

Integrating Green Marketing and Environmental Behavior to Predict Revisit Intention in Indonesian Ecotourism

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Abstract

Purpose: The escalation of ecotourism as sustainability-oriented travel highlights the inconsistency of tourists' responsible actions during visits, which is also known as the attitude-behavior gap, whereas environmental concern does not necessarily translate into action, as discussed in sustainable tourism literature.

Research Methodology: A quantitative approach was employed using Partial Least Squares Structural Equation Modeling, collected through questionnaire surveys from 478 tourists who had previously visited Ecotourism destinations in Batam City, Indonesia, using SmartPLS 4.

Results: The findings show how direct environmental experiences at the destination were more effective in encouraging responsible tourist behavior than pre-visit digital exposure, which presumes that it is more likely to develop revisit intentions as long-term destination loyalty.

Conclusions: The study highlights the importance of environmental behavior in fostering revisit intention within ecotourism destinations and suggests that direct interpretive experiences at the destination may play a more influential role in shaping tourists' behavior than digital promotional exposure alone.

Limitations: This study was limited to one ecotourism site in Batam City, with cross-sectional self-reported data, which may have limited generalizability.

Contributions: This study extends sustainable tourism literature by integrating digital green marketing, environmental belief, and environmental interpretation into a unified behavioral framework explaining revisit intention through environmental behavior and offer practical insights for ecotourism managers to strengthen sustainable behavior and long-term destination loyalty through effective communication and interpretation strategies.

Keywords: *Digital Green Marketing Campaign, Environmental Belief, Environmental Interpretation, Environmental Behavior, Revisit Intention*

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1. Introduction

Global tourism recorded 1.52 billion international tourist arrivals in 2023, surpassing the pre-pandemic 2019 figure ([World Tourism Organization, 2024](#)), and cementing its position as the sector with the most consistent growth in the modern era ([Zhang & Nahar, 2022](#)). This surge in visits has triggered ecological pressures in various destinations ([Gulzar et al., 2024](#)), giving rise to the phenomenon of overtourism that threatens the sustainability of natural resources ([Beall, Boley, Landon, & Woosnam, 2021](#)), and in turn driving the growth of ecotourism as a conservation-based approach to tourism ([Jin & Gao, 2025](#); [Kumar, Hasija, Kumar, & Sageena, 2023](#)). In this context, Southeast Asian mangrove ecosystems,

including those in Indonesia, are the most strategic areas for the development of coastal ecotourism ([Blanton et al., 2024](#)). Although Generation Z is increasingly aware of the environmental impacts of their travel choices ([de Araújo, Andrés-Marques, & López Moreno, 2025](#)), this awareness does not always lead to a reduction in ecological pressure at ecotourism destinations ([Ruhanen, 2019](#)).

A mangrove forest area in Batam City, Riau Islands, has become a notable example of nature-based ecotourism growth in Indonesia, evolving in recent years into an attractive destination for both domestic and international visitors ([Lituhayu, Widowati, Nirmala, & Subowo, 2025](#)). Batam's strategic geographical position along an international border represents one of its key advantages, despite the significant development pressures it continues to face ([Aunurrahman, Anggoro, Muskananfol, & Saputra, 2023](#); [Irawan & Sidabutar, 2024](#)). The presence of Pandang Tak Jemu Mangrove Ecotourism as one of Batam's most active mangrove forests ([Kementerian Pariwisata Republik Indonesia, 2025](#)) has succeeded in attracting tourists from around the world ([Rakhmad, 2026](#)) due to its crucial role in sustaining the coastal ecosystem, thereby requiring management approaches capable of balancing increasing tourist arrivals with environmental preservation ([Irawan & Sidabutar, 2024](#)).

A growing body of research highlights the existence of an attitude-behavior gap during tourism activities ([Purwianti, Ariyanto, Winata, & Changbo, 2025](#); [Sattayathamrongthian & Vanpetch, 2025](#)) which occurs because tourists in unfamiliar environments are more susceptible to contextual shifts ([Luna-Cortes, López-Bonilla, & López-Bonilla, 2025](#)), has been consistently found in ecotourism destinations, where the pleasure-oriented nature of tourism leads to irresponsible behavior and non-compliance with conservation rules, even though tourists explicitly choose nature-based destinations based on environmental concern ([Bilynets & Knezevic Cvelbar, 2022](#); [Wut, Lee, & Lee, 2023](#)). These findings suggest that environmental beliefs alone are insufficient to predict actual behavior ([Aguilar-Luzón, Carmona, Calvo-Salguero, & Castillo Valdivieso, 2020](#)), highlighting the need to further identify factors capable of bridging the gap between attitudes and actions.

Digital Green Marketing Campaigns (DGMC) have evolved into the primary approach used by ecotourism destination managers to promote environmental responsibility among tourists ([Fasha, Anggraini, Purwianti, & Yaacob, 2026](#); [Sanjaya, Arief, Juli Setiadi, & Heriyati, 2024b](#); [Vicente, 2024](#)), supported by shifts in the social media-based communication landscape ([M. T. Nguyen, 2024](#)). The effectiveness of DGMC is measured by how many tourists are exposed to it and to what extent that exposure actually drives responsible behavior in the field ([Daoud et al., 2024](#); [Hasibuan, Sulyanto, & Novandari, 2026](#)), as a process also influenced by how tourists interpret the environmental messages they receive, a cognitive dimension that has received little attention in ecotourism marketing research ([H. Wang, Tong, & Zeng, 2025](#)). The use of Instagram as the primary promotional tool makes Mangrove Pandang Tak Jemu Ecotourism relevant for examining the effectiveness of green digital marketing campaigns in shaping tourists' environmental behavior ([Asdecker, 2022](#); [Ummar, Shaheen, Bashir, Ul Haq, & Bonn, 2023](#)), although existing research tends to stop at the direct impact of campaigns on attitudes or intentions without investigating whether these changes are actually translated into concrete actions during the visit ([Rahimian, Molavi, & Chegheni, 2025](#); [Rayo, Rayo, & Mandagi, 2024](#)).

Among the factors influencing environmental behavior, Environmental Interpretation (EI) is the variable most frequently overlooked in marketing-based tourism research models ([Phan & Schott, 2019](#); [Saputra & Putra, 2020](#)), largely because EI has traditionally been categorized as a conservation tool rather than a marketing variable. In fact, high-quality environmental interpretation has been shown to enhance tourists' ecological understanding and encourage engagement in responsible behavior ([Luna-Cortes et al., 2025](#)), while also fostering emotional bonds that are a prerequisite for the intention to revisit ([Wut et al., 2023](#)). In Batam's mangrove ecosystem, which harbors complex biodiversity but lacks adequate interpretive guidance ([Aunurrahman et al., 2023](#)), the role of EI becomes increasingly critical to investigate.

Existing studies have predominantly examined these variables in isolation, focusing either on the influence of DGMC on tourists' attitudes and intentions ([Sanjaya, Arief, Juli Setiadi, & Heriyati, 2024a](#)), the role of EI in shaping environmental behavior ([Rahimian et al., 2025](#)), or the relationship

between environmental behavior and revisit intention with mixed empirical results ([Akhshik, Rezapouraghdam, Ozturen, & Ramkissoon, 2023](#); [Vicente, 2024](#)). Consequently, the relative contribution of digital communication, individual environmental beliefs, and on-site interpretive experiences in fostering environmentally responsible behavior remains unclear, particularly when these factors operate simultaneously.

This evidence reveals an important theoretical gap, where ecotourism behavior is unlikely to be explained by a single antecedent as the tourists' decisions emerge from the interaction of digital communication, psychological predispositions, and destination experiences. However, as no previous study has integrated DGMC, Environmental Beliefs (EB), and EI into a comprehensive mediation model that positions environmental behavior as the mechanism linking these antecedents to revisit intention, the present study develops and tests an integrated model to examine how these three antecedents, providing a more comprehensive explanation of sustainable tourist behavior and practical guidance for ecotourism destination management.

2. Literature Review and Hypotheses Development

2.1 Theoretical background

Theory of Planned Behavior (TPB) ([Ajzen, 1991](#)) provides the theoretical foundation for this study, explaining that behavior is preceded by a cognitive evaluation process involving attitudes, subjective norms, and perceived behavioral control, which shape behavioral intentions and ultimately influence actual behavior. TPB has consistently demonstrated its ability to explain tourists' pro-environmental behavior by linking psychological evaluations with environmentally responsible actions ([B. Setiawan, Munawar, Lee, & Romadona, 2025](#); [Yuriev, Dahmen, Paillé, Boiral, & Guillaumie, 2020](#)). The relevance of the TPB in this study lies in its ability to accommodate three antecedents of differing natures simultaneously, where DGMC serves as a pre-visit external stimulus that shapes tourists' attitudes prior to their visit ([Sanjaya et al., 2024b](#); [Ummar et al., 2023](#)), EB as a relatively stable internal disposition rooted in an individual's value system ([Haltinner & Sarathchandra, 2022](#)), as well as EI as a situational factor at the location that strengthens tourists' perceived behavioral control through direct understanding of the consequences of their actions on the ecosystem ([Tang et al., 2022](#); [T.-L. Wang, 2024](#)). These three antecedents, although conceptually mappable to the TPB, have never been tested together in a single model that treats environmental behavior as a mediator between them and revisit intention.

2.2 Digital Green Marketing Campaign & Environmental Behavior

DGMC is known as the integration of digital marketing and green marketing that explicitly promotes environmental sustainability values and practices ([Alkhatib, Kecskés, & Keller, 2023](#); [Saura, Palos-Sanchez, & Rodríguez Herráez, 2020](#)) as a pre-visit external stimulus that builds tourists' understanding of their environmental responsibilities ([Vicente, 2024](#)), by shaping normative expectations that influence tourists' attitudes toward behavior within the TPB framework and encouraging their actual engagement in pro-environmental actions while at the destination ([Daoud et al., 2024](#); [Sanjaya et al., 2024b](#)). Previous research has demonstrated that DGMC has a positive relationship with Environmental Behavior (EBeh) ([Khan, Jabeen, Bhutta, Ghani, & Bihi, 2025](#); [Peiró-Signes, Biondo, Sakka, Borsellino, & Galati, 2025](#); [Sanjaya et al., 2024b](#); [Vicente, 2024](#); [Yu, 2024](#)), which refers to concrete actions taken by individuals aimed at minimizing negative impacts on the environment ([Mónus, 2020](#); [Shafiei & Maleksaeidi, 2020](#)) and a manifestation of environmental awareness that has been successfully internalized through various external stimuli, including digital campaigns received prior to the visit ([Berger & Wyss, 2021](#)), whereby when tourists exhibit responsible behavior during their visit, the quality of the tourism experience improves alongside the preservation of the environment ([D. T. Nguyen, Dao, & Pham, 2026](#)).

H₁: Digital Green Marketing Communication (DGMC) has a positive effect on Environmental Behavior (EBeh)

2.3 Environmental Belief & Environmental Behavior

EB describes how humans interaction position themselves in relation to nature ([Ren, Jiang, & Tang, 2022](#)), reflecting an individual's perceptions of environmental values ([Inkpen & Baily, 2020](#)), while

also shaping how individuals understand and assess the consequences of human activities on the natural environment ([Zhu, Tang, Wang, & Chen, 2021](#)). Strong EB has been shown to have a positive and significant influence on an individual's tendency to engage in sustainable behavior ([Hasan & Ivarada, 2025](#); [Kim, McGinley, Choi, & Agmapisarn, 2020](#)), which is known as EBEh that contributes to shaping individuals' actual actions in the context of tourism ([Haltinner & Sarathchandra, 2022](#)).

H₂: Environmental Behavior (EB) has a positive effect on Environmental Behavioral Engagement (EBEh)

2.4 Environmental Interpretation & Environmental Behavior

EI aimed at connecting individuals with their surrounding environment ([Frías-Jamilena, Fernández-Ruano, & Polo-Peña, 2022](#)), to shapes visitors' experiences within natural tourism spaces ([Xie et al., 2023](#)), while also interpreting experiences and cognitive processes occurring directly on-site ([Tang et al., 2022](#)). The way tourists interpret environmental information has been shown to influence both their perception of the destination and their behavior within it ([Hadrian & Ratnasari, 2025](#)), and effective interpretation consistently enhances environmental awareness and encourages tourists to engage in more responsible behavior during their visit ([Lee, Jan, & Chen, 2021](#)).

H₃: Environmental Interpretation (EI) has a positive effect on Environmental Behavioral Engagement (EBEh)

2.5 Environmental Behavior & Revisit Intention

EBEh serves as a key factor in sustaining nature-based destinations ([Hu, Samad, & Mahmood, 2026](#)), where tourist behavior is a primary determinant of ecosystem sustainability ([Khuadthong, Imjai, Yordudom, Armandsiri, & Aujiirapongpan, 2025](#)). When tourists exhibit responsible behavior, the tourism experience and environmental preservation improve ([D. T. Nguyen et al., 2026](#)), fostering an affective bond with the destination that strengthens long-term loyalty ([Sunarso, Chairani, Triloka, & Kurniawan, 2025](#)). Revisit intention refers to tourists' willingness to revisit a destination, reflecting prior visit experiences ([Respati, Kusumawati, Yulianto, & Fahrudi, 2025](#)), which is shaped by experience evaluation and positive destination perceptions ([Tavitiyaman, Qu, Tsang, & Lam, 2021](#)) and reinforced by experiences consistent with tourists' sustainability values ([Rueda-López, Castaño-Prieto, Álvarez-Robles, & Aguilar-Rivero, 2026](#)), such that in ecotourism, Revisit Intention (RI) is driven not only by satisfaction but also by meaningful experiences arising from the internalization and enactment of environmental values at the destination ([He, Blye, & Halpenny, 2023](#)).

H₄: Environmental Behavioral Engagement (EBEh) has a positive effect on Revisit Intention (RI)

2.6 Environmental Behavior as Mediator

This study positions EBEh as a mediator linking DGMC, EB, and EI to RI, based on the premise that digital stimuli, environmental beliefs, and interpretive experiences do not automatically generate tourist loyalty unless they first translate into responsible behavior during the visit ([Fenitra, Premananto, Sedera, Abbas, & Laila, 2022](#); [Sunarso et al., 2025](#)). In the first mediation pathway, DGMC received before the visit influences revisit intention only when it is translated into responsible behavior at the destination ([Zheng, Han, Gandolfi, Alturise, & Alkhalaf, 2025](#)), making EBEh the mechanism linking external stimuli to long-term loyalty (Shen & Wang, 2023). In the second mediation pathway, strong EB requires EBEh to translate environmental beliefs into affective attachment to the destination ([Darabaneanu, Maci, & Oprea, 2024](#); [Meng & Si, 2022](#); [Yoon, Lee, & Larson, 2024](#)), as the attitude-behavior gap suggests that beliefs alone do not consistently produce meaningful behavioral outcomes ([Sheeran & Webb, 2016](#)). In the third mediation pathway, effective on-site EI not only enhances tourists' cognitive understanding but must also stimulate responsible behavior before influencing tourist loyalty ([Li, Coca-Stefaniak, Nguyen, & Morrison, 2024](#)), who argue that on-site education functions not only as a conservation tool but also as an experience-based marketing strategy whose effectiveness depends on its ability to transform understanding into action.

H₅: Environmental Behavioral Engagement (EBEh) mediates the relationship between Digital Green Marketing Communication (DGMC) and Revisit Intention (RI)

H₆: Environmental Behavioral Engagement (EBEh) mediates the relationship between Environmental Behavior (EB) and Revisit Intention (RI)

H₇: Environmental Behavioral Engagement (EBEh) mediates the relationship between

Environmental Interpretation (EI) and Revisit Intention (RI)

Based on previous studies, the research framework for this study is as follows in figure 1 below:

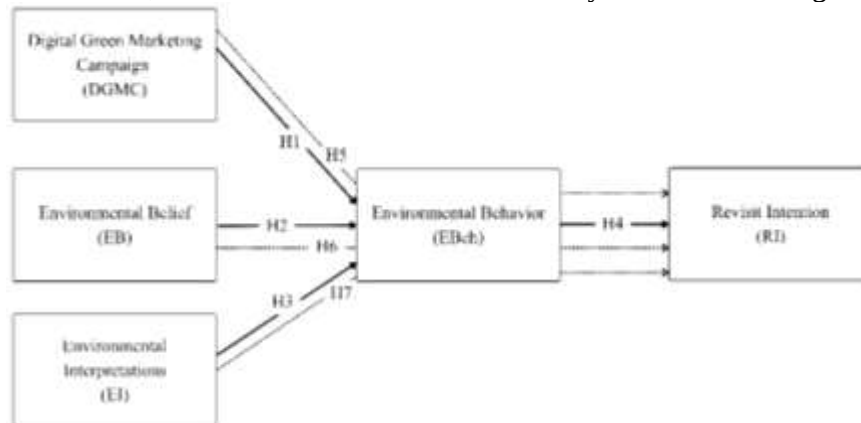


Figure 1. Research framework

3. Methodology

This study employed a quantitative approach to examine the relationships among the proposed variables (Lim, 2025), with the minimum sample size was determined using Cochran's formula with a 95% confidence level and a 5% margin of error (Adam, 2020). Based on Batam's population of approximately 1.3 million (Badan Pusat Statistik, 2026), the minimum required sample was 384 respondents and were collected through an online questionnaire using a five-point Likert scale (Campbell et al., 2020). Respondents were defined as tourists who had visited the Pandang Tak Jemu Mangrove Ecotourism site in Batam City within the past two years. All participation was voluntary, and respondent data were kept confidential. The measurement instrument was adapted from previously validated scales, with minor wording modifications to ensure consistency with the mangrove ecotourism context while preserving the original conceptual meaning of each construct.

DGMC construct was measured using 4 indicators adapted from the Social Media Marketing scale Francis et al. (2023) to examine how social media encourages tourists interest from travel experiences trends, which also leads to measure EB from the Environmental Belief scale by Khanh and Phong (2020) to analyze people's sense of responsibility toward protecting nature from harmful impact. EI was adopted from four indicators from the Environmental Interpretation scale proposed by H. V. Nguyen et al. (2021) to understand how tourists portrayed environmental ambience which leads to a deeper understanding of how far people are willing to prioritize sustainability over convenience in their travel choices, measured using six indicators adapted from the Environmentally Conscious Behavior scale (Perera, Kalantari, & Johnson, 2022). Lastly, RI used three indicators from the Revisit Intentions scale developed by Bahja and Hancer (2021) to measure visitors' long-term loyalty and intention to return to ecotourism destinations. In examining the relationships among variables, Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4 was chosen for predictive models, as it does not require normally distributed data, and is appropriate for testing mediation models involving reflective constructs (Hair, Risher, Sarstedt, & Ringle, 2019). The analysis comprised assessment of the measurement model (convergent and discriminant validity), reliability, multicollinearity, hypothesis testing through bootstrapping, and evaluation of the structural model using R^2 and Q^2 (Memon et al., 2021).

4. Results and Discussions

4.1 Result

4.1.1 Descriptive Statistics

This study collected data from 478 respondents, consisting of 243 male and 235 female participants, where most respondents were relatively young, particularly aged 18-24 years (139 respondents) and 25-34 years (105 respondents). Respondents aged 35-44 years accounted for

96 participants, followed by those aged 45-54 years with 85 participants, while respondents aged 55 years and above formed the smallest proportion with 53 participants. The sample was dominated by individuals within the productive age range of 18-34 years, reflecting a group that is generally more familiar with digital platforms and more frequently exposed to digital-based information, as this study focuses on the influence of digital communication on tourists' behavior and revisit intention.

4.1.2 Reliability and Validity Assessment

Table 1 shows the results of the reliability and validity testing for all constructs, where all outer loading values were above the recommended threshold of 0.70, as well as Cronbach's Alpha values ranged from 0.823 to 0.913 and Composite Reliability (CR) values ranged between 0.894 and 0.939, exceeding the minimum recommended value of 0.70. Convergent validity shows all Average Variance Extracted (AVE) values were above 0.50, where Environmental Belief (EB) recorded the highest AVE value at 0.794 as the strong level of shared variance among its indicators. In addition, all Variance Inflation Factor (VIF) values were below the threshold of 5, confirming that multicollinearity was not a serious issue in the proposed measurement model ([Hair et al., 2019](#)).

Table 1. Reliability and validity result

Construct	Item	Outer Loading	Cronbach's Alpha	CR	AVE	VIF
DGMC	DGMC1	0.843	0.869	0.911	0.718	2.163
	DGMC2	0.823				1.887
	DGMC3	0.890				2.580
	DGMC4	0.832				2.052
EB	EB1	0.911	0.913	0.939	0.794	3.606
	EB2	0.836				2.239
	EB3	0.903				3.223
	EB4	0.912				3.397
EBeh	EBeh1	0.874	0.912	0.932	0.694	2.984
	EBeh2	0.825				2.359
	EBeh3	0.819				2.309
	EBeh4	0.794				2.065
	EBeh5	0.842				2.629
	EBeh6	0.841				2.576
EI	EI1	0.827	0.855	0.902	0.697	2.026
	EI2	0.809				1.795
	EI3	0.872				2.328
	EI4	0.830				1.959
RI	RI1	0.871	0.823	0.894	0.739	1.973
	RI2	0.844				1.684
	RI3	0.863				2.001

Table 2 presents the HTMT (Heterotrait-Monotrait Ratio) values for each construct pair. The highest value was found between EBeh and RI at 0.853, which is still below the recommended threshold of 0.90 ([Cheung, Cooper-Thomas, Lau, & Wang, 2024](#)). This result indicates that all constructs in the model have achieved adequate discriminant validity, as no excessive correlation was identified between different constructs.

Table 2. The Heterotrait-Monotrait Ratio value

Variables	DGMC	EB	EBeh	EI	RI
DGMC					
EB	0.777				
EBeh	0.775	0.844			

EI	0.678	0.740	0.826		
RI	0.726	0.784	0.853	0.756	

Table 3 presents the results of the discriminant validity test using the Fornell-Larcker criterion, whereby the root mean square error of approximation (RMSEA) for each construct must be greater than the correlations between the other constructs ([Hair et al., 2019](#)). The results show that all constructs meet these criteria, where DGMC (0.848), EB (0.891), EBeh (0.833), EI (0.835), and RI (0.859) each have a higher AVE square root value than the highest correlation with other constructs in the same row. Thus, all constructs in this research model have met the criteria for discriminant validity.

Table 3. The Fornell-Larcker value

Variables	DGMC	EB	EBeh	EI	RI
DGMC	0.848				
EB	0.697	0.891			
EBeh	0.694	0.773	0.833		
EI	0.589	0.656	0.732	0.835	
RI	0.618	0.683	0.741	0.637	0.859

4.1.3 The Structural Model Assessment

Table 4 presents the results of the structural model evaluation using the adjusted R-square, F-square, and Q² values. The adjusted R-square value for EBeh of 0.707 indicates that DGMC, EB, and EI together account for 70.7% of the variance in the EBeh variable, which falls into the strong category ([Hair et al., 2019](#)). The adjusted R-square value for RI of 0.549 indicates that EBeh explains 54.9% of the variance in the RI variable, which falls into the moderate to strong category.

Table 4. R-square overview

	R-square	R-square adjusted
EBeh	0.708	0.707
RI	0.550	0.549

The results of the blindfolding test on Table 5 show a Q² value of 0.486 for EBeh and 0.402 for RI, both of which are well above 0 and fall into the strong category (>0.35). These findings confirm that the structural model in this study has strong predictive relevance for both endogenous variables ([Hair et al., 2019](#)).

Table 5. Construct cross-validated redundancy (Q²)

	Q ²
DGMC	0.000
EB	0.000
EBeh	0.486
EI	0.000
RI	0.402

4.1.4 Hypotheses Testing

Based on Table 6, all proposed hypotheses were supported, as the t-statistic values exceeded 1.96 and the p-values were below 0.05. DGMC was found to have a significant positive effect on EBeh ($\beta = 0.214$, $t = 4.413$, $p < 0.001$), supporting H_1 . Likewise, EB significantly influenced EBeh ($\beta = 0.398$, $t = 8.454$, $p < 0.001$), providing support for H_2 . The strongest relationship was observed between EI and EBeh ($\beta = 0.741$, $t = 31.643$, $p < 0.001$), confirming H_3 . In addition, EBeh had a significant positive effect on RI ($\beta = 0.344$, $t = 7.012$, $p < 0.001$), thereby supporting H_4 . Overall, the findings provide support for all direct-effect hypotheses proposed in this study.

Table 6. Result Direct Effect

Relationship	Hypotheses	Coefficient	St. dev	T-statistics	P-values	Result
DGMC → EBeh	H_1	0.214	0.049	4.413	0.000	Accepted
EB → EBeh	H_2	0.398	0.047	8.454	0.000	Accepted
EI → EBeh	H_3	0.741	0.023	31.643	0.000	Accepted
EBeh → RI	H_4	0.344	0.049	7.012	0.000	Accepted

Based on Table 7, all indirect effect hypotheses were supported, with t-statistic values above 1.96 and p-values below 0.05. EBeh significantly mediated the relationship between DGMC and RI ($\beta = 0.159$, $t = 4.316$, $p < 0.001$) and the effect of EB on RI ($\beta = 0.295$, $t = 8.054$, $p < 0.001$), supporting H_5 and H_6 . In addition, EBeh significantly mediated the relationship between EI and RI ($\beta = 0.255$, $t = 6.897$, $p < 0.001$), supporting H_7 , which conclude these findings indicate that EBeh serves as a significant mediator in the proposed model.

Table 7. Result indirect effect

Relationship	Hypotheses	Coefficient	St. dev	T-statistics	P-values	Result
DGMC → EBeh → RI	H_5	0.159	0.037	4.316	0.000	Accepted
EB → EBeh → RI	H_6	0.295	0.037	8.054	0.000	Accepted
EI → EBeh → RI	H_7	0.255	0.037	6.897	0.000	Accepted

Table 8 shows the total effect assessment, indicating that all model relationships are statistically significant, with t-statistics exceeding the recommended threshold of 1.96 and p-values below 0.05. EI appears to be the primary driver of EBeh ($\beta = 0.741$), while the effects of EB ($\beta = 0.398$) and DGMC ($\beta = 0.214$) are relatively weaker. Moreover, EBeh maintains a significant positive association with RI ($\beta = 0.344$). When considering the overall influence on RI, EB exhibits the largest total effect ($\beta = 0.295$), ahead of EI ($\beta = 0.255$) and DGMC ($\beta = 0.159$). Collectively, these results reinforce the robustness of the proposed structural model and support the hypothesized relationships among the constructs.

Table 8. Total effect

Relationship	Hypotheses	Coefficient	St. dev	T-statistics	P-values
DGMC → EBeh	H_1	0.214	0.049	4.413	0.000
EB → EBeh	H_2	0.398	0.047	8.454	0.000
EI → EBeh	H_3	0.344	0.049	7.012	0.000
EBeh → RI	H_4	0.741	0.023	31.643	0.000
EB → RI	H_5	0.159	0.037	4.316	0.000
DGMC → RI	H_6	0.295	0.037	8.054	0.000
EI → RI	H_7	0.255	0.037	6.897	0.000

4.2 Results and Discussions

The Theory of Planned Behavior believes that behavioral intention is formed from three components ([Ajzen, 1991](#)), which in this study are reflected in H_1 , H_2 , and H_3 . Hypothesis 1 is verified to have a positive effect, reflecting that the development of digital media has turned its role into a place that builds social constructions of how individuals should behave ([Rosana & Fauzi, 2024](#)). Its consequences are how tourists now interpret digital media as a place for social validation ([Latifah & Setyowardhani, 2020](#)), which is why the influence of DGMC on EBeh ($\beta = 0.214$; $p < 0.05$) tends to be lower than other variables, as the relationship has not been fully transformed into substantive behavioral changes in the

real world. The emergence of social pressure formed in the digital space encourages tourists to develop positive evaluations of environmentally friendly behavior ([Sorcaru, Muntean, Manea, & Nistor, 2024](#)), which in TPB represents the formation of Attitudes. Hypothesis 2 shows that EB has a greater influence on EBEh ($\beta = 0.398$; $p < 0.05$) on positioning themselves towards nature, which was in line with the Subjective Norm component in TPB that forms tourists' beliefs about what is considered socially appropriate ([Fenitra et al., 2022](#)). The rapid spread of green information amid rising sustainability trends has contributed to a more superficial public understanding of ecological realities ([Vangeli, Małecka, Mitreaga, & Pfajfar, 2023](#)). The significant influence of Hypothesis 3, where EI on EBEh ($\beta = 0.344$; $p < 0.05$) gives direct exposure to environmental impacts that strengthen Perceived Behavioral Control as one of the components in TPB, where tourists' emotional engagement reinforces the belief that their actions have meaningful ecological consequences, thereby fostering behavioral intention ([Liu et al., 2024](#)). Hypothesis 4 proves EBeh has a significant effect on RI ($\beta = 0.741$; $p < 0.05$), which is formed once tourists feel the ecological meaning which forms a moral resonance that attaches them to revisit intention towards the destination ([Luong, 2025](#)) as the key for long-term loyalty in the context of Pandang Tak Jemu Mangrove Ecotourism. The mediation path of Hypothesis 5 shows how digital sustainability is effective in building visibility ([Sanjaya et al., 2024a](#)), although the loyalty requires a real behavior ([H. Setiawan, Rini, & Alditia, 2024](#)) in Hypothesis 6 to produce stronger behavioral involvement in tourist, that reinforced by Hypothesis 7 where direct ecological experience at the destination makes tourists form a deeper attachment to the destination ([Vu, Hoang, & Nguyen, 2024](#)).

5. Conclusions

5.1 Conclusion

The seven supported hypotheses demonstrate EI as the strongest predictor of EBeh ($\beta = 0.741$), followed by EB ($\beta = 0.398$), while DGMC showed a positive but comparatively weaker effect ($\beta = 0.214$). These findings suggest that DGMC influence is more limited than tourists' EBeh and on-site interpretive experiences. This indicates that digital communication is more effective when complemented by meaningful environmental experiences that encourage tourists to translate environmental awareness into actual behavior. The findings also support the existence of the attitude-behavior gap, highlighting that responsible environmental behavior is more likely to emerge when tourists actively engage with the destination rather than relying solely on pre-visit communication.

By mapping DGMC, EB, and EI to the cognitive components of the Theory of Planned Behavior, this study demonstrates that different antecedents contribute to environmental behavior through distinct cognitive pathways. Among these, EI emerged as the most influential predictor, emphasizing the importance of interpretive experiences in strengthening tourists perceived behavioral control and encouraging environmentally responsible actions. Furthermore, environmental behavior significantly influenced revisit intention ($\beta = 0.344$), suggesting that long-term tourist loyalty is shaped by opportunities for meaningful ecological engagement. These findings extend the application of TPB in ecotourism by highlighting environmental behavior as the mechanism through which digital communication, environmental beliefs, and on-site interpretation contribute to revisit intention.

As this study focuses on Pandang Tak Jemu Mangrove Ecotourism in Batam City, several practical implications can be drawn. First, destination managers should reconsider the balance of investments between digital communication and on-site visitor experiences, as this paper suggests that digital campaigns are most effective when complemented by high-quality interpretive experiences. Second, the significant role of environmental beliefs indicates that managers may benefit from collaborating with universities, environmental organizations, and nature-based communities to attract visitor segments with stronger pro-environmental values, thereby increasing the effectiveness of both digital communication and on-site interpretation. These findings also extend the application of the Theory of Planned Behavior by demonstrating that DGMC, EB, and EI represent complementary cognitive pathways that jointly shape environmental behavior, while highlighting environmental interpretation as the most influential driver within the mangrove ecotourism context. Finally, the results suggest that tourism authorities should complement promotional activities with greater investment in environmental interpretation and visitor education, while fostering collaboration among destination managers,

conservation organizations, educational institutions, and local communities to support environmentally responsible visitor behavior and the long-term sustainability of mangrove ecotourism destinations.

5.2 Research Limitations

Several limitations should be acknowledged in this study. First, the cross-sectional design limits the ability to capture changes in tourists' environmental behavior over time, leaving unanswered whether such behavior remains sustained after the visit or gradually declines as the situational influence of the tourism experience fades. Second, this study relied entirely on self-reported data, which may be subject to social desirability bias, potentially encouraging respondents to report more positive behavior than what occurs during the visit. Third, the study focused exclusively on the Pandang Tak Jemu Mangrove Ecotourism destination in Batam City, which should be exercised when generalizing these findings to other ecotourism destinations with different ecological characteristics, tourism infrastructures, and visitor profiles.

5.3 Suggestions and Directions for Future Research

Based on the identified limitations, several recommendations for future research are proposed. First, future studies are encouraged to adopt longitudinal approaches in order to examine whether tourists' environmental behavior remains consistent before, during, and after their visits to analyze the long-term effectiveness of DGMC, EB, and EI in shaping sustainable tourist behavior. Second, future research may benefit from employing mixed-method approaches by combining survey-based data with direct behavioral observation in the field to reduce the limitations associated with self-reported responses and provide more objective measurements of tourists' actual environmental behavior. Third, replicating this model across different ecotourism contexts, such as coral reef tourism, rainforest ecotourism, or savanna-based destinations, would improve the external validity of the findings and allow for comparisons across different ecological environments. Fourth, future studies are encouraged to incorporate additional moderating variables, such as environmental identity, previous travel experience, environmental knowledge, or digital literacy, to better understand the conditions under which digital campaigns and environmental interpretation. Finally, future research could develop a broader structural model by examining the direct relationships between DGMC, EB, EI, and RI simultaneously, thereby allowing researchers to determine whether EBEh functions as a full or partial mediator within different ecotourism contexts.

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Author Contributions

AF contributed to the conceptualization of the study, the development of the research methodology, and the drafting of the manuscript. AF also collaborated on data analysis and interpretation, contributing valuable insights that strengthened the discussion and the study's overall findings. CK contributed to the literature review, data collection, and collaborated closely in the data analysis and interpretation process to ensure the accuracy and validity of the findings through critical evaluation. CK was also actively involved in revising the manuscript for important intellectual content and contributed to refining and finalizing the research for publication. LL contributed by ensuring that all stages of the research adhered to applicable academic and ethical standards, while also supporting the overall coherence, quality, and integrity of the study throughout the research process. BS contributed to supervision, final review, and approval of the version to be published. All authors approved the final version of the manuscript.

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