Study on the Influence of Environmental Destination Social Responsibility Strategies on Ecological Value Co-Creation Behavior of Island Tourists

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ABSTRACT: *Purpose: This study examines how environmental destination social responsibility (Env DSR) strategies affect tourists' ecological value co-creation behavior on islands, and tests the chain mediation of destination trust and altruism motives.*
Patients and methods: The present study involved the execution of three research laboratory experiments utilizing a between-subjects factorial design. Study 1 (N=102) demonstrated significantly higher levels of eco-citizenship behavior among island tourists exposed to the pre-crisis environmental DSR strategycompared with the post-crisis strategy.In study 2 (N=202), we introduce a new dimension to assess the chain mediation of destination trust and altruistic motivation.Findings indicate that altruism motive and destination trust play an intermediary role between Env DSR strategies and tourist citizenship behavior, and there is a chain intermediary. In study 3 (N=84) reveals thatapology strategies during crises specifically increased ecological participation behavior but not citizenship behavior.
Conclusion: Tourists' altruism motive, destination trust and ecological citizenship behavior tended to be higher when a destination applied the pre-crisis (vs. post-crisis) Env DSR strategyon islands. In fact, the findings provide valuable insights for island managers or resort managers.
KEY WORD: *Destination social responsibility; Attribution theory; Destination trust; Ecological value co-creation behavior.*

I. INTRODUCTION

Tourism has the potential to foster regional economic growth; however, overtourism may result in the degradation of the destination's social, cultural, and environmental fabric(Benner, 2020). Compared to the mainland, islands have a smaller area, depend heavily on marine ecological resources, and possess a fragile ecosystem(Bai et al., 2022), consequently, the adverse effects of overtourism on island regions are more pronounced. The detrimental impact of overtourism on island destinations extends beyond hindering their sustainable development, it also poses significant threats to marine ecosystems. Sustainable tourism serves as a vital strategic approach to mitigate the adverse impacts of overtourism(Gowreesunkar & Seraphin, 2019). Tourist value co-creation behaviors can significantly contribute to sustainable development (Elliot et al., 2023). Thus, it is crucial to comprehend the mechanisms for engaging tourists in value co-creation to enhance the ecological sustainability of the destination.

Since the 1990s, the concept of value co-creation has garnered significant academic attention. As research on value co-creation theory deepens, scholars have applied it to explore various perspectives, including management(Mathibe et al., 2022), innovative entrepreneurship (Portuguez-Castro, 2023) and marketing (Sohaib & Han, 2023), and it has become the most popular research topic in the tourism industry (Maruyama, Keith, & Woosnam, 2019). The research on value co-creation in the tourism sector primarily emphasizes enhancing the service experience of tourists (Finsterwalder & Kuppelwieser, 2020). From the perspective of a service ecosystem, the value of a tourism ecosystem encompasses not only tourist experiences but also the sustainable cultural, social, and emotional values contributed by various stakeholders (Font et al., 2021). However, the majority of existing research emphasizes the value of the

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visitor experience, while there is a notable gap in studies that examine tourists' participation in the co-creation of sustainable value or ecological value. In addition, tourism value co-creation focuses on the interaction of different participants and their value co-creation, in particular, employees and tourists (Teng & Tsai, 2020；Uslu & Tosun, 2023；Leong et al., 2024), tourists and tourists (Lin et al., 2021), tourists and residents (Chen et al., 2020；Yang, et al., 2021), enterprises and enterprises (Hamidi et al., 2019；Tuan et al., 2019). The current research covers the tourism service fields such as hotels (Cuiet al.,, 2024； Liet al.,2024), scenic spots (Leong et al., 2024), travel agencies (Singhet al., 2022), ethnic tourism communities (Hamidiet al., 2019), online platforms(Jiang, 2024), artificial intelligence platforms (Chuang, 2023；Solakiset al., 2022), and also discusses the value co-creation in various forms of natural tourism, cultural tourism. However, in the context of island tourism, existing literature reveals a notable gap in research. Compared to inland regions, the ecological stability of islands is generally lower, resulting in a more fragile ecological environment(Baiet al., 2022). Thus, exploring tourists' involvement in island ecological value co-creation is crucial for promoting the sustainable development of island ecosystems.

On the other hand, prior research has acknowledged the significant roles of tourist factors, interpersonal factors, and destination factors in fostering tourists' engagement in value co-creation (Carvalho & Alves, 2022). Specifically, studies focusing on the impact of destination factors have demonstrated that proactive fulfillment of social responsibilities can enhance tourist value co-creation behaviors (Badaret al., 2024). However, the impact of different types of destination social responsibility (DSR) strategies on tourist value co-creation remains underexplored. Environmental destination social responsibility (Env DSR) is an important part of DSR (Farrington et al., 2017). The eco-destination image will affect tourists' travel intention (Chi & Pham, 2022), therefore, Env DSR should also be paid attention to. Exploring the impact of Env DSR strategies holds significant value. Destination managers may adopt different Env DSR strategies, such as reactive and proactive strategies (Su et al., 2020), pre-crisis and post-crisis strategies (Kim & Choi, 2016).

To fill this research gap, this research explores how Env DSR strategies influence ecological value co-creation behavior of island tourist. Therefore, our study aims to answer the three fundamental research questions.

Q1. How does Env DSR Strategies (Pre-crisis or post-crisis Env DSR) affect tourist ecological value co-creation behavior？

Q2. How do different crisis communication strategies (apology strategy or scapegoat strategy) incorporated into post-crisis Env DSR influence ecological value co-creation behavior of island tourist?

To address this issue, we employ attribution theory to posit that when tourists learn about the Env DSR strategies, they are likely to attribute these actions to the destination's management, thereby fostering robust trust in the destination. This trust can subsequently motivate tourists to allocate their exchangeable resources towards co-creating ecological value. First, we examine the influence of Env DSR strategies on ecological value co-creation of island tourist. Second, we examine the mediating effects of altruism motive attribution and destination trust. Thirdly, we also examine the chain mediation effects of altruism motive attribution and destination trust. Finally, based on situational crisis communication theory (SCCT), we study the relationship between different crisis communication strategies (apology or scapegoat strategy) in the post-crisis Env DSR and ecological value co-creation of island tourists.

Taking Chinese tourists as experimental subjects, this study explored the mechanism of influence of Env DSR strategies on ecological value co-creation of island tourist through investigation and experiment. After the end of the COVID-19, Chinese tourism industry has entered a phase of robust recovery. In 2023, the number of domestic tourists in China reached 4.891 billion, an increase of 93.3% over the previous year, and the number of inbound and outbound tourists exceeded 190 million, an increase of more than 2.8 times over 2022. This indicates that Chinese tourism industry has experienced a rapid recovery, and the Chinese tourism market is poised to make significant contributions to the global tourism sector. Consequently, Chinese tourists serve as a representative research subject.
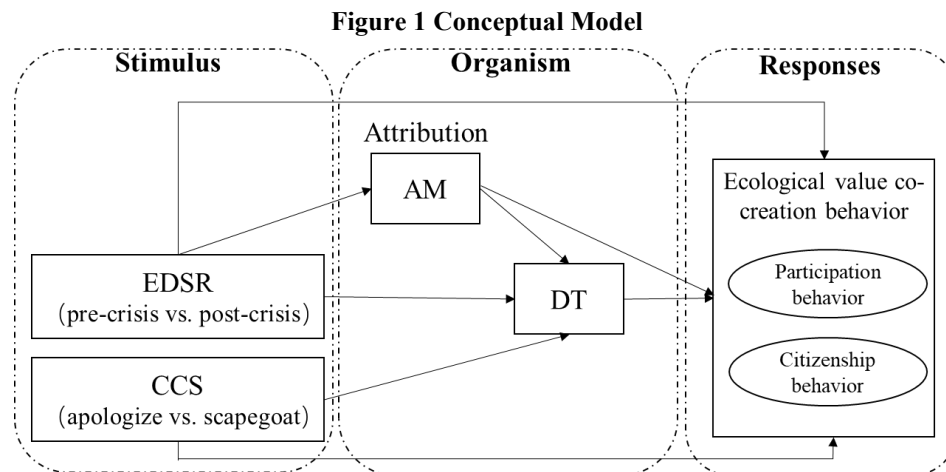
The remainder of this article is organized as follows. First, we present the theoretical background and review relevant literature. Next, we detail the design, execution, and analysis of results for experiment 1, experiment 2 and experiment 3. Finally, we provide conclusions, discuss limitations, and offer further discussion.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT
2.1 SOR Model
The SOR (Stimulus-Organism-Response) model is an evolution of the SR (Stimulus-Response) model proposed by behavioral ethologist John B. Watson and John Wilson in 1915.In this model, "S" refer to external

environmental factors that trigger individual psychological and cognitive responses (Lin & Lo, 2015)."O" refers to the cognitive and emotional processes that mediate between stimuli and behavior (Chanet al., 2017)."R"refers to the response, represents the ultimate behavioral or intentional reaction that is elicited following the influence of stimuli and organic factors. This study adopted the SOR model framework as a foundation, Env DSR strategies as stimuli, organics related to tourist' altruistic motive and destination trust, ecological value co-creation of island tourists as the final response. (**Figure 1**)

Figure 1 Conceptual Model

Fig.1.
Notes: EDSR stands for Env DSR strategies; CCS stands for crisis communication strategies; AM stands for altruism motive attribution; DT stands for destination trust.

2.2Env DSR Strategies

Environmental corporate social responsibility (Env CSR) is part of CSR (Farrington et al., 2017). Env CSR is characterized by two key dimensions: a company's commitment to climate responsibility and the sustainable utilization of natural resources (Johns & Khojastehpour, 2014). Env CSR promotes sustainable societal development, boosts corporate competitiveness and brand image, and encourages positive stakeholder interactions (Johns & Khojastehpour, 2014 ; Kumar et al., 2024). Scholars have extended the concept of CSR to the realm of destination management, thereby introducing the notion of DSR (Su & Swanson, 2017). The dimensions of DSR include economic, environmental, social, stakeholder, voluntariness, stakeholder responsibility (Su, Swanson, & He, 2019). This paper focuses on Env DSR, where destination managers incorporate environmental protection and management into daily governance to ensure sustainability and support regional economic development. At present, there are many researches on DSR (Agapito et al., 2022), but there are few researches on the impact of the single dimension of Env DSR. Based on Kim, Choi (2016) research, this paper divides Env DSR strategies into pre-crisis and post-crisis Env DSR. Pre-crisis Env DSR refers to the destination's proactive communication of environmental responsibility initiatives to tourists before an ecological crisis. Post-crisis Env DSR refers to the socially responsible actions taken by the destination after an ecological crisis.

2.3 Ecological value Co-Creation of Tourists

Value co-creation has garnered significant academic attention since the 1990s.With the advancement of social networks, examining value co-creation from a consumer perspective has emerged as a critical focus in marketing research (Hajli et al., 2017). With the in-depth study of value co-creation theory, scholars have increasingly applied it to explore various perspectives, such as tourism (Ribeiro et al., 2023), innovative entrepreneurship (Shams & Kaufmann, 2016) and social media (Rashid et al., 2019). From an ecological perspective, the value includes the total worth of ecosystem products and services that enhance human well-being and support sustainable social development (Nie et al., 2022). Ecological value encompasses the worth of ecological products and ecosystem services, integrating environmental, economic, and social values(Nie et al., 2022). This study considers ecological value in its broadest sense. Realizing, maintaining, and enhancing ecological value is a dynamic process influenced by stakeholders. However, literature on this process and the involved stakeholders is limited. Tourists' behaviors significantly impact destination ecology, so tourists and other stakeholders should collaborate to create and enhance ecological value.

Ecological value co-creation of tourists involves participating in local ecological management activities or interacting with stakeholders, thus contributing to ecological value during travel experiences (Nieet al., 2022). It covers eco-friendly behaviors, interactions with other tourists and local managers, feedback on

environmental information, participation in eco-tourism initiatives, purchasing eco-friendly products, and sharing ecological experiences. According to the research of consumer value co-creation behavior (Yi & Gong, 2013), ecological value co-creation behavior of tourists is divided into ecological participation behavior and ecological citizenship behavior.

2.4 Env DSR Strategies and Ecological Value Co-Creation Behavior of Island Tourists

A substantial body of research showed that enterprises engaging in CSR can enhance their corporate image and customer trust (Kim & Ham, 2016 ; Liu et al., 2019). According to Wu, Huang, Tsai and You (2023), empirical research demonstrates that CSR enhances customer identification and trust, thereby stimulating customer citizenship behavior. CSR plays a key role in stimulating customer participation behavior and customer citizenship behavior (Mubushar et al., 2024). However, reactive CSR initiatives stemming from irresponsible behavior can lower consumer ratings and alter positive attitudes toward companies (Su et al., 2020 ; (Ricks, 2005)

In addition, post-crisis CSR can be perceived by consumers as insincere or opportunistic (Vanhamme & Grobben, 2008), in turn, consumers have negative feelings towards enterprises (Rim & Kim, 2016). Tourists perceive pre-DSR as more sincere than post-crisis DSR. They may exhibit a more positive attitude toward pre-crisis DSR activities and demonstrate a greater willingness to engage in ecological value co-creation. Therefore, we assume that:

H1 Pre-crisis (vs. post-crisis) Env DSR strategy will have a positive effect on ecological value co-creation behavior of island tourists.

H1a Pre-crisis (vs. post-crisis) Env DSR strategy will have a positive effect on ecologicalparticipative behavior of island tourists.

H1b Pre-crisis (vs. post-crisis) Env DSR strategy will have a positive effect on and ecological citizenshipbehavior of island tourists.

2.5 The Mediating Effect of Altruism Motive Attribution

Implementing Env DSR strategies can alter tourists' perceptions of island organizers' ecological conservation efforts. Attribution involves inferring the causes of events or behavior (Kelley & Michela, 1980). In CSR attribution research, motivations can be categorized as altruism or egoism motive (Jeon & An, 2019). Consumers show more trust and positive attitudes when they believe a company's CSR efforts are altruistically motivated (Dai & Guo, 2024). Conversely, perceiving CSR as egoistically driven leads to negative attitudes and lower purchase intentions (Min et al., 2023). After understanding Env DSR, island tourists can explore the underlying reasons instead of staying at a superficial level. Compared to post-crisis Env DSR strategy, pre-crisis Env DSR strategy is more likely to result inaltruism motive attributionamong island tourists (Su et al., 2020).

Reciprocity theory posits that when individuals perceive personal benefits, they experience psychological pressure to reciprocate with equivalent benefits (Falk & Fischbacher, 2006). DSR can stimulate the guilt of individuals for not making returns (Liua et al., 2024). After understanding Env DSR, island tourists can delve into the underlying reasons rather than remaining at a superficial level (Kim et al., 2023). When island tourists view DSR altruistically, they recognize the island's social contribution and are motivated to reciprocate. However, egoistic attribution makes it difficult for tourists to show similar effort. The following hypothesis is proposed:

H2 Tourists' altruism motive attributions play a mediating role in the relationship between Env DSR strategies and ecological value co-creation behavior of island tourists.

H2a Tourists' altruism motive attributions play a mediating role in the relationship between Env DSR strategies and ecologicalparticipative behavior of island tourists.

H2b Tourists' altruism motive attributions play a mediating role in the relationship between Env DSR strategies and ecological citizenshipbehavior of island tourists.

2.6 The Mediating Effect of Destination Trust

In tourism, DSR strategies signal to visitors that the destination is reliable and trustworthy.Destination trust refers to tourists' confidence that the destination will fulfill their expectations and their willingness to accept associated risks. This concept encapsulates tourists' faith and assurance in the reliability of the destination (Liu & Derong, 2018). Trust develops when one party views the other as reliable and consistent with expectations (Blau, 1964). Many researches have confirmed that destination trust is an important antecedent for tourists' participation in value co-creation (Arıca et al., 2023 ; Chuangxin et al., 2024).

H3 Destination trust will actively mediate the relationship between Env DSR strategies and ecological value co-creation behavior of island tourists.

H3a Destination trust plays a mediating role in the relationship between Env DSR strategies and ecologicalparticipative behavior of island tourists.

H3b Destination trust plays a mediating role in the relationship between will Env DSR strategies and ecologicalcitizenship behavior of island tourists.

2.7 Chain Mediation of Altruism Motive and Destination Trust

Whether DSR strategies can enhance tourists' trust in a destination is contingent upon the specific attribution circumstances.Intrinsic motivation significantly enhances tourists' trust (Su et al., 2020). Destination trust often leads to positive behaviors, such as pro-environmental behaviors (Aziz & Niazi, 2024), visitor intentions (Su et al., 2022 ; Shen et al., 2022) and revisit intention(Chang et al., 2023). Trust is crucial for consumer participation in co-creation. In tourism, trust influences tourists' motivation to participate in co-creation and re-participate in co-creation (Arıca et al., 2023). Therefore, we reasonably predict the chain mediating effect of altruism motive and destination trust between Env DSR strategies and tourist ecological value co-creation behavior, and proposed the following hypothesis:

H4 Altruism motive attribution and destination trust play a chain mediation role in the relationship between Env DSR strategies and ecological value co-creationbehavior of island tourists.

H4a Altruism motive attribution and destination trust play a chain mediation role in the relationship between Env DSR strategies and ecologicalparticipative behavior of island tourists.

H4b Altruism motive attribution and destination trust play a chain mediation role in the relationship between will Env DSR strategies and ecologicalcitizenship behavior of island tourists.

2.8 Crisis Communication Strategies and Ecological Value Co-Creation Behavior of Island Tourists

According to SCCT, different crisis communication strategies should be used for different types of crises. For preventable crises, reconstruction strategies like apology and compensation are recommended. For unpreventable crises, denial strategies such as denying or scapegoating are suggested (Coombs & Holladay, 2007). The apology strategy in the reconstruction approach can lessen consumers' negative emotions, especially when seen as sincere and paired with corrective actions (Langaro et al., 2022). Denial and silence can rebuild trust, and denial is the best strategy for preventable crises like scapegoating69,70.Yu, Cheng, Yang and Yu (2022) found that hotels using the scapegoat strategy during COVID-19 reduced consumers' perception of the company's crisis responsibility, controllability, and stability. However, the apology strategy was more effective in enhancing consumer reputation. In this study, when an ecological pollution crisis occurs at the destination, it suffers from reduced tourist numbers and a decline in the local tourism economy (Prideaux et al., 2021). Therefore, based on SCCT, the destination can use an apology strategy to mitigate negative impacts. However, the ecological crisis may also stem from organizational inaction (Stovall et al., 2019), and the destination should adopt the scapegoat strategy. Therefore, the coping strategies used by destinations based on SCCT can be categorized into apology and scapegoat strategies. Adopting an apology strategy to address environmental pollution crises is more likely to evoke positive emotions, promoting higher levels of ecological value co-creation among island tourists. Based on this, this paper assumes:

H5 Compared with scapegoat strategy, apology strategy can promote ecological value co-creation behavior of island tourists.

H5a Compared with scapegoat strategy, apology strategy can promote ecologicalparticipative behavior of island tourists.

H5b Compared with the scapegoat strategy, apology strategy can promote ecologicalcitizenship behavior of island tourists.

2.9 The Mediating Effect of Destination Trust on Ccs and Ecological Value Co-Creation Behavior of Island Tourist

Under the brand crisis communication strategies, consumers will form different degrees of brand trust (Hegner et al., 016). Apology is an effective way to rebuild trust when the brand has a trust crisis (Yang, 2024), and the apology in the case of competence crisis is more effective than that in the case of moral crisis (Lewicki & Brinsfield, 2017). Denial strategies are also a way to rebuild trust, but denial alone can undermine brand trust (Li & Yang, 2024). Denial strategy is more effective than apology strategy in moral crisis, and apology strategy is more effective than denial strategy in competency-based crisis (Lewicki & Brinsfield, 2017). When consumers have higher trust in the brand, their participation in value co-creation will be more active (Wallace et al., 2021 ; Sohaib & Han, 2023). Therefore, the higher the degree of trust in the destination, the higher the tourists perceive the ecological governance efforts of the destination, and the more active they may participate in the co-creation of ecological value. Based on this, this paper proposes the following hypothesis:

H6 Destination trust will actively mediate the relationship between CCS and ecological value co-creation behavior of island tourists.

H6a Destination trust will actively mediate the relationship between CCS and ecologicalparticipative behavior of island tourists.

H6b Destination trust will actively mediate the relationship between CCS and ecologicalcitizenship behavior of island tourists.

III.   STUDY 1
3.1. Study Design and Stimulus Development
The purpose of Study 1 is to validate Hypotheses 1 and Hypothesis 3. In Experiment 1, we used a single-factor between-groups design with two conditions: pre-crisis and post-crisis Env DSR strategies. We recruited 102 subjects on the platform (https://www.credamo.com) and randomly assigned them to different experimental groups.

Before answering questions, subjects imagined traveling to an island to view pre-designed news stimuli (see **Appendix 1**). The pre-crisis group noted consistent ecological protection efforts by island managers. In contrast, the post-crisis group reported current measures addressing prior ecological neglect. After reviewing the stimuli, participants assessed ecological value co-creation and destination trust, followed by demographic measurements. The experiment then concluded.

3.2. Sample and Data Collection
Inexperiment 1, we recruited 102 participants and randomly assigned them to two group.The participants imagined themselves traveling on an island and answered questions about news content to ensure the questionnaire's reliability. To assess the validity, we included a test item that participants read: "If you see this question, please select option 1."Among the 102 participants, 8 participants gave incorrect responses and were excluded, resulting in a final sample of 94 valid responses. Each group consisted of 47 participants, with males accounting for 64.9% of the total sample.
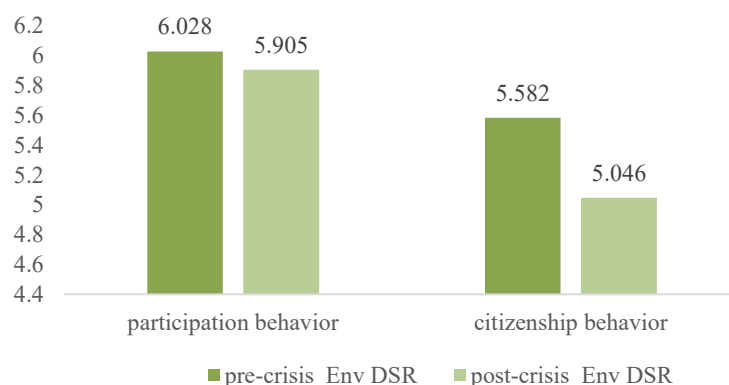
3.3. Dependent Measures
In order to measure ecological value co-create behavior of island tourist, we referred to the studies conducted by (Ricks, 2005；Hsiaoet al., 2015) and (Nieet al., 2022), and put forward the measurement scale of ecological value co-creation behavior (see **Appendix 3**). Ecological value co-creation behavior includes participation behavior and citizenship behavior. The Cronbach's α coefficients for participation behavior and citizenship behavior were 0.804 and 0.786.

3.4. Results
3.4.1 The Impact of Env Dsr Strategies on Ecological Value Co-Creation Behavior of Island Tourists
The results of the ANOVA, which utilized participation behavior and citizenship behavior as dependent variables, indicated that the Env DSR strategies does not significantly influence ecological participation behavior of island tourists ($M_{pre} = 6.028, SD = 0.599$ vs. $M_{post} = 5.905, SD = 0.668$, $F = 0.878, \rho = 0.351$) (see Figure 2). H1a were not supported. Compared with post-crisis strategy, pre-crisis Env DSR strategy improved ecological citizenship behavior of island tourists ($M_{pre} = 5.582, SD = 0.716$ vs. $M_{post} = 5.046, SD = 1.088$, $F = 7.938, \rho = 0.006$), so H1b was supported (see **Figure 2**).

Figure 2 Impact of Env DSR Strategies on Ecological Value Co-Creation of Island Tourists

3.4.2 The Mediation Effect of Destination Trust
Because there is no significant correlation between Env DSR strategies and ecological participation behavior of island tourists, so H2a was not supported. We only test the mediation effect of destination between Env DSR strategies and citizenship behavior. To test the mediation of destination trust, we used (Hayes, 2013)bootstrapping method(PROCESS Macro Model 4), the results are shown in **Table 1** and**Table2.**The results showed that Env DSR strategies reduce destination trust ($\beta = -0.963, SE = 0.199$, T value =

$-4.830, \rho = 0.000$), and destination trust positively affects ecological citizenship behavior ($\beta = 0.522, SE = 0.084$, T value $= 6.628, \rho = 0.000$). After controlling for the direct effects of Env DSR strategies ($\beta = -0.033, SE = 0.179$, T value $= -0.182, \rho = 0.856$), the mediation effect of destination trust ($\beta = -0.503, 95\% \, CI = -0.859 \sim -0.213$) was significant. So H2b was supported.

Table 1 Destination Trust Mediation Effect Results (1)

	CB		DT		CB	
	β	t	β	t	β	T
EDRS	-0.536	-2.818*	-0.963	-4.83***	-0.033	-0.182
DT					0.522	6.248***
R2	0.079		0.202		0.356	
F(df)	7.938		23.324		25.128	

Notes:* for ρ < 0.05; ** for ρ < 0.01;* for ρ < 0.001**

Table 2 Destination Trust Mediation Effect Results (2)

Effect type	path	Effect size	boot SE	boot 95% CI	
				LLCI	ULCI
total effect	EDSR-CB	-0.536	0.190	-0.913	-0.158
direct effect	EDSR-CB	-0.033	0.179	-0.388	0.323
indirect effect	EDSR-DT-CB	-0.503	0.165	-0.859	-0.213

IV.　　STUDY 2

4.1. Study Design and Stimulus Development
The purpose of Study 2 is to validate H1, H2 and H3. Experiment 2 replicated Experiment 1 with different samples of actual island tourists. The procedure was identical to Experiment 1 and involved two groups: pre-crisis strategy and post-crisis strategy. The same stimuli materials from Experiment 1 were used for reading news (see **Appendix 1**).

4.2. Sample And Data Collection
This experiment was carried out on the island of Zhanjiang City, and a total of 202 tourists volunteered to participate in the experiment. A total of 200 valid questionnaires (40.5% male) were obtained by eliminating the wrong answers to the test questions in the experiment.
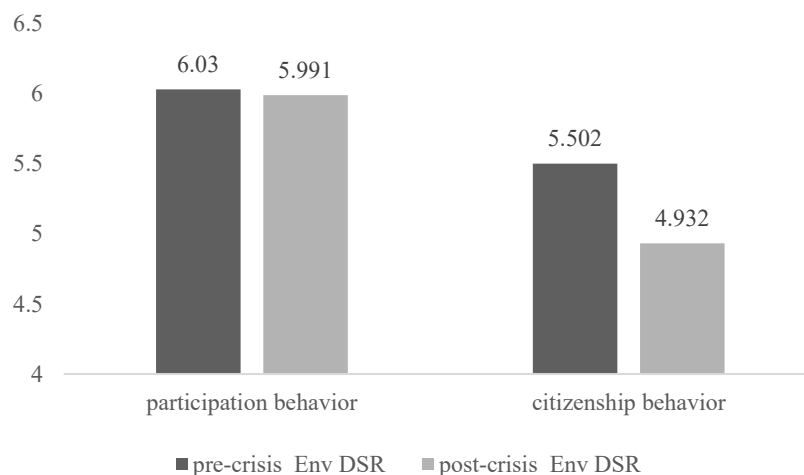
4.3. Dependent Measures
The measurement scale of ecological value co-creation behavior and destination trust is consistent with experiment 1 (see **Appendix 3**). Cronbach's α of destination trust, altruistic motivation, participation behavior and citizenship behavior were all greater than 0.7. The values are 0.887, 0.863,0.830 and 0.766.

4.4. Result
4.4.1 The Influence of Env Dsr Strategies on Ecological Value Co-Creation Behavior of Island Tourists
The results of ANOVA showed that there is no significant difference between ecological participation behavior ($M_{as} = 5.78, SD = 0.66$ vs. $M_{ps} = 5.74, SD = 0.83$, $F = 0.364, \rho = 0.716$) of tourists under either pre-crisis strategy or post-crisis strategy (see **Figure 3)**. H1a were not supported again. Compared with post-crisis strategy, pre-crisis strategy improved ecological citizenship behavior ($M_{as} = 5.92, SD = 0.70$ vs. $M_{ps} = 5.56, SD = 0.98$, $F = 2.955, \rho = 0.004$), so H1b was supported again (see **Figure 3**).
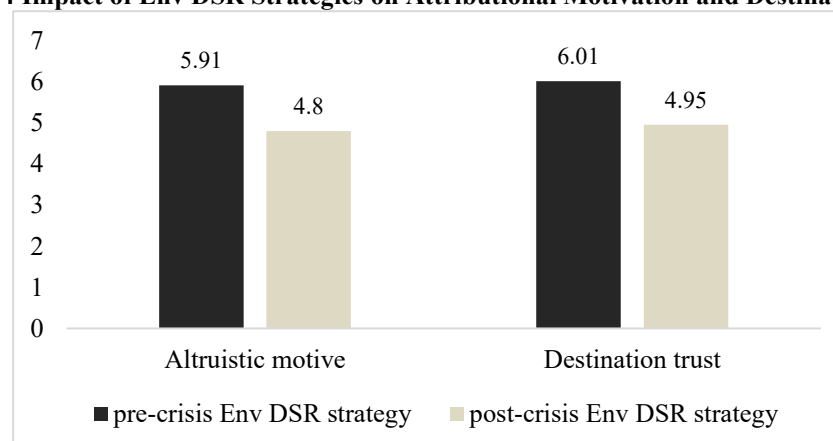
Figure 3 Impact of Env DSR Strategies on Ecological Value Co-Creation of Island Tourist

■ pre-crisis Env DSR   ■ post-crisis Env DSR

4.4.2 The Mediation Effect of Altruism Motive Attribution and Destination Trust

We used two mediating variables as dependent variables to conduct ANOVA, the results are shown in **Figure 4**. The pre-crisis strategy is more likely to cause tourists' altruism motive attribution ($M_{as} = 5.91, SD = 0.72$ vs. $M_{ps} = 4.80, SD = 1.30$, T value $= 7.487, \rho = 0.000$) and destination trust ($M_{as} = 4.96, SD = 1.26$ vs. $M_{ps} = 5.43, SD = 0.97$, T value $= -2.954, \rho = 0.004$), while the post-crisis strategy is more likely to reduce tourists' destination trust.

Figure 4 Impact of Env DSR Strategies on Attributional Motivation and Destination Trust

■ pre-crisis Env DSR strategy   ■ post-crisis Env DSR strategy

Then, the study tested the chain mediation mechanism of Env DSR strategies on island tourists' ecological value co-creation behavior using (Hayes, 2013) bootstrapping method (PROCESS Macro Model 6). Because there was no significant correlation between Env DSR strategies and ecological participation behavior of island tourists, so H2a, H3a and H4a were not supported. We only tested the mediation effect of destination between Env DSR strategies and citizenship behavior.

The results of chain mediating effects are shown in **Table 3 and Table 4**. According to the hypothesis, there are three mediating paths between destination social responsibility strategy and tourist citizenship behavior: "Env DSR strategies →altruism motive →tourist citizenship behavior"" Env DSR strategies→ trust → tourist citizenship behavior"" Env DSR strategies→altruism motive→ trust → tourist citizenship behavior. Their 95% confidence intervals respectively are [-0.333, -0.017], [-0.308,0.052], [-0.339, -0.101], confidence interval does not contain 0. These indicate that altruism motive and destination trust play an intermediary role between Env DSR strategies and tourist citizenship behavior, and there is a chain intermediary. So H2b, H3b and H4b were supported.

Table 3 Chain Mediation Effect Results.

Effect type	path	Effect size	boot SE	boot 95% CI	
				LLCI	ULCI
total effect	EDSR-CB	-0.570	0.115	-0.758	-0.343
direct effect	EDSR-CB	-0.046	0.114	-0.270	0.178
indirect effect	EDSR-AM- CB	-0.154	0.078	-0.322	-0.019
	EDSR-DT- CB	-0.161	0.065	-0.307	-0.055
	EDSR-AM-DT- CB	-0.209	0.059	-0.334	-0.107

Notes: EDSR stands for Env DSR strategies; CB stands for citizenship behavior; DT stands for destination trust; AM stands for altruism motive attribution.

Table 4 Destination Trust Results in Mediation between Ccs and Participating Behavior (1).

	PB		DT		PB	
	β	t	β	t	β	T
CCS	0.546	3.464***	0.756	3.399***	0.199	0.128
DT					0.458	7.499***
R2	0.133		0.129		0.496	
F(df)	11.997		11.550		37.935	

Note: * for ρ < 0.05; ** for ρ < 0.01;*** for ρ < 0.001

V. STUDY 3

5.1. Study Design

The purpose of Study 3 is to validate Hypotheses 4 and Hypothesis 5. In experiment 3, a single-factor intergroup experimental design was used to test the effects of crisis repair strategies (apology strategy vs. Scapegoat strategy) on destination trust and co-creation of tourists' ecological value. The third experiment was conducted through the Credamo platform(https://www.credamo.com), and the subjects were all from the official test database of the platform, and they were randomly assigned to different experimental groups. Before answering questions, subjects imagined traveling to an island to view pre-designed news stimuli (**see Appendix 2**).

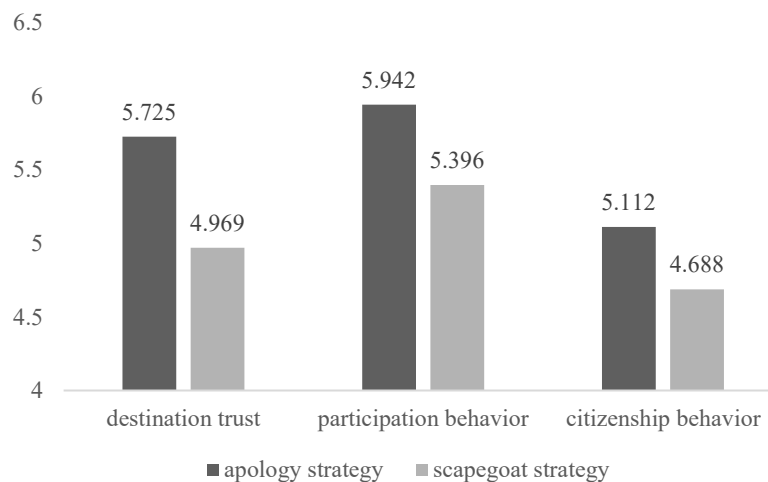### 5.2. Sample and Data Collection

A total of 85 subjects were tested in this experiment. Of these, four samples answered in less than 90 seconds. After excluding these two invalid samples, 81 sample data remained. In addition, a measurement item of subjects' attention was added to the test to exclude and eliminate low-intervention sample data. The question was "What is 20+40?" and one of the subjects failed the attention test. After removing this sample, 80 valid sample data were obtained, and the effective rate was 97.2%. 63.7% were males and 36.3% were females.

5.3. Result

The measurement scale of tourist ecological value co-creation was consistent with experiment 1. All items were scored on a7-point Likert scale (1 = completely disagree; 7 = completely agree). Ecological value co-creation was divided into ecological participation behavior and citizenship behavior, and Cronbach' α coefficients were 0.851 and 0.841.

In this paper, The results (see **Figure 5**) of ANOVA showed that, the apology strategy significantly improved the destination trust of the subjects compared with the scapegoat strategy (M apology=5.725, SD=0.711 vs. M scapegoat=4.969, SD=1.214, F=11.550, p=0.001). Compared with the scapegoat strategy, the apology strategy significantly improved tourist participation behavior (M apology =5.942, SD=0.460 vs. Mscapegoat =5.396, SD=0.884, F=11.997 p=0.001). It indicated that H5a was supported. But there was no significant difference between the tourist citizenship behavior under either apology strategy or scapegoat strategy (Mapology =5.112, SD=0.780 vs. Mscapegoat=4.688, SD=1.185, F=3.588, p=0.062), indicating that H5b was not supported.

Figure 5 Mean Comparisons: Apology Strategy and Scapegoat Strategy

Then, this study used the bootstrapping method of Hayes (2013) to test the intermediary mechanism of CCS affecting the co-creation behavior of tourists' ecological value on islands (Model 4).

Because there is no significant correlation between CCS and ecological citizenship behavior of island tourists, so H6b were not supported. We only toke ecological participation behavior as the dependent variable, the results (see **Table 4** and **Table 5**) showed that compared with the scapegoat strategy, the apology strategy improved destination trust ($\beta = 0.756, \text{SE} = 0.223$, T value $= 3.399, \rho = 0.001$). Destination trust positively affected ecological participation behavior of island tourists ($\beta = 0.458, \text{SE} = 0.062$, T value $= 7.449, \rho = 0.000$). The total effect ($\beta = 0.546$, T value $= 3.464$, $\rho = 0.001$, [LLCI=0.231, ULCI=0.860]) and indirect effect ($\beta = 0.347$, [BootLLCI=0.121, BootULCI=0.625]) on ecological participation behavior were significant. The direct effect ($\beta = 0.199$, T value $= 1.538$, $\rho = 0.128$, [LLCI=-0.059, ULCI=0.457]) was not significant. Therefore, destination trust played a mediating role between crisis communication strategies and tourist's ecological participation behavior. So H6a was supported.

Table 5 Destination Trust Results in Mediation between Ccs and Participating Behavior (2)

Effect type	path	Effect size	boot SE	boot 95% CI	
				LLCI	ULCI
total effect	**CCS-PB**	0.546	0.158	0.232	0.859
direct effect	**CCS-PB**	0.199	0.130	-0.059	0.457
indirect effect	**CCS-DT-PB**	0.347	0.132	0.119	0.624

Note: CCS stands for crisis communication strategies; PB stands for Participation behavior; DT stands for destination trust.

VI. CONCLUSION AND DISCUSSION

This study examines how Env DSR strategies affect the ecological value co-creation behavior of island tourists. We found that post-crisis Env DSR strategies reduce tourist trust and subsequently lower their ecological citizenship behavior. In contrast, pre-crisis Env DSR strategies lead tourists to perceive destination managers as altruistic, enhancing trust and promoting ecological citizenship behavior. Conversely, post-crisis strategies may be seen as self-serving, reducing trust and diminishing ecological participation. Additionally, adopting an apology strategy during an ecological crisis can promote tourist participation.

6.1 Theoretical Implications

Although many previous studies have explored tourist value co-creation behavior (e.g, (Hayes, 2013 ; Ribeiro et al., 2023), particularly focusing on their experiences (Finsterwalder & Kuppelwieser, 2020), but few have considered tourists' participation in creating sustainable or ecological value. Previous studies have demonstrated that tourists' value-co-creation behaviors can significantly promote sustainable development (Elliot et al., 2023). Therefore, integrating tourist value co-creation with an environmental sustainability perspective is essential. To address the existing research gap, this study represents a pioneering effort in investigating ecological value co-creation behavior of island tourists. Drawing upon the theory of value co-creation and prior research(Teng & Tsai, 2020 ; Yi & Gong, 2013), this study verifies the scale of tourist ecological value co-creation behavior, which is divided into ecological participation behavior and civic behavior.

Social responsibility provides tourist destinations with a competitive edge, attracting recent academic attention.Most studies on DSR have shown its significant impact on tourists' visit intention (Su et al., 2020), re-visit intention (Hassan & Soliman, 2021), pro-environment behavior (Su & Swanson, 2017 ; Li et al.,2023) and destination brand loyalty (Tran et al., 2023). However, few studies have explored the relationship between DSR and tourist value-co-creation behavior, especially DSR in island tourism. Actually, previous studies have shown that CSR can promote the value co-creation behavior of stakeholders (Mubushar et al., 2024). This study explored the influence of Env DSR strategies on ecological value co-creation of tourist in island tourism. This study broadens the research of DSR, and responds to the academic concerns expressed by Suet al., 2020.

We explored the mediating role of attribution motivation attribution and destination trust. Previous studies have explored the impact of destination trust on tourist value-co-creation behavior (Arıca et al., 2023) and the impact of DSR on destination trust (Su et al., 2020 ; Hassan & Soliman, 2021). However, few studies have examined the mediating effects of destination trust on DSR and tourists value co-creation. The study distinguished two types of Env DSR strategies (pre-crisis and post-crisis) and found that pre-crisis strategy can induce the tourists' perception of altruistic motivation and destination trust, so as to generate the tourist citizenship behavior. These findings substantiate the role of attribution motivation and destination trust as chain mediators in the relationship between Env DSR strategies and value co-creation behavior. These conclusions enrich the literature of destination trust in this field and offer some new insights.

Moreover, we explore the relationship between CCS adopted by the destination after ecological crisis and ecological value co-creation behavior. Previous research has explored how interactions lead to value co-creation and co-destruction during major service disruptions (Assiouras et al., 2023), and how argument quality and source credibility of CSR communication influence value co-creation during a pandemic (Chang & Berwanger, 2024). However, the relationship between specific CCS and value co-creation is not discussed. The conclusion of this study enriches the literature of value co-creation after destination ecological crisis.

6.2. Managerial Implications
The findings of this study have significant implications for destination management practices.Destination managers, especially island managers, can use DSR strategies and motivations to build trust among tourists, which in turn fosters ecological value co-creation of both current and potential tourists.

Firstly, pre-crisis Env DSR strategy is more effective than post-crisis strategy in generating altruistic motivation and destination trust among island tourists, thereby promoting their citizenship behavior. Therefore, destination managers should proactively communicate with tourists about Env DSR to inspire citizenship behavior among tourists. Enhancing destination trust and altruistic attributions requires proactive ecological protection. Destination managers should engage tourists on Env DSR before ecological damage occurs.

Secondly, it is also very necessary to adopt DSR after the occurrence of ecological damage events. At the same time, when using the strategy, we should pay attention to using the apology strategy rather than the scapegoat strategy, so as to improve destination trust and stimulate the tourists to jointly create ecological value.

6.3. Limitations and Future Research
Like all research, this study has limitations.
First, this paper only analyzes from the perspective of pre-crisis and post-crisis strategies. In the future, more different types of strategies can be considered, such as collective interests and individual interests, concrete and abstract, etc., to explore tourist ecological value co-creation from the perspective of frame effect.

Secondly, Current research focuses on Chinese consumer data, offering deep insights into the Chinese market. To enhance understanding and generalizability, future studies should include cross-country samples. Comparing tourists from different countries can reveal how cultural differences influence ecological value co-creation behavior, highlighting both commonalities and differences between markets. This approach will help destination managers develop more accurate global strategies and provide new perspectives for cross-cultural research.

Data Sharing Statement
The datasets are available from the corresponding author upon reasonable request.
Ethics Approval
This study followed the principles of the Declaration of Helsinki and received approval from the Ethics Research Committee of Lingnan normal University. All study participants provided informed consent before participating in the research, and the study procedures were formulated to safeguard participant privacy and ensure confidentiality.

Disclosure

The author(s) report no conflicts of interest in this work.

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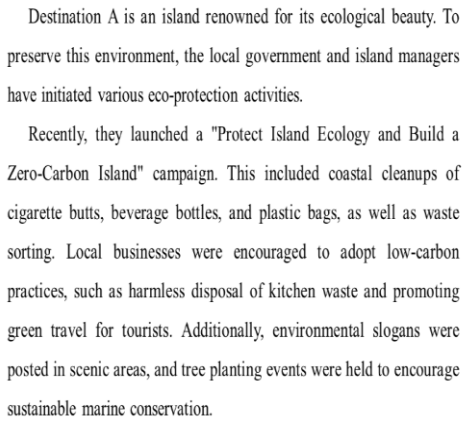
Appendix 1

Experiment1 Condition 1: pre-crisis Env DSR

Experiment 1 Condition 2: post-crisis Env DSR

Appendix 2

Experiment2 Condition 1: apology strategy

Hemei Island -- Ecological protection

目的地A   2024年11月29日 14:55

In the past, there were ecological environmental pollution problems such as coastal pollution and piles of garbage on the island, which seriously affected the lives of local residents and tourists' travel experience. After an in-depth investigation, there are indeed some loopholes in the island's ecological management. **We apologize for this.** In the future, we will strengthen ecological protection and create a better ecological environment.To this end, we have taken a variety of ecological management measures, launched the "Love Island ecology, build a zero-carbon island series of activities" to take sewage treatment, beach cleaning, harmless treatment of domestic waste, tree planting and other activities, while strengthening environmental protection publicity in the island.

After ecological restoration, island resident Chen said: "After this period of management, the island ecology has gradually been restored and improved, and now there are more trash cans on the island, there is no garbage on the beach, the sea has turned blue, and I recently saw white dolphins when I went out to sea, indicating that the island ecological protection has achieved better results." I have been living on this island and have a deep affection for it, and I am very happy to see the gradual restoration of the island's ecology.

阅读1245

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Experiment1 Condition 2: scapegoat strategy

Hemei Island -- Ecological protection

目的地A   2024年11月29日 14:55

In the past, there were ecological environmental pollution problems such as coastal pollution and piles of garbage on the island, which seriously affected the lives of local residents and tourists' travel experience. After in-depth investigation, it was found that the island has always paid attention to ecological protection and management, but in recent years, more and more tourists on the island have caused pressure on the local ecological environment.

To this end, we have taken a variety of ecological management measures, launched the "Love Island ecology, build a zero-carbon island series of activities" to take sewage treatment, beach cleaning, harmless treatment of domestic waste, tree planting and other activities, while strengthening environmental protection publicity in the island.

After ecological restoration, island resident Chen said: "After this period of management, the island ecology has gradually been restored and improved, and now there are more trash cans on the island, there is no garbage on the beach, the sea has turned blue, and I recently saw white dolphins when I went out to sea, indicating that the island ecological protection has achieved better results." I have been living in this island and have deep feelings for the island, and I am very happy to see the gradual restoration of the island ecology.

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Appendix 3

Measures (1=strongly disagree through 7=strongly agree)

Altruism Motive (adopted from 89)

The destination launched the campaign because it truly cares about the public.

The destination has a genuine concern for the welfare of their tourists

The destination really cares about providing a better environment to its stakeholders.

The destination is trying to give something back to the community.

Destination trust (adopted from 62)

I believe that if there is a problem with the island's ecological environment, the management will deal with it immediately.

I believe the island manager is capable of protecting the ecological environment.

I believe the ecological environment of the island will become better and better.

I think the management of the island is trustworthy.

Ecological participation behavior of tourist (adopted from 43,44)

I will provide useful ecological and environmental protection information to the relevant administrative departments of the island.

I will provide necessary eco-protection advice to relevant management department of island tourism.

When I find problems in the ecological environment during my tour on the island, I will give feedback to the relevant management department.

When I have constructive opinions on the ecological environment development of tourism on the island, I will tell the relevant management department.

If other tourists are ecological vandals, I will correct their behavior

When traveling on the island, I will fulfill my ecological obligations as a tourist (e.g. not wearing sunscreen while swimming in the sea, not littering, etc.).

I will follow relevant regulations of the island tourism administration when traveling on the island.

During my trip to the island, I will do my best to protect the ecological environment as expected by the tourism authorities.

Ecological citizenship behavior of tourist (adopted from 43,44)

I will share the ecological benefits of the island with others.

I would recommend the ecology here to others.

I would encourage friends and relatives to travel here to experience the ecological environment.

If the island's ecological environment does not meet expectations, I will be willing to put up with it.

If ecological environment of the island is destroyed, I am willing to wait patiently for management.

If it takes longer than expected to improve island's ecological environment, I am willing to accept it.