazilian travelers respond better to interactive social media. Moreover, technologies such as AI and virtual reality (VR) can deliver immersive, personalized experiences that bridge informational gaps, especially in remote ecotourism areas. Policymakers should incentivize the adoption of AI-driven and culturally adaptive technologies to amplify sustainable tourism outcomes.

5. Conclusion

This study highlights the pivotal role of digital marketing strategies—particularly social media, mobile applications, and SEO—in shaping ecotourism behavior and enhancing sustainability outcomes. Among these strategies, social media exerts the most significant positive impact on both destination image and ecotourism behavior, confirming its effectiveness in engaging environmentally conscious travelers. Mobile applications also positively influence ecotourism outcomes, though their performance remains moderate, signaling opportunities for further optimization. In contrast, SEO, despite its potential to increase destination visibility, demonstrates a negative impact on ecotourism behavior, suggesting misalignment with sustainability goals. The research also confirms the mediating role of destination image, though its influence on ecotourism behavior is limited in this context. Importantly, ecotourism significantly contributes to community development, environmental conservation, and education. These findings not only expand the Theory of Planned Behavior (TPB) in the digital tourism domain but also provide actionable insights for policymakers and practitioners to enhance sustainable tourism through tailored digital marketing efforts.

The findings of this study offer valuable implications for ecotourism stakeholders, including businesses, marketers, and policymakers. By demonstrating the positive influence of digital marketing tools—such as social media, SEO, and mobile applications—on ecotourism behavior and destination image, the research underscores the importance of investing in these strategies. Effectively leveraging these tools can enhance destination visibility, attract environmentally conscious tourists, and promote sustainability. Additionally, adopting data-driven approaches can optimize marketing efforts, fostering deeper engagement and long-term success within the ecotourism sector.

Future research should adopt longitudinal designs to explore the long-term effects of artificial intelligence (AI) and virtual reality (VR) on visitor satisfaction and destination loyalty. Studies should also investigate how emerging technologies interact with local community engagement in sustainable tourism. Despite the valuable insights provided by this study, several limitations must be acknowledged. First, the focus on specific regions in Indonesia may limit the generalizability

of the findings to other global ecotourism destinations. Cultural, economic, and environmental differences may influence tourist behavior in ways not captured here. Second, the reliance on self-reported data may introduce bias, as respondents may not accurately reflect their behaviors or motivations. Additionally, this study examines the relationships between digital marketing strategies and ecotourism behavior without delving deeply into the underlying mechanisms or contextual influences. Future research should address these limitations through cross-regional studies and mixed-method approaches to gain a more comprehensive understanding of the dynamics involved.

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