Unraveling the mediating role of environmental attitude and the moderating role of altruism in the pro-environmental behavior of Vietnamese domestic tourists

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ABSTRACT

For tourism to grow sustainably, promoting Pro-Environmental Behavior (PEB) among tourists is crucial for the sustainable growth of tourism. This is the first study to focus on Vietnamese tourists and the variables that influence their PEB. An integrated structural model of PEB was developed by drawing on postulates from the Norm Activation Model (NAM) and Protection Motivation Theory (PMT). Data from 306 tourists who visited Vietnam locations were analyzed in our study. It was found through Structural Equation Modeling (SEM) that there is a significant direct association between Perceived Severity (PS), Perceived Vulnerability (PV), and PEB. The relationship between PS, PV, and PEB is mediated by Environmental Attitude (EA). Also, Altruism (AL) plays a significant moderating role in the EA and PEB relationship. This suggests that both EA and AL are key factors in shaping Vietnamese domestic tourists' PEB. The findings, which include the correlations between the variables, provide credence to the theoretical framework that was suggested. To enhance PEB, tourism agencies should make visitors' PS, PV, and AL more prominent.

1. Introduction

Pro-Environmental Behavior (PEB) refers to an individual or group's actions that encourage or lead to sustainable resource use (Miao & Wei, 2013). Tourists' PEB is an environmentally responsible, sustainable, and ecological tourist behavior (Li & Wu, 2020). The use of travelers' PEB appears to be the best way to achieve sustainability in tourism, making destinations more eco-friendly (Lee et al., 2013; Li & Wu, 2020). Sustainable development is a priority in tourism due to its environmental impact (Lin et al., 2022). Environmental quality management can significantly increase destination competitiveness (Ruan et al., 2020). New travel trends, such as green tourism, are popular and will become important in the future. Vietnam's growing popularity as a tourist destination led to the welcoming of 12.6 million international visitors in 2023, and people expect this number to rise this year. Vietnam aims to be one of the world's top 30 most competitive tourist destinations by 2030, according to its tourism development strategy. This goal requires green, sustainable, environmentally friendly tourism (MOCST, 2024). Tourism contributes to economic growth,

but it harms the environment (Loureiro et al., 2022). Despite growing interest in this topic, researchers have debated what factors influence PEB, particularly the complexities of PEB (Esfandiar et al., 2020). Hence, this study investigates the psychological mechanisms that underpin the positive PEB of Vietnamese domestic tourists.

Researchers' interest in the question of what motivates people to engage in pro-environmental behavior has grown in recent years, given the growing body of literature praising such actions (Li et al., 2019). A growing body of sustainable tourism literature examines the factors that motivate visitors to act in an eco-conscious manner (Li & Wu, 2020). Although many studies have examined the impact of individual factors on PEB, there is still no consensus on the relative importance of these factors in the context of Vietnamese tourism. According to PMT, "people appraise the severity and likelihood of being exposed to a depicted noxious event, evaluate their ability to cope with the event and alter their attitudes accordingly" (Rogers, 1975, p. 100). If tourists feel threatened while on vacation, they may take more precautions. This study takes into account the threat appraisal components of PMT in order to forecast the PEB of domestic tourists (Ruan et al., 2020). The Norm Activation Model (NAM) proposes a sequential process in which awareness of consequences influences PEBs (Schwartz, 1977). Thus, travelers who are more conscious of the damage they do to the planet are more likely to feel obligated to engage in PEBs (Lin et al., 2022). To further our understanding of PEBs, it might be helpful to combine theories from various fields or points of view (Lin et al., 2022). While there has been much discussion about how an individual's internal attitudes affect their PEB, the evidence regarding how this applies to travel is still inconclusive (Li & Wu, 2020). Psychological variables can predict any kind of behavior (including PEB), according to behavioral theories (Kim et al., 2012). PMT and NAM are two important theoretical models used to explain PEBs, based on perceptions of risk and personal motivation. This study investigates the PEB of Vietnamese domestic tourists by combining the NAM and PMT.

A review of PEB mapping (Kothe et al., 2019) reveals that both coping and threat perception influence the intention to engage in PEB. Two factors, threat appraisal and coping appraisal, are stated by PMT to determine individuals' self-protective behavior. Perceptions of environmental pollution, i.e., Perceived Severity (PS) and Perceived Vulnerability (PV), may play a more significant role in predicting tourists' PEB (Ruan et al., 2020). Hence, this study focuses on the two threat appraisal structures in PMT (i.e., PS and PV) to explain how they affect travelers' PEB. The degree to which an individual values the performance of behavior as favorable or unfavorable is reflected in their attitude (Graham-Rowe et al., 2015; Li et al., 2019). The majority of research generally indicates that Environmental Attitude (EA) is the primary factor influencing environmental behavior (Li et al., 2019). Adding new constructs, such as EA in this study, to the PMT to improve its ability to predict tourists' PEB is valuable. In addition, the social sciences focus on the contrast between rational choice calculations and normative altruism (Guagnano, 2001). PEB often involves a trade-off between individual and collective benefits, so Schwartz's (1977) altruism model has been used to conceptualize it. Therefore, there is a positive correlation between Altruism (AL) and environmentally responsible visitor behavior (Rahman & Reynolds, 2019). Given the consistent and unchanging nature of personal beliefs, AL is gaining more attention to sustainability (Uslu et al., 2023). It should be taken into account that altruistic values can predict the environmental beliefs, behaviors, and preferences of tourists (Shao et al., 2021). Examining the significance

of altruistic values in the relationship between EA and PEB is deemed important in this context. Consequently, the idea of AL was taken into account in the current study as a moderator in the suggested model.

This study aims to fill that gap by examining the impact of threat appraisal (PS, PV) and psychological factors such as Environmental Attitude (EA) and Altruism (AL) on the PEB of Vietnamese domestic tourists. Specifically, this study will focus on answering the following questions:

1. How do Perceived Severity (PS) and Perceived Vulnerability (PV) directly affect Pro-Environmental Behavior (PEB) of tourists?

2. Does Environmental Attitude (EA) play a mediating role in the relationship between PS, PV, and PEB?

3. How does Altruism (AL) moderate the relationship between EA and PEB?

2. Literature review and hypotheses development

2.1. Theoretical foundation

Protection Motivation Theory (PMT)

PMT, developed by Rogers (1975), explains how people assess and respond to threats through two main processes: threat appraisal and coping appraisal. This model has been widely applied to study tourists' PEB. In keeping with this idea, PMT proposes that there should be a positive association between perceived severity, perceived vulnerability, and protection motivation (Rainear & Christensen, 2017). As noted by Gardner and Stern (2002, p. 244), "It shows how several psychological processes and mechanisms can interact, reminds us that all of these processes and mechanisms can contribute to misestimation and inaction at the same time, and suggests multicomponent programs that are likely to be effective in efforts to increase people's estimation of environmental threats and/or their actions toward those threats," which makes the PMT particularly useful for PEB overall (Bockarjova & Steg, 2014).

Norm Activation Model (NAM)

Schwartz (1977) claims that the NAM can predict pro-social altruistic intentions and behavior. Because PEB often involves a trade-off between individual and collective benefits, Schwartz's (1977) NAM model has been used to view it (Guagnano, 2001). AL occurs when people are aware of negative social consequences for others and take responsibility for preventing or improving them, according to the NAM. An expanded sense of altruism can be directed toward non-human species or the biosphere (Stern et al., 1993). Studies found that personal values explain environmentally significant and norm-based behavior. Altruistic value is one of many factors that affect pro-social intention (Meng et al., 2020).

2.2. Threat appraisal and tourists' Pro-Environmental Behavior (PEB)

The Perceived Severity (PS) "reflects how serious an existing risk is perceived to be" (Bockarjova & Steg, 2014, p. 277). Perceived Vulnerability (PV) "reflects perceptions of how susceptible one is to the existing threat" (Bockarjova & Steg, 2014, p. 277). According to PMT, PS, and PV can increase protection motivation (Rainear & Christensen, 2017). Individuals engage in threat appraisal when they anticipate being impacted by a potential threat stimulus and evaluate their PS and PV to that threat. So, when travelers are PS and PV,

their fear level rises, and they are more motivated to take precautions (Chen, 2020). Ruan et al. (2020) found that PS and PV positively and significantly impact the intentions of international tourists to adopt protective behaviors. Based on PMT and previous studies (e.g., Ruan et al., 2020), we hypothesize:

H1: PS significantly and positively affects tourists' PEB

H2: PV significantly and positively affects tourists' PEB

2.3. The mediating role of Environmental Attitude (EA)

The significance of attitude in comprehending human behavior has been acknowledged (Peter & Olson, 2010). Environmental Attitude (EA) is commonly defined as individuals' emotional attachment to and evaluation of environmental protection. Within the realm of literature, attitude has consistently been regarded as a reliable indicator of behavior (Ahmad et al., 2022). The meta-analysis concludes that attitudes are significantly influenced by one's PS and PV (Zhao et al., 2018). According to Gao et al. (2015), consumers' attitudes toward wearable technology in healthcare would be greatly impacted by their perceptions of both PS and PV. From PMT's point of view, PS and PV can affect tourists' EA (Tzeng & Ho, 2022). The importance of environmental protection and the promotion of environmental health was assessed using EA (Lin & Niu, 2018). According to Law et al. (2017), tourists' EA is shaped by their values and their understanding of their responsibilities and role in the environment. They would then display their psychological intentions, which included agreement, disapproval, intimacy, and exclusion about specific environmental issues. The first step toward adopting concrete environmental protection behaviors is having an EA (Lin & Niu, 2018). Positive EAs were associated with a greater willingness to sacrifice and/or exert a considerable amount of more effort for the environment, according to PMT and earlier research on the subject (Jia et al., 2017). The current study proposes the following hypotheses to address this issue:

H3: The connection between PS and PEB is mediated by EA

H4: The connection between PV and PEB is mediated by EA

2.4. The moderating role of Altruism (AL)

Human behavior is thought to be guided by personal values, such as AL. An intrinsic concern for the welfare of society and its members is a component of the AL (Rahman & Reynolds, 2019). Moreover, AL entails self-serving objectives, but actions can also be driven by altruistic goals that are, compassion for others - regardless of what one may gain personally from the relationship (Wang et al., 2020). Altruistic concern for others is what drives altruistic motivation in most cases (Lemmon & Wayne, 2014). When visitors are motivated to preserve the environment and accomplish environmental goals to improve the welfare of others, this is referred to as an altruistic concern (Wang et al., 2020). Visitors who participate in PEBs have been found to have stronger AL (Rahman & Reynolds, 2019). Since the environment is regarded as a public good, people must act responsibly toward it outside of AL (Stern, 2000).

According to Schwartz's (1977) NAM, people who believe that certain circumstances may pose threats to others and that their actions could inevitably prevent those negative outcomes will act in an altruistic way (Rahman & Reynolds, 2019). Also, one of the most important drivers of behavior is altruistic concern (Wang et al., 2020). When tourists at tourist destinations prioritize the well-being and interests of others and the destinations themselves,

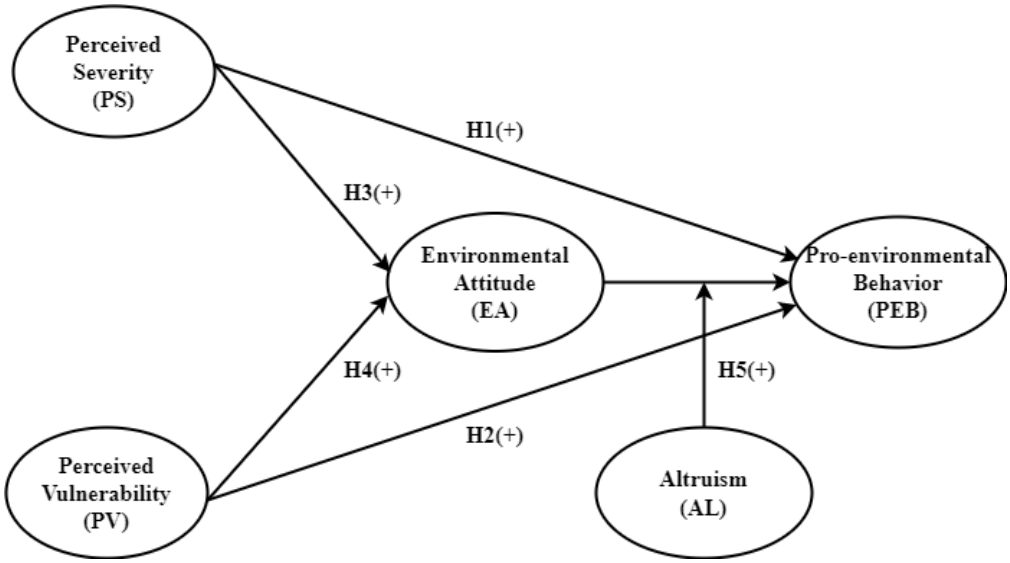
they are more inclined to invest their time and effort in participating in PEB aimed at preserving the destination's environment. AL can strengthen the emotional bond between individuals engaged in certain behaviors (Zhang et al., 2022). AL prioritizes society and the biosphere over the individual (Lee et al., 2014). The relationship highlights the need to consider AL from an environmental perspective. Sustainability is focusing more on AL because individual values are stable (Uslu et al., 2023). Environmental beliefs, behaviors, and preferences can be predicted by altruistic values (Shao et al., 2021). Thus, examining AL's moderating impact on the EA-PEB relationship is entirely appropriate in this context. AL was hypothesized to moderate the nexus between EA and tourists' PEB in this study. Consequently, we proposed the following hypothesis:

H5: The connection between EA and PEB is moderated by AL

Figure 1 summarizes the relationships between the key variables in the study, including the hypotheses about the effects of PS, PV, EA, and AL on tourists' PEB.

Figure 1

Hypothesized Model



Note. Authors

3. Methodology

3.1. Data collection and sample

The data was obtained through self-reported questionnaires given to local tourists in destinations in Ho Chi Minh City. The city leads Vietnam's tourism industry with nearly 05 million international visitors, and 35 million domestic visitors. The city also faces waste, noise, air, and climate change issues (Vneconomy, 2023). The skilled research assistants approached visitors at the exit gates of the destinations, using the convenience sampling technique. Convenience sampling was chosen due to the logistical challenges of accessing a random sample at busy tourist destinations, which could introduce bias in the sample (Creswell & Creswell, 2017), and the results should be interpreted with caution. Between June and July of 2024, data for this study were gathered. This period was chosen primarily to make data collection easier, as summer is Vietnam's busiest travel season. If a visitor declined to participate, the next one was invited due to difficulties and restrictions with random sampling in destinations, such as the

difficulty of intercepting visitors at the exit gates. 306 valid questionnaires were kept for data analysis after 44 invalid responses and outliers were eliminated. Invalid responses were identified based on incomplete questionnaires and inconsistent answers, while outliers were detected through statistical analysis, ensuring that only reliable data were used in the analysis. To estimate the research model, this sample size satisfies the minimum sample size requirements. Table 1 provides a detailed breakdown of the collected data's descriptive statistics, including demographic information such as age, gender, and occupation, which provide a comprehensive profile of the sample.

3.2. Measurement of constructs

The measurement scales were selected based on their demonstrated reliability and validity in previous studies across various contexts, including tourism and environmental behavior, ensuring their appropriateness for this study. Each construct was measured using a five-point Likert scale, where 1 indicated "strongly disagree" and 5 indicated "strongly agree." Responses were coded accordingly and analyzed to assess the relationships among the constructs. The study employed a three-item scale for Perceived Severity (PS) and a four-item scale for Perceived Vulnerability (PV) adapted from Ruan et al. (2020). The Environmental Attitude (EA) was measured using a three-item scale based on Ahmad et al. (2022). Altruism (AL) was assessed using a three-item scale from Albayrak et al. (2013), while tourists' Pro-Environmental Behavior (PEB) was measured with a five-item scale derived from Jiao and Wang (2024).

4. Empirical findings

4.1. Description of sample characteristics

The sample consisted of 48.7% female tourists, with the majority of respondents falling within the age range of 39 to 58 years old (40.2%). In total, 62.7% of respondents had a bachelor's degree, while 68.3% and 19.3% reported that they made 01 to 03 trips per year and 04 to 10 trips per year, respectively. A total of 81.0% of tourists are married. Table 1 presents a comprehensive analysis of the descriptive statistics of the gathered data.

Table 1

Characteristics of Sample Respondents

Characteristics	Frequency	Percent
Gender:		
- Female	149	48.7
- Male	157	51.3
Age (years old):		
- Below 18	28	9.1
- 18 - 38	99	32.4
- 39 - 58	123	40.2
- Over 58	56	18.3

Characteristics	Frequency	Percent
Educational level:		
- High school	103	33.7
- University	192	62.7
- Master	6	2.0
- Other	5	1.6
Marital status:		
- Married	248	81.0
- Other	58	19.0
Number of trips per year:		
- 01 - 03	209	68.3
- 04 - 10	59	19.3
- Over 10	38	12.4
N = 306		

Note. Authors

4.2. Evaluation of measurement model

We eliminated the PV4 (due to high cross-loading), PEB4, and PEB5 items (due to failing reliability requirements) before assessing the measurement model (Hair et al., 2019). The data must first be assumed to be normally distributed, which is a crucial step (Collier, 2020; Ha & Doan, 2024). The kurtosis and skewness tests are used to evaluate the normalcy of the data. If the skewness is less than an absolute of 3.0 and the kurtosis is smaller than 7.0, the data is considered normal (Collier, 2020). The normality test results demonstrate that the data are normally distributed, with kurtosis falling between 0.180 (PEB3) and 3.553 (AL1) and skewness between -1.634 (PEB2) and -0.618 (EA2).

Cronbach's Alpha (α) was used to assess internal consistency, with values above 0.7 indicating acceptable reliability. Average Variance Extracted (AVE) and Composite Reliability (CR) were also calculated, with AVE values above 0.50 and CR values above 0.70 confirming the convergent validity of the constructs (Hair et al., 2019). Table 2 displays results that demonstrate the following: α values are greater than the recommended level of 0.7; all measures had AVEs greater than the recommended value of 0.50 (PV = 0.688 to PS = 0.819); all measures had CRs greater than the recommended value of 0.70 (PV = 0.868 to PS = 0.931); and all items had standardized regression weights greater than the recommended value of 0.5 per (Hair et al. 2019).

Table 2

Constructs and Their Responding Measures

Construct	Code	Items	Loading	AVE	CR
Perceived Severity (PS)	PS1	"Environmental pollution is harmful to human health"	0.846***	0.819	0.931
	PS2	"Environmental pollution ruins mood in daily life"	0.931***		
	PS3	"Environmental pollution reduces humans' quality of life"	0.936***		
Perceived Vulnerability (PV)	PV1	"Environmental pollution will affect tourists' travel itinerary"	0.795***	0.688	0.868
	PV2	"Environmental pollution will affect the quality of tourism activities"	0.867***		
	PV3	"Environmental pollution will affect tourists' tourism mood"	0.849***		
	PV4	"Environmental pollution will affect the quality of photos at tourist destinations"	-		
Environmental Attitude (EA)	EA1	"It is essential to promote green living in Vietnam"	0.850***	0.736	0.893
	EA2	"I strongly agree that environmental protection works are needed in Vietnam"	0.871***		
	EA3	"It is important to raise environmental awareness among the Vietnamese people"	0.763***		
Altruism (AL)	AL1	"Environmental protection in the tourist destination will help people have a better quality of life"	0.834***	0.739	0.895
	AL2	"Environmental protection benefits everyone living near the tourist destination"	0.871***		
	AL3	"Environmental protection in tourist destinations benefits the whole ecosystem"	0.874***		
Pro-Environmental Behavior (PEB)	PEB1	"During my tour, I properly managed waste"	0.889***	0.788	0.917
	PEB2	"During my tour, I adhered to the principles of environmental conservation"	0.944***		
	PEB3	"I purchase the green products offered by my tour"	0.826***		
	PEB4	"I make every effort to protect the destination and the surrounding environment" (d)	-		
	PEB5	"I persuade my fellow companions to take environmentally friendly actions" (d)	-		

Note. (d) indicates that measures fail the validity and reliability tests; *** indicates significance at $p < 0.001$. Authors

To evaluate the scale's discriminant validity, we employed Henseler et al.'s (2015) Heterotrait-Monotrait (HTMT) ratio of correlations. The HTMT ratio measures the correlation between similar constructs. A discriminant validity violation occurs when the value exceeds 0.85. The constructs' discriminant validity was confirmed by the fact that the HTMT values were less than 0.85, as revealed by our research. The HTMT values from our analysis are in Table 3.

Table 3

HTMT Analysis

	PEB	AL	PS	EA	PV
PEB					
AL	0.419				
PS	0.568	0.570			
EA	0.526	0.524	0.589		
PV	0.572	0.334	0.519	0.494	

Note. Authors

The statistics for the fit of the model were very good. The following values are provided: $\chi 2 = 192.200$ (df = 80, p = 0.000), CMIN/df = 2.403, SRMR = 0.0357, CFI = 0.968, TLI = 0.958, and RMSEA = 0.068. Therefore, it can be concluded that the constructs are both valid and reliable.

4.3. Evaluation of the structural model

After that, we check all of our hypotheses by looking at the structural model. The following step is to estimate all of the hypothesized relationships from the research model using maximum likelihood estimation (Collier, 2020). According to the model fit measures, with 92 degrees of freedom, $\chi 2 = 242.727$ and p = 0.000. According to Hu and Bentler (1999), the model is parsimoniously acceptable because the $\chi 2$/df value of 2.638 falls within the 3 and 5 thresholds. Several metrics were measured, including the SRMR (0.0545), CFI (0.958), TLI (0.946), and RMSEA (0.073). In general, according to all fit indices, the model achieves a satisfactory to outstanding degree of absolute and incremental goodness of fit (Hair et al., 2019; Hu & Bentler, 1999). The results of the hypothesis testing for the structural model assessment can be observed in Table 4. There are various levels of statistical significance for all hypotheses.

Table 4

Hypothesis Testing of Structural Model

Hypothesized relationships	Proposed effects	SRW	Results
H1: PS → PEB	Positive	0.268***	Supported
H2: PV → PEB	Positive	0.316***	Supported
H3: PS → EA → PEB	Positive	0.088**	Supported
H4: PV → EA → PEB	Positive	0.047**	Supported
H5: EAxAL → PEB	Positive	0.184***	Supported

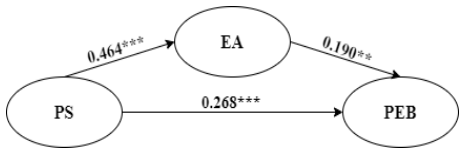
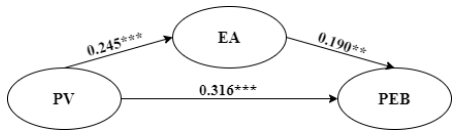
Note. *** p < 0.001; ** p < 0.010; * p < 0.050. Authors

4.4. Mediation analysis

A bootstrapping mediation analysis revealed the relationships between PS, PV, AL, EA, and PEB. For each of the roughly 1,999 permuted samples (which also included the original, unpermuted data, for a total of 2,000 samples) used in the permutation methods, 2,000 bootstrap samples were drawn for the bootstrap methods (Taylor & MacKinnon, 2012). The analysis was executed with a 95% confidence level for the bias-corrected confidence interval. The mediation analysis revealed that EA partially mediates the relationship between PS and PEB, as well as between PV and PEB. This indicates that while PS and PV directly influence PEB, their impact is significantly enhanced when mediated by a positive EA. The mediation test results are summarized in Table 5.

Table 5

Products of Mediation Analysis

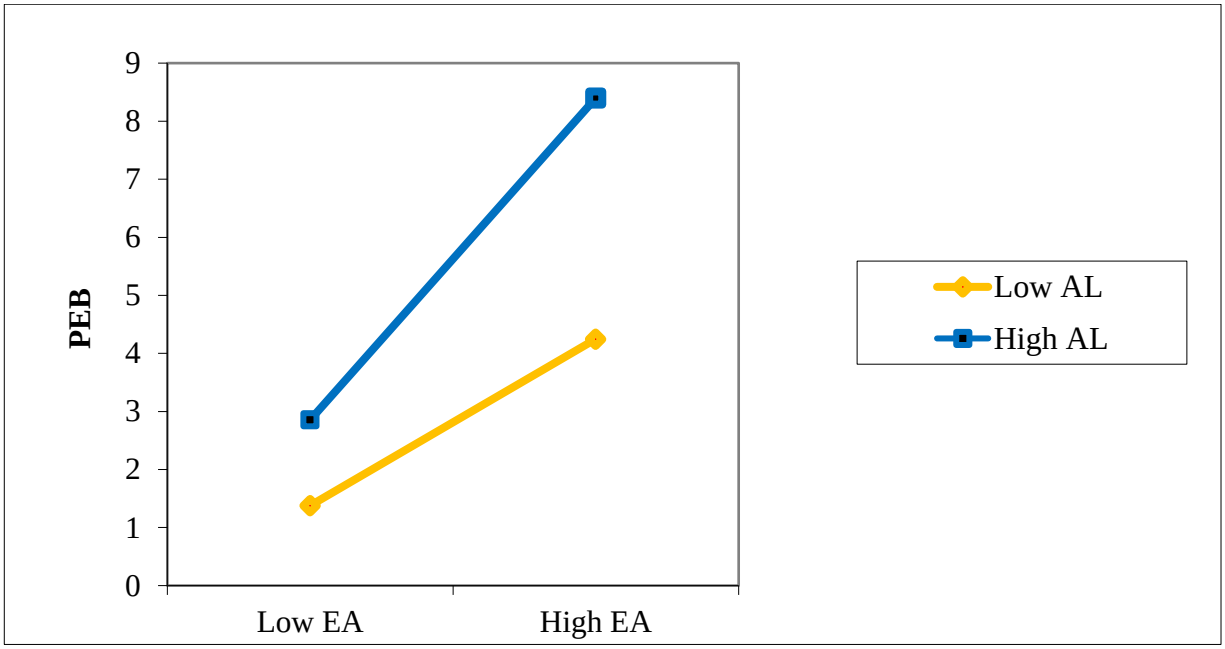
Relationship	Path of mediation	Estimate	Probability	Conclusion
H3: PS - EA - PEB		0.088	< 0.010	Partial mediation
H4: PV - EA - PEB		0.047	< 0.010	Partial mediation

Note. ***p < 0.001; **p < 0.010; * p < 0.05. Authors

4.5. Moderation analysis

Figure 2

The Moderating Effect of AL on the Positive Relationship between EA-PEB



Note. Authors

Models developed for the examination process included all variables, including the independent, dependent, moderating, and interaction terms (Collier, 2020). Figure 2 confirms that AL moderates the relationship between EA and PEB effectively, indicating that EA's positive effect on PEB was stronger ($\beta = 0.184$, $p < 0.001$), supporting H5. This study linked the two moderator degrees to identify the high and low levels of EA, thereby demarcating the moderating effects of AL (Dawson, 2014). The role of AL in moderation is depicted in Figure 2. It also emphasizes how AL, particularly high AL levels, enhances the positive correlation between EA and PEB.

5. Discussion

Given the risks posed by environmental issues, it is necessary to reevaluate how humans and the environment interact and adopt more environmentally friendly practices (Shafiei & Maleksaeidi, 2020). Accordingly, research on how visitors behave has grown in importance within the environmental studies literature in recent years (Wang et al., 2020). Based on the PMT and NAM, a causal model was created to determine what motivates guests' PEB. Except for H5, the data supported the hypothesized relationships.

Our analysis shows that PV and PS significantly and positively affect PEB (H1 and H2 were supported). Results from the study by Shafiei and Maleksaeidi (2020) and Chen (2020) are in agreement with these findings. Furthermore, this study extends the understanding of PS and PV, which have been extensively recognized in the PMT as the enablers in tourists' PEB prediction. Thus, threat appraisal will occur if visitors view environmental pollution as serious and believe they are susceptible to its effects. This threat assessment increases travelers' motivation to protect the environment (Chen, 2020).

Our analysis verifies that EA mediates the relationship between PS, PV, and PEB (H3 and H4 are supported). Previous studies have shown that visitors' positive attitudes toward the local environments influence their intentions to engage in PEB (Shafiei & Maleksaeidi, 2020). Furthermore, this study extends the understanding of EA which has been extensively recognized in the literature as the mediating variable in behavior prediction (Ahmad et al., 2022). This study, however, is one of the first to look at EA's role as a mediator between PS, PV, and PEB. From the point of view of PMT, EA is heavily impacted by PS and PV, which highlights the impact of threat assessments. This data points to threat assessments as crucial precursors of EA (Zhao et al., 2018).

Our analysis shows that AL positively moderated the impact of EA on PEB (H5 was supported). Furthermore, this finding broadens our understanding of AL as a moderator of the relationship between tourists' EA and PEB. While no research exists that is comparable to H5, Baek et al. (2020) investigated the moderating function of AL in the connection between fan attitude and intention to purchase licensed merchandise. Altruistic values, as opposed to those that seek to benefit the individual, are linked to the welfare of society and the biosphere as a whole (Lee et al., 2014). This connection highlights the necessity of considering the environment when evaluating the idea of AL (Uslu et al., 2023).

6. Implications and conclusion

6.1. Theoretical implications

To begin with, using the PMT and NAM models as a theoretical framework, the study's primary contribution was to identify factors impacting PEB. Within the framework of

the Vietnamese tourism industry, the study combined the PMT and NAM models to produce a strong conceptual model (Jiao & Wang, 2024; Pappas, 2017). Due to the complexity of social and psychological determinants of PEB, attention has shifted. However, the environmental behavior formation mechanism analysis is lacking. No clear explanation exists for the formation process, impact pattern, and interaction between variables on PEB, according to preliminary research. Unfortunately, attitude and moral norms affect each other, but their relationship is ignored. In conclusion, we add to the literature on PEB, its impact mechanisms, and environmental behavior boundary conditions (Li et al., 2019).

Second, these results not only confirm the assumptions of PMT but also suggest that the theory can be extended by considering the mediating role of EA, a variable not traditionally emphasized in PMT. Evidence suggests that the cognitive mediating processes proposed by the PMT model can effectively motivate individuals to take protective measures (Rogers & Prentice-Dunn, 1997). According to the results, EA plays a crucial mediating function between tourists' PS, PV, and PEB. The variables that form the basis of PMT have been expanded and refined in this study by applying them to the field of Vietnamese tourism. This improves the PMT's applicability in the field of PEB and enhances its explanatory components.

Last, we explored AL's moderating function by successfully applying PMT and NAM theory. Our research is the first of its kind to find that AL significantly moderates the relationship between EA and PEB in a tourist setting. These results not only confirm the assumptions of PMT and NAM but also suggest that these theories can be extended by considering the moderating role of AL, a variable not traditionally emphasized in PMT and NAM. Regardless of a person's unique personality or set of circumstances, PMT holds that their thought processes are universal. While there have been some efforts to expand PMT to include individual factors (Marikyan & Papagiannidis, 2023), the significance of psychological traits and personality has largely gone unexplored. Researchers were able to broaden the application of PMT to behaviors beyond health protection, for instance, by adding the moral obligation construct to help understand PEB (Chen, 2020).

6.2. Practical implications

The tourist industry constantly outpaces the global economy, making it a formidable adversary in the fight against environmental degradation. Increasing behaviors within the framework of PEB may be linked to or contributed to by PMT constructs (PV and PS), according to the present study. The findings of this study have a significant bearing on how environmental messages are crafted. The field of tourism has been the user of behavioral change theories, especially PMT, to encourage adaptive behaviors. Indeed, tourism practitioners and managers should take these variables into account to promote visitors' PEB, as PS and PV were strong predictors of PEB. A fear appeal that highlights the gravity of climate change could be effective in encouraging people to alter their behavior, given the importance of perceived severity in shaping behavioral intentions. A large portion of the population views climate change as a minor, faraway danger rather than a serious, immediate one. People may be less likely to take action to slow the pace of climate change if they hold this view. Therefore, incorporating a threat element into social media that is relevant to the environment can be a successful strategy. Therefore, media can motivate behavior change by using appropriate threat components to increase PS and PV. Tourism managers can utilize the

findings by designing educational campaigns that emphasize the severity and vulnerability associated with environmental degradation. For instance, incorporating visual and emotional appeals in social media campaigns can effectively increase tourists' awareness and encourage pro-environmental behaviors.

In addition, our findings stress the moderator role of AL in the nexus of EA and travelers' PEB. Tourism managers need to take into account the moderating role of AL, take into account the AL of visitors, develop appropriate management techniques and strategies, and provide appropriate platforms and avenues for visitors to value PEB. As this can help to lessen altruistic visitors' perceptions that tourism programs are profit-centered, tourist agencies' marketers should, as suggested by the current study, provide travelers - especially those with high levels of AL - with all the important information about their environmental protection strategies, including information related to purpose, duration, beneficiary groups, and potential benefits for the tourists.

6.3. Conclusion

The current investigation combined PMT with NAM to examine the effects of PS and PV on the PEB of Vietnamese domestic tourists, the mediating function of EA, and the moderating role of AL. By presenting a novel and robust model that is not found in the existing literature, this study expands upon previous conceptual models that have tested the PMT and NAM in the Vietnamese tourism context. The model is centered around visitors' PEB. The causal links in the suggested model, which include both direct and indirect relationships as well as moderating ones, were also found to be valid. Among these connections, PS and PV had an impact on PEB directly, and EA, acting as a mediator, effectively explained PEB. To be more precise, AL fortified the bond between EA and PEB. So, although there haven't been many efforts to combine PMT and the NAM into a single theoretical framework, this study can offer valuable insights into this new topic and draw concrete conclusions.

6.4. Limitations and future research suggestions

The study's generalizability may be limited due to several factors, notwithstanding its findings. First, it is difficult to generalize the results to other countries because this study only collected data from travelers in Vietnam. Researchers in the future should broaden their international sample sizes when studying this topic. Second, two processes, coping appraisal, and threat appraisal, are proposed by PMT to govern the participation in protective behaviors (Kothe et al., 2019). Future studies should explore the role of coping appraisal in conjunction with threat appraisal to provide a more comprehensive understanding of the factors influencing PEB. Additionally, expanding the research to include diverse cultural contexts could offer valuable insights into the generalizability of the PMT and NAM models.

SCIENTIFIC CONTRIBUTION

The manuscript clearly identifies a research gap; the manuscript proposes a new theoretical model; the manuscript offers managerial implications.

AUTHOR CONTRIBUTIONS

CRediT: **Doan Bao Son**: Conceptualization, Methodology, Software, Validation, Formal Analysis, Writing - Review & Editing, Supervision; **Pham Thi Bao Ngoc**: Investigation, Writing - Original Draft, Funding Acquisition; **Vo Mai Diem Mi**: Investigation,

Writing - Original Draft; **Nguyen Thi Kieu My**: Investigation, Data Curation, Writing - Original Draft; **Huynh Thi Tra My**: Investigation, Data Curation, Writing - Original Draft; **Tran Thi Hong Ngoc**: Investigation, Data Curation, Writing - Original Draft.

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NO CONFLICT OF INTEREST STATEMENT

All authors declare that they have no conflict of interest.

References

Ahmad, F. S., Rosli, N. T., & Quoquab, F. (2022). Environmental quality awareness, green trust, green self-efficacy and environmental attitude in influencing green purchase behaviour. *International Journal of Ethics and Systems*, *38*(1), 68-90. https://doi.org/10.1108/IJOES-05-2020-0072

Albayrak, T., Aksoy, Ş., & Caber, M. (2013). The effect of environmental concern and scepticism on green purchase behaviour. *Marketing Intelligence & Planning*, *31*(1), 27-39. https://doi.org/10.1108/02634501311292902

Baek, W. Y., Song, H. S., Kim, D. H., & Byon, K. K. (2020). Cause-related marketing and purchase intention toward team-licensed products: Moderating effects of sport consumers' altruism. *Sustainability*, *12*(8), Article 3183. https://doi.org/10.3390/ su12083183

Bockarjova, M., & Steg, L. (2014). Can protection motivation theory predict pro-environmental behavior? Explaining the adoption of electric vehicles in the Netherlands. *Global Environmental Change*, *28*, 276-288. https://doi.org/1016/j.gloenvcha. 2014.06.010

Chen, M. F. (2020). Moral extension of the protection motivation theory model to predict climate change mitigation behavioral intentions in Taiwan. *Environmental Science and Pollution Research*, *27*(12), 13714-13725. https://doi.org/10.1007/s11356-020-07963-6

Collier, J. E. (2020). *Applied structural equation modeling using AMOS: Basic to advanced techniques* (1st ed.). Routledge.

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage Publications.

Dawson, J. F. (2014). Moderation in management research: What, why, when, and how. *Journal of Business and Psychology*, *29*(1), 1-19. https://doi.org/10.1007/s10869-013-9308-7

Esfandiar, K., Dowling, R., Pearce, J., & Goh, E. (2020). Personal norms and the adoption of pro-environmental binning behaviour in national parks: an integrated structural model approach. *Journal of Sustainable Tourism*, *28*(1), 10-32. https://doi.org/10.1080/09669 582.2019.1663203

Gao, Y., Li, H., & Luo, Y. (2015). An empirical study of wearable technology acceptance in healthcare. *Industrial Management & Data Systems*, *115*(9), 1704-1723. https://doi.org/10.1108/IMDS-03-2015-0087

Gardner, G. T., & Stern, P. C. (2002). *Environmental problems and human behavior* (2nd ed.). Pearson Custom Publishing.

Graham-Rowe, E., Jessop, D. C., & Sparks, P. (2015). Predicting household food waste reduction using an extended theory of planned behaviour. *Resources, Conservation and Recycling*, *101*, 194-202. https://doi.org/10.1016/j.resconrec.2015.05.020

Guagnano, G. A. (2001). Altruism and market-like behavior: An analysis of willingness to pay for recycled paper products. *Population and Environment*, *22*(4), 425-438. https://doi.org/10.1023/A:1006753823611

Ha, T. M., & Doan, S. B. (2024). Exploring moral voice in Vietnam's public sector: A study of socially responsible human resource management, public service motivation, and ethical leadership. *Journal for International Business and Entrepreneurship Development*, *16*(1), 34-62. https://doi.org/10.1504/JIBED.2024.139131

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage Learning.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*(1), 115-135. https://doi.org/10.1007/s11747-014-0403-8

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1-55. https://doi.org/10.1080/10705519909540118

Jia, F., Soucie, K., Alisat, S., Curtin, D., & Pratt, M. (2017). Are environmental issues moral issues? Moral identity in relation to protecting the natural world. *Journal of Environmental Psychology*, *52*, 104-113. https://doi.org/10.1016/j.jenvp.2017.06.004

Jiao, Y., & Wang, Y. (2024). The formation of tourists' pro-environmental behavior in natural history museum scene: A configuration analysis based on motivation-opportunity-ability theory. *Journal of Vacation Marketing*, *2024*(1), 1-18. https://doi.org/10.1177/13567667241247073

Kim, S., Jeong, S. H., & Hwang, Y. (2012). Predictors of pro-environmental behaviors of American and Korean students: The application of the theory of reasoned action and protection motivation theory. *Science Communication*, *35*(2), 168-188. https://doi.org/10.1177/1075547012441692

Kothe, E. J., Ling, M., North, M., Klas, A., Mullan, B. A., & Novoradovskaya, L. (2019). Protection motivation theory and pro-environmental behaviour: A systematic mapping review. *Australian Journal of Psychology*, *71*(4), 411-432. https://doi.org/10.1111/ajpy. 12271

Law, M. M. S., Hills, P., & Hau, B. C. H. (2017). Engaging employees in sustainable development - A case study of environmental education and awareness training in Hong Kong. *Business Strategy and the Environment*, *26*(1), 84-97. https://doi.org/10.1002/ bse.1903

Lee, T. H., Jan, F. H., & Yang, C. C. (2013). Conceptualizing and measuring environmentally responsible behaviors from the perspective of community-based tourists. *Tourism Management*, *36*, 454-468. https://doi.org/10.1016/j.tourman.2012.09.012

Lee, Y. K., Kim, S., Kim, M. S., & Choi, J. G. (2014). Antecedents and interrelationships of three types of pro-environmental behavior. *Journal of Business Research, 67*(10), 2097-2105. https://doi.org/10.1016/j.jbusres.2014.04.018

Lemmon, G., & Wayne, S. J. (2014). Underlying motives of organizational citizenship behavior: Comparing egoistic and altruistic motivations. *Journal of Leadership & Organizational Studies*, *22*(2), 129-148. https://doi.org/10.1177/1548051814535638

Li, D., Zhao, L., Ma, S., Shao, S., & Zhang, L. (2019). What influences an individual's pro-environmental behavior? A literature review. *Resources, Conservation and Recycling*, *146*, 28-34. https://doi.org/10.1016/j.resconrec.2019.03.024

Li, Q., & Wu, M. (2020). Tourists' pro-environmental behaviour in travel destinations: Benchmarking the power of social interaction and individual attitude. *Journal of Sustainable Tourism, 28*(9), 1371-1389. https://doi.org/10.1080/09669582.2020 .1737091

Lin, M. T., Zhu, D., Liu, C., & Kim, P. B. (2022). A systematic review of empirical studies of pro-environmental behavior in hospitality and tourism contexts. *International Journal of Contemporary Hospitality Management*, *34*(11), 3982-4006. https://doi.org/10.1108/IJCHM-12-2021-1478

Lin, S. T., & Niu, H. J. (2018). Green consumption: Environmental knowledge, environmental consciousness, social norms, and purchasing behavior. *Business Strategy and the Environment, 27*(8), 1679-1688. https://doi.org/10.1002/bse.2233

Loureiro, S. M. C., Guerreiro, J., & Han, H. (2022). Past, present, and future of pro-environmental behavior in tourism and hospitality: a text-mining approach. *Journal of Sustainable Tourism*, *30*(1), 258-278. https://doi.org/10.1080/09669582.2021.1875477

Marikyan, D., & Papagiannidis, S. (2023). Protection motivation theory: A review. In S. Papagiannidis (Ed.), *TheoryHub book*. https://open.ncl.ac.uk/ISBN: 9781739604400

Meng, B., Chua, B. L., Ryu, H. B., & Han, H. (2020). Volunteer Tourism (VT) traveler behavior: Merging norm activation model and theory of planned behavior. *Journal of Sustainable Tourism, 28*(12), 1947-1969. https://doi.org/10.1080/09669582.2020 .1778010

Miao, L., & Wei, W. (2013). Consumers' pro-environmental behavior and the underlying motivations: A comparison between household and hotel settings. *International Journal of Hospitality Management, 32*, 102-112. https://doi.org/https://doi.org/10.1016/j.ijhm. 2012.04.008

Ministry of Culture, Sports and Tourism (MOCST). (2024). *Green tourism - A journey towards the future*. https://moitruongdulich.vn/en/index.php/item/17257

Pappas, N. (2017). Risks and marketing in online transactions: A qualitative comparative analysis. *Current Issues in Tourism, 20*(8), 852-868. https://doi.org/10.1080/13683500.2016.1187586

Peter, J. P., & Olson, J. C. (2010). *Consumer behavior and marketing strategy* (9th ed.). McGraw-Hill Irwin.

Rahman, I., & Reynolds, D. (2019). The influence of values and attitudes on green consumer behavior: A conceptual model of green hotel patronage. *International Journal of Hospitality & Tourism Administration, 20*(1), 47-74. https://doi.org/10.1080/15256480. 2017.1359729

Rainear, A. M., & Christensen, J. L. (2017). Protection motivation theory as an explanatory framework for proenvironmental behavioral intentions. *Communication Research Reports, 34*(3), 239-248. https://doi.org/10.1080/08824096.2017.1286472

Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *The Journal of Psychology*, *91*(1), 93-114. https://doi.org/10.1080/00223980.1975.9915803

Rogers, R. W., & Prentice-Dunn, S. (1997). Protection motivation theory. In D. S. Gochman (Ed.), *Handbook of health behavior research 1: Personal and social determinants* (pp. 113-132). Plenum.

Ruan, W., Kang, S., & Song, H. (2020). Applying protection motivation theory to understand international tourists' behavioural intentions under the threat of air pollution: A case of Beijing, China. *Current Issues in Tourism*, *23*(16), 2027-2041. https://doi.org/10.1080/13683500.2020.1743242

Schwartz, S. H. (1977). Normative influences on altruism. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 10, pp. 221-279). Academic Press. https://doi.org/10.1016/S0065-2601(08)60358-5

Shafiei, A., & Maleksaeidi, H. (2020). Pro-environmental behavior of university students: Application of protection motivation theory. *Global Ecology and Conservation*, *22*, e00908. https://doi.org/10.1016/j.gecco.2020.e00908

Shao, J., Mahmood, A., & Han, H. (2021). Unleashing the potential role of CSR and altruistic values to foster pro-environmental behavior by hotel employees. *International Journal of Environmental Research and Public Health*, *18*(24), Article 13327. https://doi.org/10.3390/ijerph182413327

Stern, P. C. (2000). New environmental theories: Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, *56*(3), 407-424. https://doi.org/10.1111/0022-4537.00175

Stern, P. C., Dietz, T., & Kalof, L. (1993). Value orientations, gender, and environmental concern. *Environment and Behavior*, *25*(5), 322-348. https://doi.org/10.1177/00139 16593255002

Taylor, A. B., & MacKinnon, D. P. (2012). Four applications of permutation methods to testing a single-mediator model. *Behavior Research Methods*, *44*(3), 806-844. https://doi.org/10.3758/s13428-011-0181-x

Tzeng, S. Y., & Ho, T. Y. (2022). Exploring the effects of product knowledge, trust, and distrust in the health belief model to predict attitude toward dietary supplements. *Sage Open*, *12*(1), 1-13. https://doi.org/10.1177/21582440211068855

Uslu, F., Keles, A., Aytekin, A., Yayla, O., Keles, H., Ergun, G. S., & Tarinc, A. (2023). Effect of green human resource management on green psychological climate and environmental green behavior of hotel employees: The moderator roles of environmental sensitivity and altruism. *Sustainability*, *15*(7), Article 6017. https://doi.org/10.3390 /su15076017

Vneconomy. (2023). *Record high revenue, Ho Chi Minh City tourism has a successful year 2023*. https://vneconomy.vn/doanh-thu-cao-ky-luc-du-lich-tp-hcm-co-mot-nam-2023-thanh-cong.htm

Wang, S., Wang, J., Li, J., & Yang, F. (2020). Do motivations contribute to local residents' engagement in pro-environmental behaviors? Resident-destination relationship and pro-environmental climate perspective. *Journal of Sustainable Tourism*, *28*(6), 834-852. https://doi.org/10.1080/09669582.2019.1707215

Zhang, Y., Liu, Y., & Tao, W. (2022). The influence of tourists' online value co-creation behavior on consumer-brand relationship quality: The moderating effect of altruism. *Frontiers in Psychology*, *13*, Article 950546. https://doi.org/10.3389/fpsyg.2022.950546

Zhao, Y., Ni, Q., & Zhou, R. (2018). What factors influence the mobile health service adoption? A meta-analysis and the moderating role of age. *International Journal of Information Management*, *43*, 342-350. https://doi.org/10.1016/j.ijinfomgt.2017.08.006