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The Effect of "Host-Guest Interaction" on Tourists' Pro-Environmental Behaviour in Rural B&B Tourism: A Chained Multiple Intermediary Model

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Abstract: This study investigates the impact of host-guest interactions on pro-environmental behaviours among tourists engaged in rural bed and breakfast (B&B) tourism. It also explores the mediating effects of tourists' perceived value and place attachment. The target population comprised tourists from the Yangshuo B&B cluster in China. Data were collected through a questionnaire administered to 401 participants, which were subsequently analysed using AMOS software. The findings indicate that host-guest interactions significantly influence tourists' perceived value, thereby enhancing their emotional attachment to the place. Furthermore, the results reveal that these interactions indirectly foster pro-environmental behaviours in tourists via perceived value and place attachment. This research represents one of the few attempts to integrate host-guest interaction behaviours in B&B settings with tourists' pro-environmental actions. It highlights novel avenues for future research to elucidate the pivotal role of interaction behaviours in fostering environmental sustainability. Additionally, the insights gained can assist managers in enhancing conditions that facilitate the development of pro-environmental behaviours among tourists, thereby addressing the escalating environmental challenges faced by tourist destinations.

Introduction

Environmental protection has garnered significant international attention, with tourist behaviour emerging as a crucial factor influencing the ecological health of destinations. Inappropriate tourist actions present challenges to the sustainable development of these areas, making it essential for the tourism industry to cultivate and guide pro-environmental behaviours. By fostering awareness and encouraging responsible actions among tourists, the industry can promote sustainable tourism and mitigate environmental governance costs (Gomes & Lopes, 2023).

Tourists' pro-environmental behaviours in non-customary environments frequently encounter dilemmas such as embodied dysfunctionality and information asymmetry. Additionally, externally imposed policies and regulations often hinder effective reductions in inappropriate environmental behaviours among tourists. Conversely, strong emotional motivations can transcend the limitations imposed by situational factors, leading to positive spill over effects. Individuals with a high degree of environmental attachment are better equipped to engage in pro-environmental behaviours across various contexts. Consequently, there has been considerable interest in examining tourists' pro-environmental behaviours from an emotional perspective. Research has incorporated factors such as place attachment, psychological distance, natural empathy, and subjective well-being into the analytical framework, demonstrating that pro-environmental behaviours stimulated by emotional management are more stable, proactive, and sustainable (Yu, 2017).

Moreover, individuals do not merely accept situational factors passively; they also actively respond to environmental events. Interactions and communications between subjects and guests from diverse cultural backgrounds can mitigate stereotypes and foster a deeper understanding, affection, and respect for the tourist destination (Kirillova, Lehto, & Cai, 2015). Conversely, some scholars argue that the culture shock resulting from host-guest interactions can heighten tourists' uncertainty and discomfort, subsequently leading to negative perceptions and behaviours towards the destination (Goeldner & Ritchie, 2008). This indicates that the relationship between host-guest interactions and tourist behaviour is not consistently defined and is subject to variation based on different contexts and research perspectives. Therefore, we posit that exploring the emergence of tourists' pro-environmental behaviours through the lenses of individual cognition, emotion, and social interactions provides a more holistic understanding, elucidating the active mechanisms driving the development of these pro-environmental behaviours.

Rural B&Bs originated in the United Kingdom and subsequently diversified in countries such as France, the United States, and Japan. In China, rural B&Bs have evolved from Nongjiale, family hotels, and inns into boutique accommodations that serve as tourism and vacation destinations. These establishments offer high-quality lodging while integrating agricultural experiences, local expertise, and cultural activities through the "B&B+" model, fostering harmonious interactions between humans and nature and creating co-creative value. This approach has become a popular short-distance holiday choice for many tourists, enhancing their experiences and ecological perceptions of the environment (Fan et al., 2023). By addressing environmental issues through social interaction and leveraging the host's environmental knowledge, this model presents a win-win strategy for ecological

governance (Zhu, Wang, & Liu, 2021). However, the mechanisms by which such interactions influence tourists' pro-environmental behaviours remain insufficiently explored in the current literature.

Conversely, research conducted by Western scholars has predominantly focused on the cultural interactions between tourists and hosts within the context of transnational tourism (Greer & Wagner, 2023). In contrast, Chinese scholars have concentrated more on the communication and interactions between domestic tourists and local residents within a shared cultural framework (Wang, 2020). Existing literature suggests that cultural differences and research contexts significantly influence the relationship between pro-environmental behavioural intentions and their antecedents. Consequently, investigations into tourists' pro-environmental behaviours within the framework of rural B&B tourism in China are likely to yield markedly different findings compared to those observed in developed countries.

Another significant psychological factor is place attachment, a key concept in the human-environment relationship that describes an individual's cognitive or emotional connection to a specific location. Place attachment plays a crucial role in fostering positive attitudes and pro-environmental behaviours among tourists towards their destinations. However, empirical findings regarding its impact are mixed; some studies indicate a positive relationship between place attachment and pro-environmental behaviours, while others suggest that it may diminish such behaviours or show no direct correlation at all. These discrepancies may arise from the multidimensional nature of place attachment, with each dimension potentially relating to pro-environmental behaviours in distinct ways. Additionally, variations in cultural contexts and the use of different measurement instruments may account for some of the observed cultural differences (Daryanto & Song, 2021). Therefore, further research is needed to explore the antecedents and the role of place attachment among rural B&B tourists.

Our argument is grounded in the Stimulus-Organism-Response (S-O-R) theory, which elucidates how external stimuli affect mental processes and subsequently influence behavioural responses. This model has become a foundational framework for studying tourist behaviour, particularly in relation to green consumption and responsible environmental actions. In the context of rural B&B tourism, the interactions between hosts and guests act as social-environmental stimuli. Factors such as interaction style, emotional intensity, intimacy, and economic reciprocity influence tourists' evaluations of their perceptual experiences (Liu & Chang, 2020). The S-O-R theory thus provides a theoretical foundation for understanding how subjective perceptions shape evaluations of pro-environmental behaviours.

Literature Review and Hypotheses Development

Tourist Pro-Environmental Behaviour

Tourists' pro-environmental behaviours encompass actions that promote environmental protection and minimise harm to natural ecosystems. These behaviours include selecting environmentally friendly travel options and engaging in sustainable consumption practices. It is important to note that individual pro-environmental behaviours in tourism contexts differ from those exhibited by the general public in everyday environments, possessing distinct contextual characteristics. In relation to specific tourist destinations, pro-environmental behaviours should encompass

respecting local cultures, safeguarding the natural environment, and minimising disturbances to the local ecosystem. These actions represent sustainable practices for tourists within particular locales (Li et al., 2023b) Thus, the definition of pro-environmental behaviours among tourists extends beyond merely protecting the ecological environment; it also incorporates the cultural dimensions of tourism and encompasses a broader range of content related to the customs and traditions of the destination.

Research on the factors influencing pro-environmental behaviour has primarily focused on daily life, examining aspects such as attitudes, norms, values, and cognitive elements. This is often framed by the theory of planned behaviour and the theory of normative activation, which predict individual environmental actions based on internal attitudes. While these theories have been widely studied, there is limited exploration of pro-environmental behaviour from an affective-psychological perspective, particularly in mobile tourism contexts where the emotional dynamics are more pronounced. Environmental appeals alone are insufficient to encourage sustainable behaviour among tourists; rather, strong emotional motivations can transcend contextual constraints and lead to positive spill over effects. Individuals with high environmental attachment are better positioned to engage in pro-environmental behaviours across different settings (Yu, 2017).

Moreover, travellers' pro-environmental behaviours are continuously and dynamically influenced during their journeys through social interactions with both hosts and the destination itself. Nevertheless, current research predominantly emphasises the impact of these interactions on visitor satisfaction and loyalty, particularly within the marketing domain (Fan et al., 2023).

"Host-Guest Interaction" and Pro-Environmental Behaviour of Tourists

Host-guest interaction pertains to direct, face-to-face exchanges between hosts and guests from diverse cultural backgrounds. Munasinghe et al. (2022) define host-guest interaction in the context of Chinese rural lodging tourism as a dynamic process that evolves throughout the tourism experience. This interaction encompasses a broad range of channels, extending beyond mere verbal communication; as long as both parties engage and perceive the information conveyed, along with providing an appropriate response, host-guest interaction is established. Current research on the effects of host-guest interaction on the tourism experience is extensive, affirming that such interactions are a crucial element of tourists' perceptions of a destination. They significantly influence tourists' consumption decisions and overall satisfaction. By recognising, accepting, and valuing cultural differences, visitors leverage these distinctions to enrich the experiences of both hosts and guests, thereby fostering a collective human identity (Lehto, Davari, & Park, 2020).

In contrast to traditional hotels, rural bed-and-breakfast establishments place a greater emphasis on host-guest interactions. B&B hosts not only observe tourists but also actively influence their on-site behaviours, promoting practices such as minimising consumption, engaging in responsible photography, and demonstrating cultural respect. Hosts subtly educate and guide guests' behaviours while addressing any misbehaviour through implicit forms of discouragement. The hosts' ecological knowledge and advice significantly enhance tourists' pro-environmental behaviours. Consequently, hosts play a vital role in these interactions, possessing the potential to mitigate uncivil behaviours among tourists. Furthermore, host-guest interactions foster amicable relationships that transcend mere transactional dynamics, contributing to the co-creation of value within local, sustainable tourism practices (Pu et al., 2023).

Perceived Value and Its Mediating Effects

Perceived value represents a customer's overall assessment of a product's utility, balancing perceived benefits against costs. This evaluation is more abstract and emotional than simple assessments of price and quality, making it a subjective construct that varies across time, cultures, and individual customers. Introduced into tourism research in the 1990s, the concept of perceived value focuses on tourists' evaluations of the quality and level of products and services experienced at a destination, with an emphasis on "value for money." Over time, the definition has evolved from a narrow focus on monetary considerations to encompass a broader evaluation of the benefits derived from products and services. Thus, perceived value in tourism transcends the mere notion of "value for money," incorporating a more comprehensive understanding of the experiential benefits that influence tourists' assessments (Sánchez et al., 2006).

"Host-Guest Interaction" and Perceived Value

In the context of tourism, interpersonal interaction constitutes a relational dynamic that shapes the overall tourism experience. Positive "host-guest interaction" is regarded as a fundamental prerequisite for the actualisation of perceived value. The interaction between B&B hosts and tourists embodies a flow of emotional energy that facilitates the fulfilment of tourists' psychological needs. Through the provision of products and services, B&B hosts engage with tourists in a manner that positively influences their perception of value (Ye et al., 2022). Prior to their visit, tourists utilise information platforms to engage with the B&B host, initiating communication based on essential functional details about the establishment. This preliminary interaction helps to mitigate tourists' perceived risks and informs their "value for money" assessments, facilitating a successful transaction. The ensuing emotional exchange diminishes tourists' unfamiliarity during their journey, while high-quality interactions enhance their overall experiential value. Throughout their stay, "host-guest interaction" encompasses various activities, such as welcoming ceremonies, product services, and problem-solving behaviours, fostering a familial atmosphere akin to friendship. This dynamic evokes positive emotions in tourists, alleviating feelings of strangeness and constraints. Additionally, the aesthetic design of the B&B, the local folklore narratives, and the surrounding natural environment contribute to the richness of the "host-guest interaction" experience (Qian & Li, 2024).

Perceived Value and Pro-Environmental Behaviour

From a marketing perspective, perceived value significantly influences positive behavioural outcomes, such as loyalty, brand trust, destination image, and value co-creation (Le, Mai, & Pham, 2023). However, it remains subjective and varies based on factors like context and time. In forest tourism, all dimensions of perceived value positively affect environmentally responsible behaviours, with experience value exerting the strongest influence, followed by cost, service, and resource value (Liu, Wang, & Liu, 2022). Tourists' sensitivity to natural elements, such as wind and birdsong, enhances their connection to the environment,

thereby increasing their concern for ecological changes and motivating them to engage in responsible behaviours.

The Mediating Role of Perceived Value

Social exchange theory highlights that individuals aim to maximise benefits and minimise costs in social interactions. Tourists' decisions to respond positively to hosts depend on perceived value, weighing the services received against incurred costs. Different interaction mechanisms can influence these perceptions; for instance, tenants sharing space with hosts may prioritise social well-being, while those renting an entire space may focus more on functionality and economic value (Lee, 2022). B&B hosts serve as ambassadors, conveying the values of a destination through enjoyable "host-guest interactions," which can enhance tourists' post-trip evaluations and environmental behaviours. By developing sensory experience products that align with tourists' needs—drawing from local culture, natural scenery, and sustainable practices—hosts significantly influence tourists' perceived value and behaviours. This approach fosters a sense of responsibility for nature and encourages harmonious coexistence between humans and the environment (Zhang, Guo, & Shen, 2022). Perceived value acts as a crucial link connecting various influencing factors.

Place Attachment and Its Mediating Role

The notion of place attachment is grounded in psychological attachment theory (Bowlby, 1977), which highlights "attachment" as an emotional dimension and "place" as the environment to which individuals form this emotional bond, encompassing both physical and social contexts. This attachment arises from the meanings that individuals ascribe to their geographical surroundings through their interactions, thereby fostering an emotional connection between the individual and their environment. Traditional research posits that place attachment comprises two dimensions: place identity and place attachment, with this two-dimensional framework being validated across various contexts (Pineda et al., 2023).

Place identity reflects the connection between an individual's self-concept and a specific context, while place attachment signifies an individual's functional dependence on a location, primarily determined by its ability to meet personal needs rather than emotional evaluation. Consequently, place attachment can inspire particular activities or actions in individuals. Place attachment is considered a significant variable within the "psycho-behavioural" paradigm for examining human-place relationships at the micro level. It reflects internal organismic and integrative psychological states influenced by both functional and affective factors. As a valuable framework for interpreting behavioural intentions, place attachment plays a crucial role in fostering positive attitudes and pro-environmental behaviours among tourists towards their destinations (Kalantidou, 2023).

"Host-Guest Interaction" and Place Attachment

In tourism contexts, tourists often develop place attachment when their social interactions or experiences at the destination hold personal significance. Upon departing from their usual environment and entering a new destination, bodily experiences and social interactions can create meaning associated with that place, fostering an emotional connection. Place attachment signifies the alignment between a traveller's self-concept and their perceptions of the destination. Rural bed and breakfast tourism, characterized by its emotional and

communicative nature, encourages tourists to link their experiences to a constructed sense of place, primarily shaped by interpersonal interactions. This relationship between sense of place and attachment is particularly pronounced in Eastern cultures (Zhang & Ji, 2022).

Chinese society is characterized by its vernacular nature, with a significant portion of the agricultural population having migrated to urban areas during the process of urbanization. As a result, many urban residents in China increasingly value and yearn for the emotional experiences associated with the local atmosphere of rural life, fostering a nostalgic connection to the countryside. Rural bed and breakfast (B&B) tourism has emerged as a means for individuals to temporarily satisfy this longing. The emotional intimacy established through genuine sharing, timely assistance, and even exceeding contractual obligations enhances the "homelike atmosphere" of B&Bs. This unique emotional experience, characterized by a sense of "human touch" and "homeliness," is often unattainable in traditional hotels and other standardized accommodations (So, Kim, & Oh, 2021).

Place Attachment and Pro-Environmental Behaviour

Place attachment can effectively transcend contextual barriers to environmentally responsible behaviour, such as differing social norms and the availability of necessary facilities. It enhances an individual's commitment and sense of responsibility towards a specific location, thereby influencing their environmentally responsible behaviours. Research indicates that tourists with a strong attachment to a destination are more likely to demonstrate a commitment to environmental protection and engage in proactive environmentally responsible actions. This includes advocating for environmental sustainability and showing respect for the natural environment in their daily activities. Furthermore, place attachment is associated with heightened awareness of the environmental degradation affecting natural areas (Chen et al., 2024).

The Mediating Role of Place Attachment

Drawing on the Stimulus-Organism-Response (S-O-R) theory, which highlights the sequential relationship between stimuli, organisms, and responses, place attachment is conceptualized as a complex psychological structure that encompasses cognitive, affective, and behavioural commitments (Lewicka, 2011). This structure mediates the relationship between environmental stimuli and human behaviour. Numerous studies have explored the mediating role of place attachment in this context. For instance, Cheng, Cheng, & Liu (2022) established a pathway of "social responsibility of tourist sites → place dependence → place identity → conservation promotion behaviour" in their research on the Yuelu Mountain Scenic and Historic Spot in Changsha, China. Their findings indicate that, within the tourism context, stimulating tourists' psychological ownership through local identity and dependence is crucial for promoting environmental responsibility, with local identity playing a more significant mediating role than previously understood. Similarly, Irani, Aghdam, & Ghasemzadeh (2023) demonstrated the mediating influence of local dependence on the relationship between environmental cognition, social interactions, and pro-environmental behaviours among community residents in Iranian urban areas.

In the context of rural B&B tourism, rich host-guest interactions enhance tourists' emotional and functional connections to the place. By engaging with B&B hosts, tourists build rapport and develop an appreciation for local

culture, leading to unique memories and a sense of belonging. This emotional attachment fosters a sense of significance toward the place, which influences their environmentally responsible behaviours. Higher levels of place attachment correlate with increased ecological responsibility among tourists (Li et al., 2023a).

Chain Mediation of "Perceived Value" and Place Attachment
"Perceived Value" and Place Attachment

As a representation of rural culture, B&Bs fulfil not only a residential role but also enable tourists to gain cultural perceived value through their experiences and interactions with the environment. This interaction serves as a catalyst for fostering a sense of place. In their study, Huang & Bing (2021) explored the relationship between tourists' perceived value and place identity in B&Bs in Shanghai, China, using web scraping techniques on data from Airbnb and Ctrip.com. Their research revealed a consistent spatial pattern linking the intensity of tourists' cultural perceptions with the strength of place identity. Furthermore, they found that the influence of cultural perceived value is contingent upon the availability of cultural information and tourists' preferences for that culture.

Chain Mediation of Perceived Value, Place Attachment

For mass tourists, environmentally responsible behaviours are often not intrinsically motivated but rather influenced by external factors. The model of goal-directed behaviour (MGB) can be further elucidated by incorporating the concepts of "extrinsic motivation" and "desire." Here, "desire" provides a clearer understanding of the mechanisms driving pro-environmental behaviour among mass tourists. Numerous studies indicate that the notion of place attachment possesses this potential for external motivation.

Building on the chain mediating roles of perceived value and place attachment, Jiang & Sun (2021) established a framework for understanding how nostalgic emotions influence the environmental responsibility behaviours of tourists in historical and cultural districts. Their findings indicated that nostalgic emotions did not exert a significant direct impact on environmentally responsible behaviour; rather, this influence was mediated through the pathway of "nostalgic emotion → perceived value → place attachment → environmentally responsible behaviour." Moreover, the perceived value associated with the originality of island tourism significantly enhances tourists' place attachment and stimulates value co-creation behaviours, mediated by this attachment. This intrinsic mechanism promotes environmental perception and fosters loyalty among rural boarding summer vacationers, aligning with cognitive assessment theory. Thus, place attachment serves a mediating function in the relationship between environmental perception and vacationer loyalty.
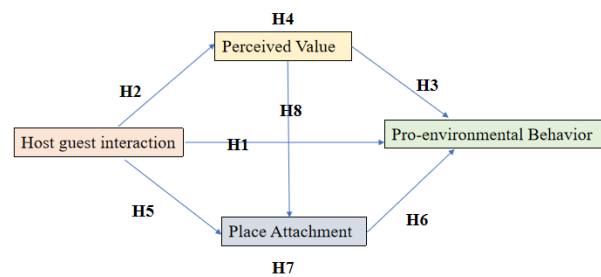
Figure 1: Conceptual Framework.

Hypothesis Development

Table 1 displays the hypotheses along with their respective null hypotheses.

Table 1: Hypotheses Development.

Hypothesis Number	Hypothesis	Null Hypothesis
H1	"Host-guest interaction" has a positive effect on tourists' pro-environmental behaviour.	"Host-guest interaction" does not have a positive effect on tourists' pro-environmental behaviour.
H2	"Host-guest interaction" has a positive effect on perceived value.	"Host-guest interaction" does not have a positive effect on perceived value.
H3	Perceived value has a positive effect on pro-environmental behaviour.	Perceived value does not have a positive effect on pro-environmental behaviour.
H4	Perceived value mediates the relationship between "host-guest interactions" and pro-environmental behaviour.	Perceived value does not mediate the relationship between "host-guest interactions" and pro-environmental behaviour.
H5	"host-guest interactions" have a positive effect on place attachment.	"host-guest interactions" do not have a positive effect on place attachment.
H6	Place attachment has a positive effect on pro-environmental behaviour.	Place attachment does not have a positive effect on pro-environmental behaviour.
H7	Place attachment mediates the relationship between "host-guest interactions" and pro-environmental behaviour.	Place attachment does not mediate the relationship between "host-guest interactions" and pro-environmental behaviour.
H8	Perceived value positively influences place attachment.	Perceived value does not positively influence place attachment.
H9	"Perceived value and place" attachment have a chain-mediated effect on the relationship between "host-guest interactions" and pro-environmental behaviour.	"Perceived value and place" attachment do not have a chain-mediated effect on the relationship between "host-guest interactions" and pro-environmental behaviour.

Methodology

Study Context

This study focuses on B&B tourists in Yangshuo County, Guilin City, China. Between 2016 and 2021, Yangshuo County

has been recognised as an "Advanced County of High-Quality Development in Guangxi Province" and a "Demonstration County of China's Rural B&B Development" for six consecutive years. These accolades reflect the county's successful integration of its natural ecological advantages, characterised by its "green mountains," with economic and

social development, prioritising a path of sustainable growth. In 2023, Yangshuo County was ranked among the top 100 counties in China for overall tourism strength, attracting 21.1143 million visitors and generating a total tourism revenue of 30.029 billion yuan. This comprised 21,015,600 domestic tourists contributing 29.780 billion yuan in domestic tourism consumption and 98,714 inbound tourists (Guilin People's Government Website).

The Yangshuo B&B industry has experienced significant growth in recent years. By the end of 2022, approximately 1,000 B&Bs were listed on Ctrip, China's largest travel service platform. These accommodations are primarily concentrated in popular scenic areas, including West Street, the Ten Mile Gallery, Xingping Ancient Town, and the Yu Long River, aligning closely with local tourism resources. The unique topography and landscape enhance the symbiotic relationship between lodging and the environment, showcasing the region's ecological and cultural vitality. Furthermore, rural village B&B tourism fosters more frequent and intensive interactions between hosts and guests, making Yangshuo lodging tourists an ideal research focus.

Survey Design

The questionnaire employed in this study comprises two main sections. The first section gathers demographic information, including respondents' gender, age, education, occupation, and income. The second section contains measurement items related to four constructs of interest, all of which are second-order factors. Based on the framework proposed by Wang (2021), the subject-object interaction is assessed through three sub-dimensions: "service interactions" (5 items), "social interactions" (7 items), and "interaction quality" (5 items). Perceived value is evaluated across five sub-dimensions: emotional (5 items), social (3 items), cost (3 items), quality (6 items), and knowledge (3 items). Place attachment is measured using ten items that pertain to the two dimensions of place dependence and place identity. Lastly, visitors' pro-environmental behaviours are assessed through two sub-dimensions: low-effort pro-environmental behaviours (3 items) and high-effort pro-environmental behaviours (5 items). All items are rated on a 5-point Likert scale, where "1 = strongly disagree," "2 = disagree," "3 = neutral," "4 = agree," and "5 = strongly agree."

Sampling and Data Collection

In accordance with the standards of sociological research, sample size determination takes into account confidence intervals, allowable errors, and sampling methodologies. Generally, the recommended ratio of sample size to the number of observed variables is 5:1 when the variables exhibit a normal or elliptical distribution. Conversely, a ratio of 10:1 is advisable if the variables do not conform to these distributions (Huang, 2005). This study will utilize factor analysis to evaluate the reliability of the questionnaire; thus, the sample size adheres to the general requirements associated with factor analysis. The test questionnaire comprises a total of 59 items across the four measured variables, necessitating a sample size of 295 to 590 respondents. Taking into consideration factors such as the validity and response rates, this study aims to distribute 500 questionnaires.

On October 24, 2023, a protest involving 151 participants was conducted to evaluate the instrument's "readability, clarity, reliability, and face validity." The formal questionnaire survey was administered from November to December 2023 across three research sessions, during which questionnaires were distributed and completed on-site. Members of the research team first inquired whether the tourists had

previously stayed in a bed-and-breakfast (B&B) and subsequently explained the purpose of the survey. After securing the tourists' consent, the questionnaires were distributed, and participants were instructed to complete them on-site.

Methods of Analysis

In this study, SPSS 23.0 and AMOS 24.0 software were employed to analyse the samples. Cronbach's α was utilized to assess the reliability of the samples, while key indices such as factor loading, composite reliability (R.C.R. value), and average variance extracted (AVE value) were evaluated through confirmatory factor analysis. The model fit was assessed using key fit indices, including x^2/df, GFI, AGFI, RMSEA, NFI, IFI, and TFI. Discriminant validity of the variables was tested by examining the correlation coefficients among them. Additionally, the influence relationships among the variables were analysed through standardized coefficients and p-values to derive the test results for each hypothesis. The outcomes of each hypothesis were subsequently discussed to formulate relevant conclusions and insights.

Data Collection
Respondent's Profile "Descriptive Analysis and Sample Demographics"

Out of the 500 questionnaires administered, 450 were completed and returned. Questionnaires that were filled incorrectly were omitted, and thus only 409 were used for analysis. The descriptive characteristics of the main sample are summarized in Table 2.

Table 2: Sample Demographics and Characteristics.

Variable	Category	N=409 Frequency	Percentage
Gender	Female	230	56.2
	Male	179	43.8
Age	18-24	102	24.9
	25-34	138	33.7
	35-44	82	20
	45-54	40	9.8
	55-64	46	11.2
	65 or Older	1	0.2
Education	High School or Less	52	12.7
	University Degree	320	78.2
	Master's or PhD	37	9.0
Tourist Origin	In the Province	183	44.7
	Out of Province	226	55.3
Length of Stay	1 Day	44	10.8
	2-3 Days	314	76.8
	4 Days and Above	51	12.5
Companion	Friend	181	44.3
	Family	171	41.8
	Group Tour	43	10.5
	Alone	14	3.4

Of the respondents, 43.8% were male, while 56.2% were female. The age distribution revealed that 50% of the respondents were under 34 years old, indicating a predominance of younger individuals, followed by those aged 35-44, who comprised 20%. The majority of participants held a bachelor's degree (78.2%). In terms of geographical origin, 44.7% of the travellers were from within the Guangxi Zhuang Autonomous Region, while 55.3% came from outside the province. The duration of stay in Yangshuo B&Bs was primarily 2-3 days, accounting for 76.8% of the respondents. The dominant mode of travel was self-guided, with 44.3% traveling with friends and another 44.3% traveling with family members; solo travellers represented 3.4%, and those on group tours comprised only 10.5%.

Data Analysis

The formal questionnaire is structured into two primary sections: the reliability test and the validity test.

Reliability Test

In this study, the reliability of the questionnaire was assessed using the Cronbach Alpha (α) coefficient through SPSS 22.0 for the collected samples. The overall internal consistency coefficient of the scale was found to be 0.931, with all constructs exhibiting reliability indicators exceeding 0.7. This indicates a high degree of stability in the results, demonstrating excellent quality of scale reliability (see Table 3).

Table 3: Reliability Analysis.

dimension (Math.)	Cronbach's Alpha	Quanti ties	Vari ant	Cronbach's Alpha	Quanti ties
HG1	0.900	5	HG	0.911	17
HG2	0.902	7			
HG3	0.894	5			
PV1	0.924	5	PV	0.922	20
PV2	0.787	3			
PV3	0.821	3			
PV4	0.871	6			
PV5	0.881	3			
PA1	0.918	5	PA	0.913	10
PA2	0.927	5			
PEB1	0.757	3	PEB	0.808	6
PEB2	0.840	3			

Validity Analysis

Content validity and structural validity are essential elements in the evaluation of the scale's validity. The assessment indices utilized in this study were based on established scholarly metrics and refined through iterative reviews by relevant experts and educators, demonstrating a high level of content validity. Structural validity was assessed using CFA, which included evaluations of both convergent and discriminant validity. The measurement instrument, designed to function similarly to a scale, underwent CFA using AMOS 24.

Structural Validity

The measurement model exhibited a satisfactory fit to the data, with the following indices: x^2/df = 1.239, p < 0.05, RMSEA = 0.024, CFI = 0.977, TLI = 0.974, IFI = 0.977, GFI = 0.878, PGFI = 0.772, and PCFI = 0.892. Specifically, the absolute fit metrics revealed a chi-square value of 1560.182 with 1259 degrees of freedom, yielding a x^2/df ratio of 1.239 and an RMSEA value below 0.05. The incremental fit metrics indicated that the CFI, TLI, and IFI values all exceeded 0.90. Furthermore, the refinement fit metrics, PGFI and PCFI, were below 0.5. All metrics conformed to the established threshold values (see Table 4).

Convergent and Discriminant Validity

"Indicators of convergent validity encompass factor loadings, combined reliability (C.R.), and average variance extracted (AVE) values."
The factor loading values for the measurement items of each latent variable range from 0.60 to 1.0. Consequently, all values exceed the theoretical threshold of 0.60, indicating a consistent and strong performance across total credit score measures. The computed C.R value in this study is 0.91, which is significantly higher than the accepted standard of 0.80 and well above the theoretical minimum of 0.60. Additionally, the AVE values exceed 0.50. Overall, these findings demonstrate that the observed indicators meet the fundamental criteria for testing, suggesting good convergent validity for the survey scales, as illustrated in Table 5.

Table 4: Model Fit Measurement.

Gooness of Fit Index	Acceptable Threshold Value	Full Name	Value	in the End
Chi-Square (Math.)	-	Chi-Square	1560.182	
(Number of) Degrees of Freedom (Physics)	-		1259	
x2/df	<3		1.239	Standards-Compliant
RMSEA	<0.05	Root Mean Square Error of Approximation	0.024	Standards-Compliant
CFI	>0.9	Comparative Fit Index	0.977	Standards-Compliant
TLI	>0.9	Tucker-Lewis Index	0.974	Standards-Compliant
IFI	>0.9	Incremental Fit Index	0.977	Standards-Compliant
PGFI	>0.5	Parsimonious Goodness-Fit-Index	0.772	Standards-Compliant
PCFI	>0.5	Parsimonious Comparative-Fit-Index	0.892	Standards-Compliant

In this study, a more rigorous approach was employed to assess discriminant validity using the AVE method. Specifically, the square root of the AVE for each factor needed to exceed the correlation coefficients of each pair of variables, thereby indicating the presence of discriminant validity among the factors. The correlation coefficients for each variable were initially derived through correlation analysis using SPSS, after which the square root of the AVE values was calculated and compiled into a table. The results demonstrate that the correlation coefficients between any two dimensions are lower than the square root of the AVE for each respective dimension (as indicated by the diagonal values), suggesting adequate discriminant validity among the constructs and allowing for clear differentiation between concepts. For further details, refer to Table 6.

Hypothesis Testing

Structural Equation Modelling (SEM) is a well-established multivariate statistical analysis method used across various academic fields to create a covariance matrix that elucidates relationships among variables. Therefore, this paper employs SEM to further validate our proposed hypotheses.

Model Evaluation

The key indices assessing the fit of the theoretical model to the data were within the acceptable range (x^2/df = 1.305, p < 0.05, RMSEA = 0.027, CFI = 0.987, TLI = 0.983, NFI = 0.949, GFI = 0.975, AGFI = 0.960). Notably, the CFI, TLI, AGFI, and NFI values all exceeded the threshold of 0.90, while the RMSEA was below 0.08. The chi-square statistic for the measurement model was 62.631, with 48

degrees of freedom, resulting in a chi-square/degrees of freedom ratio of 1.305. These findings indicate a good fit for the theoretical model, allowing for the validation of the hypothesized results (see Table 7).

Table 5: Measuring the Convergent Validity of Scales.

Variant	Measure Term (Math.)	Standardized Coefficient	Standard Error	T-Value	P-Value	Factor Loading	AVE	CR
	H5	1				0.753		
	H4	0.971	0.064	15.081	***	0.741		
HG1	H3	1.082	0.065	16.76	***	0.816	0.643	0.900
	H2	1.079	0.062	17.436	***	0.846		
	H1	1.094	0.063	17.455	***	0.847		
	H12	1				0.739		
	H11	0.971	0.066	14.646	***	0.736		
	H10	1.004	0.065	15.366	***	0.770		
HG2	H9	1.004	0.067	15.07	***	0.756	0.570	0.903
	H8	1.04	0.068	15.312	***	0.767		
	H7	0.945	0.064	14.734	***	0.740		
	H6	0.971	0.063	15.466	***	0.775		
	H17	1				0.799		
	H16	1.045	0.057	18.39	***	0.833		
HG3	H15	0.945	0.058	16.253	***	0.754	0.629	0.894
	H14	1.002	0.058	17.407	***	0.797		
	H13	0.914	0.054	16.925	***	0.779		
	A5	1				0.853		
	A4	1.037	0.046	22.663	***	0.872		
PA1	A3	1.017	0.049	20.707	***	0.826	0.695	0.919
	A2	0.958	0.05	19.158	***	0.787		
	A1	0.968	0.047	20.737	***	0.827		
	A10	1				0.785		
	A9	1.16	0.055	20.986	***	0.907		
PA2	A8	1.135	0.055	20.574	***	0.894	0.720	0.927
	A7	1.076	0.057	18.752	***	0.833		
	A6	1.038	0.057	18.265	***	0.816		
	P5	1				0.885		
	P4	0.897	0.041	21.696	***	0.817		
PV1	P3	0.936	0.043	21.913	***	0.821	0.711	0.925
	P2	0.932	0.042	22.402	***	0.831		
	P1	1.001	0.042	23.986	***	0.861		
	P8	1				0.689		
PV2	P7	1.121	0.088	12.698	***	0.776	0.556	0.789
	P6	1.112	0.088	12.631	***	0.768		
	P11	1				0.784		
PV3	P10	0.99	0.066	15.019	***	0.778	0.603	0.820
	P9	0.985	0.066	14.875	***	0.769		
	P17	1				0.686		
	P16	1.02	0.078	13.017	***	0.722		
PV4	P15	1.218	0.089	13.653	***	0.763	0.532	0.872
	P14	1.155	0.088	13.136	***	0.730		
	P13	1.179	0.089	13.287	***	0.739		
	P12	1.155	0.088	13.191	***	0.733		
	P20	1				0.867		
PV5	P19	0.901	0.047	19.137	***	0.811	0.712	0.881
	P18	0.932	0.046	20.258	***	0.853		
	B3	1				0.728		
PEB1	B2	1.026	0.088	11.714	***	0.758	0.514	0.760
	B1	0.895	0.082	10.977	***	0.661		
	B6	1				0.783		
PEB2	B5	1.048	0.064	16.401	***	0.845	0.641	0.842
	B4	0.956	0.062	15.36	***	0.772		

Table 6: Differentiation of Validity.

	HG1	HG2	HG3	PV1	PV2	PV3	PV4	PV5	PA1	PA2	PEB1	PEB2
HG1	0.802											
HG2	0.475	0.755										
HG3	0.355	0.401	0.793									
PV1	0.164	0.181	0.236	0.834								
PV2	0.134	0.144	0.154	0.506	0.848							
PV3	0.211	0.153	0.199	0.529	0.422	0.843						
PV4	0.164	0.119	0.159	0.449	0.404	0.496	0.745					
PV5	0.19	0.165	0.141	0.465	0.425	0.33	0.374	0.777				
PA1	0.173	0.127	0.202	0.32	0.297	0.316	0.223	0.183	0.729			
PA2	0.194	0.159	0.14	0.347	0.293	0.36	0.25	0.23	0.47	0.844		
PEB1	0.205	0.104	0.139	0.167	0.191	0.16	0.187	0.147	0.213	0.194	0.717	
PEB2	0.242	0.21	0.231	0.316	0.209	0.272	0.331	0.253	0.243	0.33	0.435	0.801

Note: Bolded numbers on the diagonal of the table are the square root of the mean-variance extracted for the corresponding dimension ($\sqrt{\text{AVE}}$), and off-diagonal numbers are inter-dimensional correlation coefficients.

Table 7: Model Fitting Results.

Fitness Index	Threshold Value	Current Value	In the End
Chi-Square (Math.)		62.631.	
(Number of) Degrees of Freedom (Physics)		48	
Cardinality/Degrees of Freedom	<3	1.305	Standards-Compliant
RMSEA	<0.10	0.027	Standards-Compliant
AGFI	>0.9	0.960	Standards-Compliant
GFI	>0.9	0.975	Standards-Compliant
CFI	>0.9	0.987	Standards-Compliant

Model Estimation (Structural Equation Modelling Path Relationship Test)

Table 8 presents the path analysis coefficients and corresponding p-values used to evaluate the research hypotheses. The analysis indicates a significant positive predictive effect of subject-object interaction on perceived value, with coefficients ß = 0.382, SE = 0.105, and p < 0.05, thereby supporting hypothesis H2. Conversely, the effect of subject-object interaction on place attachment is not significant, as evidenced by ß = 0.146, SE = 0.105, and p > 0.05, leading to the rejection of hypothesis H5. Additionally, the positive predictive effect

of perceived value on place attachment is significant (ß = 0.146, SE = 0.105, p < 0.05), thereby validating hypothesis H8. Perceived value also demonstrates a significant positive predictive effect on pro-environmental behaviour (ß = 0.225, SE = 0.071, p < 0.05), supporting hypothesis H3. Moreover, place attachment significantly predicts pro-environmental behaviour (ß = 0.296, SE = 0.083, p < 0.05), confirming hypothesis H6. Finally, hypothesis H1 is also supported, as heritage guidance has a significant positive predictive effect on pro-environmental behaviour (ß = 0.231, SE = 0.085, p < 0.05).

Table 8: Result of Model Estimation.

Trails	Standardized Path Factor	Unstandardized Path Coefficients	Standard Error S.E.	Critical Ratio C.R.	Significance P	Suppose That
PV<---HG	0.382	0.546	0.105	5.173	***	H2
PA<---HG	0.146	0.204	0.105	1.936	0.053	H5
PA<---PV	0.570	0.558	0.076	7.298	***	H8
PEB<---PV	0.225	0.165	0.071	2.322	0.020	H3
PEB<---PA	0.296	0.221	0.083	2.674	0.007	H6
PEB<---HG	0.231	0.242	0.085	2.838	0.005	H1
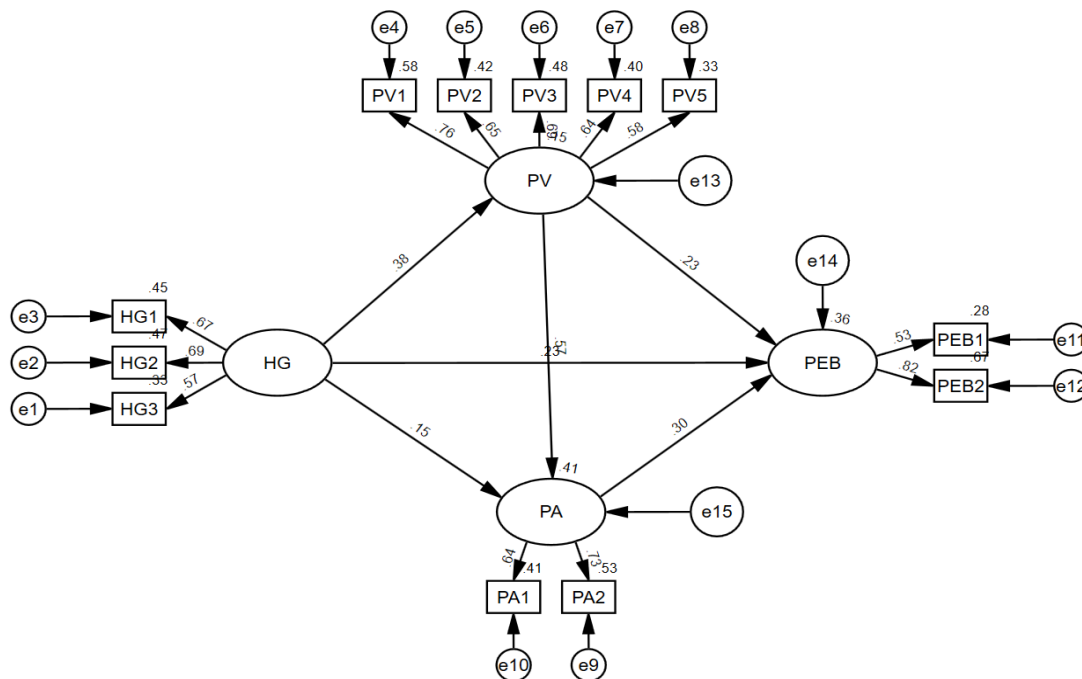
Figure 2: Result of Model Estimation.

Mediation Effect Test

Chain mediation analysis, also referred to as serial mediation analysis, is employed to investigate the mediating pathways within the proposed model. The theoretical framework delineates three mediating paths through which subject-guest interactions affect tourists' pro-environmental behavioural attitudes, mediated by

perceived value and place attachment. This study specifically employed the Bootstrap method utilizing AMOS 24.0 software to evaluate the mediation effects. A total of 5,000 Bootstrap samples were drawn for data analysis to create an approximate sampling distribution, with the presence of the mediation effect assessed by determining whether zero fell within the 95% confidence interval. The findings indicate:

Perceived value served as a significant mediator between hedonic goals and pro-environmental behaviour, with an effect value of 0.090. The bias-corrected 95% confidence interval ranged from [0.016, 0.216] and was statistically significant ($p < 0.05$). The percentile 95% confidence interval was [0.008, 0.201], also indicating significance ($p < 0.05$). Consequently, since the 95% confidence intervals from both methods did not include zero, hypothesis 4 is supported. In contrast, place attachment did not significantly mediate the relationship between hedonic goals and pro-environmental behaviour, with an effect value of 0.045. The bias-corrected 95% confidence interval ranged from [-0.005, 0.141], indicating a lack of significance ($p > 0.05$), and the percentile 95% confidence interval was [0.000, 0.096], further confirming the absence of a significant mediation effect ($p > 0.05$).

Thus, the 95% confidence intervals from both methods did not encompass zero, invalidating hypothesis 7. The pathway from subject-object interaction to perceived value, followed by place attachment and culminating in a willingness to engage in pro-environmental behaviours, demonstrated a significant positive effect ($\beta = 0.067$, $p < 0.05$). The bias-corrected 95% confidence interval ranged from [0.021, 0.169], and the percentile 95% confidence interval was [0.016, 0.149], both indicating statistical significance ($p < 0.05$). Therefore, since the 95% confidence intervals from both methods did not include zero, hypotheses 8 and 9 are validated. The detailed findings of these analyses, including effect values and confidence intervals, are presented in Table 9.

Table 9: Mediation Effect Test.

Parameter	Estimate	Lower	Upper	P	Efficacy as a Percentage of
Ind1	.090	.008	.201	.031	20.27%
Ind2	.045	-.005	.141	.094	10.14%
Ind3	.067	.016	.149	.011	15.09%
Total	.444	.249	.678	.000	
R1	.203	.017	.476	.031	
R2	.102	-.011	.298	.094	
R3	.152	.038	.343	.011	
Diff1	.045	-.102	.186	.489	
Diff2	.023	-.111	.156	.674	
Diff3	-.022	-.112	.055	.529	

Discussion

This study develops and tests a conceptual model elucidating the relationships among host-guest interactions, perceived value, place attachment, and tourists' intentions to engage in pro-environmental behaviour. The findings yield several significant implications for the fields of tourism and travel. Firstly, this research is among the initial empirical studies demonstrating that host-guest interactions play a crucial role in fostering environmentally responsible behaviours among tourists. Secondly, it highlights the importance of both affective and cognitive variables, whereby the chained mediation effect provides a comprehensive explanation of these relationships. Perceived value pertains to tourists' assessments of the destination and their environmental attitudes, while place attachment emphasizes the emotional bonds and connections tourists form with the destination. This study elucidates the interplay between perceived value and place attachment, as well as their intricate interactions with tourists' pro-environmental behaviours, through an analysis of the chained mediation effect.

The study's results demonstrate that host-guest interactions positively influence tourists' willingness to engage in pro-environmental behaviours. Rural bed-and-breakfast tourism is characterized by high interactivity, allowing tourists to experience the destination's "real life" through intimate social relationships and genuine cross-cultural exchanges with their hosts. These interactions enhance guests' understanding through mechanisms such as service and social interactions, which help alleviate anxiety and foster empathy. Specifically, social interactions deepen appreciation for the local culture and natural beauty, thereby promoting pro-environmental behaviours. The aim is to encourage such behaviours by altering the decision-making context rather than restricting options or impacting the actual costs and benefits of actions, as noted by (van Valkengoed, Abrahamse, & Steg, 2022), which serves to intervene in tourists' automatic decision-making processes.

Perceived value serves as a mediator between host-guest interactions and pro-environmental behaviours. The research findings indicate that extensive interaction between tourists and hosts, particularly through engagement with service staff, enhances tourists' satisfaction with a thoughtfully curated and orchestrated experience. In the context of rural bed-and-breakfast tourism, the quality of social and service interactions significantly influences tourists' perceived value. This further substantiates the impact of positive attitude evaluations on behaviour, as noted by Geiger et al. (2019). Higher perceived net benefits correlate with increased resident support for tourism, facilitating knowledge transfer through mutual exchanges that foster understanding and support. This "proper" exploration ultimately cultivates positive attitudes among tourists towards the destination.

The mediating role of place attachment in the relationship between host-guest interactions and pro-environmental behaviours was not substantiated. While the influence of host-guest interactions on place attachment was positive, it was insufficiently significant. This lack of significance may be attributed to several factors: first, compared to the strong place attachment experienced by residents in tourist destinations, the sense of place attachment among tourists is often fragmented and influenced by their level of engagement (Lewicka, 2011). The study predominantly involved tourists who stayed for short durations of 1-2 days, making it challenging for them to develop meaningful place attachment. Second, tourists generally prioritize relaxation and hedonistic enjoyment during their travels. In this context, interactions with hosts are primarily viewed as enhancements to their overall experience. According to social exchange theory, both hosts and guests assess the outcomes of their interactions, which subsequently influences their behaviours. Consequently, tourists' willingness to engage in pro-environmental behaviours is initially constrained by their rational evaluations of the associated benefits and costs rather than directly stemming from emotional connections (Chen, Zhang, & Hu, 2022).

Perceived value and place attachment serve as chain mediators between host-guest interactions and tourists' pro-environmental behaviours. Within the context of rural bed and breakfast tourism, mass tourists often prioritize their specific destination experience over genuine environmental protection. While they may acknowledge the importance of environmental conservation in rural areas, their motivations are largely driven by personal experience needs. A higher perceived value can foster a deeper sense of place attachment, contributing to the

development of a strong identity linked to both the place and the self, thereby enhancing psychological connections with the destination. As tourists cultivate this attachment, they become more inclined to protect "their" destination from harm, which subsequently activates pro-environmental behaviours. This finding underscores the role of place attachment as a significant mediating variable that facilitates the influence of perceived value on pro-environmental behaviours.

Practical Significance

This study offers significant management recommendations for tourism planners and local governments, particularly in rural bed and breakfast destinations. It emphasizes the importance of involving B&B owners and local residents in tourism development plans to foster supportive hospitality. By engaging rural villagers and lodging owners, interactive real-life scenarios can enhance host-guest interactions. In Yangshuo County, China, the overall evaluation of these interactions is moderate (0.57), primarily relying on high-quality social interactions (0.69) to enhance tourists' perceived value. Unlike standardized hotel services, rural lodgings leverage local culture and human resources to facilitate interactions, allowing tourists to experience local customs through the host's language, attire, scene layout, and folklore activities. This approach provides tourists with emotional support and creates a relaxed atmosphere that fosters trust and commitment, ultimately transforming transactional behaviours into deeper emotional connections with the destination. Environmental appeals alone are insufficient to foster environmentally friendly behaviours among tourists, as the link between perceived environmental knowledge and pro-environmental actions is relatively weak (0.58).

In contrast, the influence of emotional communication (0.76) and cost perception (0.69) is more pronounced. In tourism operations, it is essential to focus on community building by sharing information and creating platforms for local cultural experiences that enhance tourists' emotional perceptions and post-visit engagement. Timely collection of customer feedback and suggestions can facilitate continuous improvement of services and products. Additionally, providing information on the synergistic non-environmental benefits and costs associated with certain behaviours can help shift attitudes; for instance, highlighting how such behaviours enhance the overall tourism experience and economic benefits can encourage pro-environmental practices. This approach promotes an appreciation for nature while ensuring it is adequately respected and protected.

Sentiment is a central appeal of bed and breakfast establishments; however, relying solely on sentiment makes it challenging for tourists to develop a strong emotional attachment to the locale. Therefore, B&B owners should prioritize fostering social relationships among operators, visitors, and the broader community, emphasizing the importance of interactions between hosts and guests. This approach enables visitors to experience the comfort and warmth of a mobile "home" provided by the B&B and its surroundings. Frequent and high-quality interactions transform tourists from mere sightseers into experiencers and co-creators, cultivating diverse and interconnected identities and relationships, enhancing their sense of control and participation, and deepening their understanding of local dependence. By creating a relatively enclosed physical space, B&Bs and their surrounding rural communities facilitate relaxed and enjoyable communication among tourists from different regional cultures. Additionally, by managing tourists' psychological expectations regarding value for money and emotional resonance, B&Bs can further enhance their emotional connection to the place, fostering unique memories while encouraging a convergent mentality and positive environmental care behaviours.

Limitations of the Study and Further Research

This empirical study focuses on rural bed and breakfast tourists in Yangshuo County, Guilin, and has several limitations. Firstly, it relies on a single case location for data collection, neglecting the influence of varying interaction styles across different cultural contexts. Secondly, there is a discrepancy between tourists' pro-environmental behavioural intentions and their actual actions. Testing the proposed model in diverse tourist destinations with varying developmental levels and modes could provide comparative insights into the associations among the variables. Additionally, the explanatory power of the model may be constrained by factors such as the scale of B&B resources, the personal attributes of the B&B owner, and tourists' demographics and experiences. Future research should delve deeper into these boundary conditions to enhance the comprehensiveness of the findings, potentially incorporating qualitative methods. Furthermore, while this study examines automatic behaviours in a tourist context, the reliance on automatic processes may limit the generalizability of the findings to other environments, as it does not directly address the determinants of environmental behaviour.

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