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Exploring the mechanism of host–guest value co-creation on tourists' environmental responsibility behavior in agricultural heritage

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Amid environmental pressures and sustainable development challenges at Agricultural Heritage Sites, this study explores the impact mechanism of host–guest value co-creation on tourists' environmental responsibility behaviors, with a focus on the mediating role of psychological ownership and the moderating effect of emotional inertia. Grounded in Affective Events Theory, hierarchical regression and Bootstrap sampling were employed, analyzing 384 questionnaires from tourists at the Anxi Tieguan Yin Tea Culture System. The findings reveal: (1) Host–guest value co-creation directly promotes tourists' environmental responsibility behaviors; (2) psychological ownership serves as a mediator in the relationship between host–guest value co-creation and tourists' environmental responsibility behaviors; (3) emotional inertia, an individual characteristic, not only moderates the influence of host–guest value co-creation on psychological ownership but also the transmission effect of psychological ownership. These insights uncover the influencing mechanisms of tourists' environmental responsibility behaviors at Agricultural Heritage Sites, offering theoretical support for the sustainable management of such sites.

Agricultural heritage site tourism is increasingly gaining popularity, as urban residents yearn for immersive experiences of the unique charm of farming civilization¹. In recent years, compared to traditional first- and second-tier cities, agricultural heritage sites and remote rural areas have significantly enhanced their tourist appeal, emerging as new tourist hotspots². This trend not only reflects people's demand for tourism that highlights regional characteristics and cultural depth, but also brings new opportunities for economic revitalization and cultural inheritance to agricultural heritage sites³. However, with the frequency of tourist activities, these sites face the issue of tourist overload during peak seasons, posing severe challenges to their sustainable protection and development⁴. Meanwhile, while some tourists are savoring the tourism resources of agricultural heritage sites, they lack sufficient environmental awareness, and uncivilized behaviors frequently occur. These behaviors, which violate social ethics, damage the environment, or disrupt the normal tourism experiences of others, such as littering, vandalizing cultural relics and historical sites, and trespassing into protected areas, have drawn widespread attention from all

sectors of society and have become a focal point of academic research⁵. Tourists' environmental concepts and behaviors are crucial for maintaining the ecological environment and cultural heritage of agricultural heritage sites⁶. Therefore, enhancing tourists' environmental awareness and encouraging them to actively practice environmentally friendly behaviors are of great significance for promoting the sustainable development of agricultural heritage sites and enhancing their environmental and resource value⁷.

The exhibition of environmental responsibility behaviors by tourists in Agricultural Heritage Sites is a crucial factor in advancing their sustainable tourism development. Previous research has primarily explored this topic from the dimensions of situational factors within the tourist experience and individual differences, yet scant attention has been paid to the role of host–guest value co-creation. Host–guest value co-creation refers to the process in which tourists, agricultural heritage sites, local residents, and other fellow tourists collaborate through interaction within the tourism context to jointly shape and enhance the overall tourism experience. This

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process transcends the mere exchange of material resources; it also involves the sharing of culture, emotions, and knowledge. Existing research identifies destination support⁸, destination image⁹, regional culture¹⁰, and other external factors as triggers for tourist environmental responsibility behaviors. Meanwhile, internal factors like environmental perception¹¹, emotional attitudes¹², sense of awe¹³, and place attachment¹⁴ influence these behaviors through internal changes. These studies offer a multifaceted perspective on the antecedents of tourists' environmental responsibility behaviors, but often overlook the agency of local residents in tourism activities. In the context of tourism at Agricultural Heritage Sites, the interactions between residents and tourists are not merely about the quality of the tourist experience; they also have the potential to shape tourists' cognition, attitudes, and behaviors through emotional resonance and cultural exchanges¹⁵. Therefore, host–guest value co-creation emerges as a pivotal antecedent that is likely to propel tourists' environmental responsibility behaviors.

Despite the extensive research conducted on the theoretical foundations and driving factors of tourists' environmental responsibility behaviors, from a social interaction perspective, studies on how host–guest value co-creation influences these behaviors remain inadequate. Traditional social exchange theories often focus on the exchange of benefits between tourists and service personnel, neglecting the interactive influence of residents who are also cultural transmitters and local guardians in Agricultural Heritage Sites¹⁶. In reality, the host–guest relationship in such tourism often transcends simple economic transactions, encompassing deeper emotional connections and cultural identity¹⁷. From a macro perspective, host–guest value co-creation, through interactions between residents and tourists, exerts profound impacts on the economy, culture, and society of Agricultural Heritage Sites. At the micro level, these interactions have the potential to alter tourists' cognition, emotions, and attitudes, such as enhancing their sense of identity and protection toward agricultural heritage^{18–20}.

Existing research often views tourists as rational decision-makers, emphasizing cognitive motivations and analyzing the driving forces of environmental responsibility behaviors through variables such as travel experience, satisfaction, and tourism quality. However, this approach neglects the significant role of tourists' emotional responses in social interactions^{21–24}. In the process of host–guest value co-creation within Agricultural Heritage Sites, tourists may experience a range of intense emotional reactions, such as awe towards farming culture and gratitude for the hospitality of local residents^{25,26}. These emotional experiences can further translate into a sense of place psychological ownership—a psychological state where tourists develop deep emotional attachment, a sense of responsibility, and a claim to the Agricultural Heritage Site²⁷. As this sense of place psychological ownership strengthens, tourists become more inclined to actively participate in environmental protection and cultural heritage activities within the site²⁸. Therefore, exploring the mechanisms underlying tourists' environmental responsibility behaviors from the dimension of their emotional changes is crucial for a deeper understanding of tourist behavior in the context of Agricultural Heritage Site tourism²⁹.

In summary, through empirical analysis, this study systematically constructs a theoretical model with psychological ownership as the mediating variable and unveils the driving mechanism of host–guest value co-creation in agricultural heritage sites on tourists' environmental responsibility behaviors. The research is designed to expand and complement the existing studies on psychological ownership and affective events theory within the tourism field. The study centers on the following objectives: Firstly, from a theoretical perspective, it broadens the applicability of affective events theory in the context of agricultural heritage tourism. By verifying the correlation between host–guest value co-creation and tourists' environmental responsibility behaviors, it strengthens the mediating effect of psychological ownership in the tourism experience. Secondly, from a practical standpoint, it offers scientific evidence for managers of agricultural heritage sites. By dissecting the value co-creation mechanism, it proposes action plans to optimize tourists' participation in environmental protection

and cultural heritage preservation. This, in turn, promotes the coordinated development of social, economic, and ecological benefits, providing theoretical support for the sustainable practice of the green tourism industry under the rural revitalization strategy.

Methods

Literature review and research hypothesis

Affective events theory (AET) is a psychological model proposed by Weiss in 1996, which explains the relationship between individual emotional experiences and work behaviors³⁰. AET comprises three core constructs: affective events, emotional responses, and behavioral responses. It posits that an individual's emotional response is not static but is triggered by frequent minor affective events in daily work. These events can be positive (such as receiving praise or accomplishing tasks) or negative (such as facing criticism or setbacks)³¹. Triggered affective events initiate a perception–evaluation–response process in individuals, leading to specific emotional states that further influence their job satisfaction, commitment, performance, and intentions to leave³². Additionally, AET emphasizes the moderating role of individual traits in the relationship between events and emotional responses.

Originally applied primarily in the field of work psychology, AET explored how events at work impact employees' emotions and behaviors³³. However, in recent years, the application of this theory has expanded to include organizational behavior, consumer behavior, and tourism studies. For instance, Good and colleagues explored the positive impacts of participating in organizational social activities on three types of knowledge management behaviors, as well as the conditional indirect effects of intrinsic motivations for these activities³⁴. Scholars have also applied AET to the consumer domain, explaining how emotional events like excessive product packaging and corporate greenwashing decrease customers' intentions to make green purchases³⁵. Recently, tourism researchers have increasingly recognized AET's relevance. Chen et al. used AET to study how genuine social interactions can inspire tourists and the boundaries of this relationship³⁶. Ma et al. applied AET to expand understanding of the relationship between tourism scams and tourists' intentions to revisit, proposing that as an 'affective event,' tourism scams could provoke ethical emotions and dissatisfaction among tourists. Thus, this decreases their revisit intentions and generates negative word-of-mouth³⁷. Given the continuous development and application of AET in academia, the concept of affective events has become more enriched, extending beyond the workplace to include scenarios related to tourism activities. This broadened application provides a valuable analytical framework for exploring the emotional drivers behind tourists' environmental responsibility behaviors. Therefore, this study adopts the Affective Events Theory as its theoretical framework, considering host–guest value co-creation as a positive affective event within the context of host–guest interactions. Psychological ownership is viewed as the emotional response, while tourists' environmental responsibility behavior is seen as the behavioral response. Effective host–guest value co-creation can induce tourists to develop psychological ownership, which further promotes their exhibition of environmentally responsible behaviors. Additionally, building on this theory, the present study will also investigate the moderating role of emotional inertia, as an individual characteristic, in the process of tourists' psychological ownership formation.

The concept of host–guest value co-creation originates from Service-Dominant Logic and Service Ecosystem Theory. In the context of tourism at Agricultural Heritage Sites, it specifically refers to the process through which tourists, along with the heritage sites, local residents, and other tourists, collaboratively shape and enhance their tourism experiences through interactions³⁸. Indeed, some studies have already revealed that hosts play a decisive role in host–guest interactions, possessing the potential influence to guide tourists away from uncivilized behaviors³⁹. In the unique setting of agricultural heritage sites, high-quality host–guest interactions not only significantly enhance tourists' satisfaction with their travel experiences but also deepen the emotional connections between tourists and local communities⁴⁰, laying a solid foundation for stimulating tourists'

environmental responsibility awareness and practical actions. Specifically, when tourists participate in tourism activities at Agricultural Heritage Sites, local residents provide a wealth of material resources, professional knowledge, cultural heritage, and emotional support. This not only meets the diverse needs of tourists but also conveys, in a direct manner, the importance of environmental protection and tourists' environmentally responsible behaviors to the heritage sites. This positive social messaging makes tourists deeply feel that, within the heritage sites, environmentally responsible behaviors are not only a reflection of personal cultivation but also an important manifestation of respect and protection for the cultural value of the sites. As a result, after receiving these positive signals, tourists often develop a stronger sense of belonging to the place and a sense of responsibility for environmental protection, which then translates into practical actions—adopting a series of environmentally responsible behaviors to respond to and reciprocate the expectations of the Agricultural Heritage Sites⁴¹. This process not only promotes the sustainable development of the tourism destination but also deepens the dual bonds of emotion and responsibility between tourists and the heritage sites.

H1: Host–guest value co-creation positively influences tourist environmental responsibility behavior.

Host–guest value co-creation plays a central role in the process of tourists developing psychological ownership at Agricultural Heritage Sites. This is because, when tourists deeply engage in the tourism experience at these sites and establish close interactions with the local community, they gain direct exposure and perception of the unique culture, natural environment, and community life of the heritage sites⁴². Through in-depth exchanges with local residents, listening to historical and cultural stories, learning traditional farming techniques firsthand, participating in rural festivals, and respecting and integrating into local customs, tourists gradually form deep connections and a sense of identity with the heritage sites at an emotional level⁴³. This profound interaction not only deepens tourists' understanding and appreciation of the cultural value of the heritage sites but also prompts them to develop a sense of possession and belonging towards the sites at a psychological level. Furthermore, during the friendly interactions at Agricultural Heritage Sites, tourists invest time and energy in exploring and experiencing the unique products and cultural activities of the sites, enriching their travel experiences and gradually cultivating a sense of place attachment. At the same time, the functional facilities provided by the heritage sites, such as farming experience areas and cultural exhibition halls, offer tourists space for participation and control, enhancing their sense of control and efficacy⁴⁴. These interactive experiences fulfill tourists' deep psychological needs for self-identity, belonging, and achievement, which in turn prompts them to develop a strong sense of ownership towards the Agricultural Heritage Sites at a psychological level⁴⁵. Based on the above analysis, we can propose the following hypothesis:

H2: Host–guest value co-creation positively influences tourists' psychological ownership.

Based on the definition that tourist psychological ownership refers to the emotional connection established by tourists through their tourism experience with agricultural heritage sites, and the psychological state where they perceive the sites as an integral part of themselves, it is evident that the formation of psychological ownership is a gradual process. The longer an individual's exposure and association with agricultural heritage sites, the stronger their tendency to develop a sense of psychological ownership⁴⁶. Consequently, compared to brief sightseeing tours, immersive vacation tourism at agricultural heritage sites is more likely to facilitate the formation of tourists' psychological ownership. In the fields of organizational behavior and customer marketing, psychological ownership has been proven to have various positive effects on individual behavior, including stimulating a sense of responsibility, enhancing intrinsic motivation, and prompting these motivations to translate into practical actions such as citizenship behavior and stewardship behavior, which exceed basic role requirements⁴⁷. Similarly, scholars have also paid attention to the significant “human-place” emotional connection of tourists' psychological ownership. Yao et al. found that tourists' psychological ownership positively influences their citizenship

behavior⁴⁸. Meanwhile, She et al. also confirmed that tourists' psychological ownership can positively predict individual environmental responsibility behavior⁴⁹. In the context of agricultural heritage sites, tourists' psychological ownership plays a crucial role not only in deepening the emotional bonds between tourists and the sites but also in positively guiding tourists' behavior. Based on the above comprehensive analysis, the following hypothesis is proposed:

H3: Tourists' psychological ownership positively influences their environmental responsibility behavior.

In the context of agricultural heritage sites, the formation path of psychological ownership is closely related to tourists' intimate understanding and self-investment⁵⁰. During their visits or long-term stays at the heritage sites, tourists can gain a more comprehensive and profound understanding of the cultural, ecological, and social values of the sites through deep interactions with local residents⁵¹. At the same time, when participating in tourism activities at the heritage sites, tourists often invest a significant amount of time and energy, whether it is through engaging in farming experiences, learning traditional skills, or simply exploring the sites at their own pace, all of which constitute self-investment in the heritage sites⁵². Based on the affective events theory, when tourists experience the hospitality and friendly behavior of local residents, these positive affective events can further stimulate and satisfy their psychological ownership needs. Tourists perceive the heritage sites as part of their emotional identity and self-worth, thereby developing a strong sense of belonging and responsibility. This awareness of psychological ownership prompts tourists to cherish the uniqueness and ecological environment of the heritage sites, and they become willing to contribute to the sustainable development of the sites⁵³. Since value co-creation between hosts and guests can satisfy tourists' needs for belonging and self-identification, it promotes the formation of psychological ownership towards the place, leading to emotional changes among tourists⁵⁴. Therefore, psychological ownership plays a crucial mediating role between value co-creation at agricultural heritage sites and tourists' environmental responsibility behaviors. It not only serves as a bridge connecting tourists' emotional attachment to the heritage sites but also acts as an important driving force for inspiring tourists' environmental responsibility behaviors. Based on the above comprehensive analysis, the following hypothesis is proposed:

H4: Psychological ownership mediates the relationship between host–guest value co-creation and tourists' environmental responsibility behaviors.

Emotions refer to the psychological states that individuals experience while engaging in certain activities. These internal emotional changes, elicited through external activities, can influence an individual's behavioral intentions. Emotional inertia, first proposed by Kuppens, represents a fundamental property of maladaptive emotional dynamics, denoting the degree to which psychological states resist change and persist from one moment to the next. Often closely linked to an individual's self-esteem, emotional inertia affects how individuals appraise external events⁵⁵. Kuppens also found that the overall emotional dynamics of individuals are highly inertial, displaying that individuals with low self-esteem and depression characteristics have higher levels of positive and negative emotional inertia compared to those without such traits. He also discussed the usefulness of the concept of emotional inertia as a marker of maladaptive emotional dynamics. Current research has investigated how emotional inertia is influenced by the anticipation of social stress, and how these influences are moderated by individual differences in depression, self-esteem, and fear of negative evaluation⁵⁶.

Affective events theory suggests that the relationship between individual behaviors and psychological responses is also influenced by individual characteristics⁵⁷. This implies that the impact of host–guest value co-creation on tourist environmental responsibility behavior may be related to the personality traits of the tourists. Individual characteristics are often closely linked to one's capacity to experience psychological ownership and can significantly reflect individual differences in the appraisal of benefits⁵⁸. This indicates that the formation of tourists' place psychological ownership

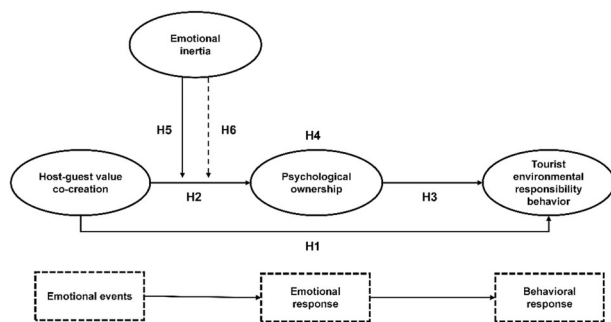


Fig. 1 | Theoretical framework. The figure constructs a model examining the relationship between host–guest value co-creation and tourists’ environmental responsibility behaviors at agricultural heritage sites. Rooted in Affective Events Theory, it conceptualizes host–guest value co-creation as the affective event, psychological ownership as the emotional response, and tourists’ environmental responsibility behavior as the behavioral response. The model systematically examines six hypothesized pathways: H1 investigates the direct pathway from host–guest value co-creation to tourists’ environmental responsibility behavior. H2 explores the pathway from host–guest value co-creation to psychological ownership. H3 examines the pathway from psychological ownership to tourists’ environmental responsibility behavior. H4 analyzes the mediating role of psychological ownership in the relationship between host–guest value co-creation and tourists’ environmental responsibility behavior. H5 tests the moderating effect of emotional inertia on the association between host–guest value co-creation and psychological ownership. H6 investigates how emotional inertia attenuates the mediating effect of psychological ownership in the linkage between host–guest value co-creation and tourists’ environmental responsibility behavior. This model provides a theoretical framework for understanding how interactive tourism experiences at agricultural heritage sites shape tourists’ environmental responsibility behaviors through emotional mechanisms.

is influenced by personal traits. When tourists perceive friendly behaviors from locals, their response is shaped by their personal traits⁵⁹. Based on the analysis, it can be inferred that tourists with high emotional inertia tend to maintain a relatively stable internal emotional state, making them less susceptible to significant influences from changes in the external environment. Consequently, even when the residents and communities of agricultural heritage sites demonstrate great enthusiasm and friendliness and offer ample opportunities for value co-creation, these tourists may find it difficult to develop a strong sense of place-based psychological ownership due to their inherent emotional stability. They are likely to interpret and experience the heritage site more through their established emotional frameworks, rather than being entirely swayed by external interactions. Conversely, tourists with low emotional inertia are more prone to the influences of their surroundings and the actions of others. In the context of agricultural heritage sites, such tourists are often more acutely aware of the residents’ friendly attitudes, the harmonious atmosphere of the community, and the unique value of the site. Through interactions with the residents, they not only gain a deeper understanding of the cultural connotations of the heritage site but also cultivate a stronger sense of emotional belonging and identification. This positive emotional experience further bolsters their formation of place-based psychological ownership, making them more inclined to view the heritage site as an integral part of their emotional landscape. Therefore, value co-creation between hosts and guests is conducive to fostering the development of place-based psychological ownership among tourists with low emotional inertia. In summary, the following hypothesis is proposed:

H5: Emotional inertia moderates the relationship between host–guest value co-creation and psychological ownership.

Psychological ownership among tourists acts as a mediator in the process through which host–guest value co-creation influences tourists’ environmental responsibility behaviors. Meanwhile, emotional inertia moderates the relationship between host–guest value co-creation and tourists’ psychological ownership. Individual characteristics not only modulate the relationship between events and emotional responses but also

affect the transmission of these emotional responses^{34,60}. This suggests that after emotional inertia weakens the positive relationship between host–guest value co-creation and tourists’ place psychological ownership, it may further inhibit the mediating effect of tourists’ place psychological ownership between host–guest value co-creation and tourists’ environmental responsibility behaviors. Specifically, when tourists exhibit high emotional inertia, the mediating effect of psychological ownership between host–guest value co-creation and tourists’ environmental responsibility behaviors is weaker. Conversely, for tourists with low emotional inertia, this mediating effect is stronger. Based on this, as shown in Fig. 1, this article constructs a moderated mediation effect model and proposes the following hypotheses:

H6: Emotional inertia weakens the mediating effect of tourists’ psychological ownership between host–guest value co-creation and tourists’ environmental responsibility behaviors.

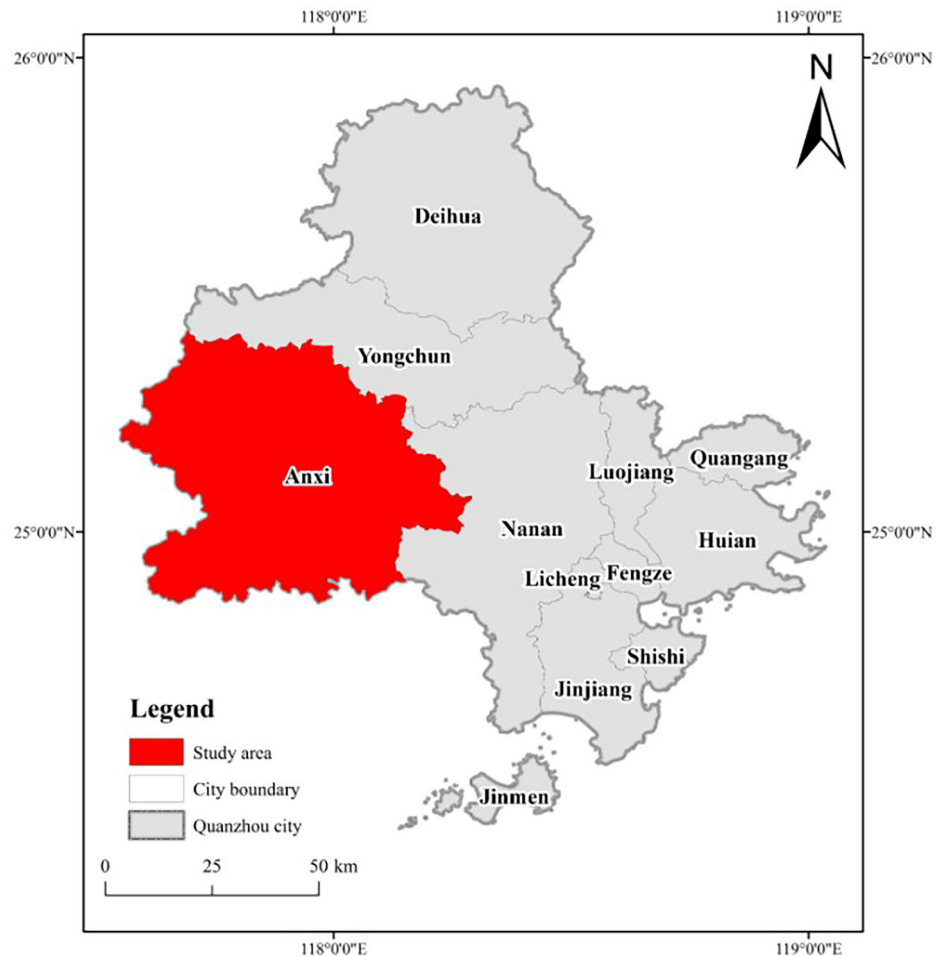
Selection of research areas

This study selects the Anxi Tieganyin Tea Cultural System in China as the case site to systematically dissect the influence mechanism of host–guest value co-creation on tourists’ environmental responsibility behaviors. Figure 2 shows the geographical location of Anxi Tieganyin Tea tea culture system. This choice is made after a thorough consideration of its uniqueness as an agricultural heritage site and its suitability for the research. From the perspective of thematic compatibility, the Anxi Tieganyin Tea Cultural System is both a Globally Important Agricultural Heritage System (inscribed in 2022) and a China-Nationally Important Agricultural Heritage System (inscribed in 2014). Its community culture, characterized by “simple folk customs, kindness to neighbors, and harmonious relationships”, along with its practice model of “using tea as a medium to achieve host–guest integration”, offers a natural platform for host–guest value co-creation. Through in-depth interactive activities such as tea-picking, tea-making, and tea-art experiences, tourists form emotional bonds with local residents through the shared experience of “making and tasting tea together”. This immersive cultural setting aligns perfectly with the logical chain of “host–guest interaction—emotional resonance—behavioral response” that this study focuses on. In terms of sample representativeness, the heritage site attracts over a million tourists annually, encompassing a diverse range of groups, including eco-tourists, cultural researchers, and in-depth experience seekers. Moreover, tourists show a high level of concern for issues such as tea garden ecological protection and the inheritance of traditional crafts. This feature of “high participation + high concern” among tourists provides representative behavioral data for the study. Regarding practical challenges, with the deepening of tourism development, the system is confronted with issues like rough management of ecological experience zones and fragmented public services. There is an urgent need to optimize tourists’ experiences and activate their environmental responsibility behaviors through the host–guest value co-creation mechanism, so as to achieve a dynamic balance between heritage protection and tourism development. Therefore, taking the Anxi Tieganyin Tea Cultural System as the case site not only validates the universality of the theoretical model but also offers a reference for sustainable development pathways in similar heritage sites.

Questionnaire design

The study uses a quantitative research approach to explore the relationships between host–guest value co-creation, emotional inertia, psychological ownership, and tourist environmental responsibility behaviors. Data collection is conducted through a survey method, and the theoretical model and hypotheses are validated using SPSS (ver.26.0) and AMOS (ver.24.0) software. The research integrates heritage tourism contexts with existing mature scales to measure the four variables: host–guest value co-creation, emotional inertia, psychological ownership, and tourist environmental responsibility behaviors. The scale for host–guest value co-creation primarily references Tu et al.’s⁶⁰ scale with six items; emotional inertia is measured using Zhang⁶¹ et al.’s scale with four items; psychological ownership follows Farzinfar et al.’s⁶² scale with four items; and tourist environmental responsibility behaviors are assessed based on Chen et al.’s⁸ scale

Fig. 2 | Study area The map illustrates the geographical location of Quanzhou City and its counties, with Anxi County highlighted in red as the study area—the Globally Important Agricultural Heritage System (GIAHS) site of Anxi Tieguanyin Tea Culture. The map also includes additional details such as a compass in the upper right corner indicating the north direction, a scale at the bottom showing distances from 0 to 50 km, and a legend explaining that the red area represents the study region while the gray area denotes the city boundaries



with five items. All scales utilize a Likert-7-point scale for assessment. Additionally, demographic-related questions targeting tourists are included to enhance the scientific validity of the study.

Data collection

Data for this study were collected in May 2024 and June–July 2024. Initially, a preliminary survey was conducted using the designed questionnaire, from which 123 valid responses were collected. After analyzing the data from this pre-survey, no modifications were made to the questionnaire. The formal survey was conducted in the afternoon or evening at the agricultural heritage sites using a random sampling method. Tourists were approached, asked if they were available and willing to participate, and then invited to fill out the questionnaire. A total of 450 questionnaires were distributed during this survey. After excluding those with identical responses and incomplete entries, 384 valid questionnaires were obtained, resulting in an effectiveness rate of 85.33%. The demographic characteristics of the valid sample are shown in Table 1.

Ethical approval and informed consent

The experimental protocol was formulated in strict accordance with the ethical principles outlined in the Declaration of Helsinki and has received approval from the Human Ethics Committee of the School of Digital Economy, Fujian Agriculture and Forestry University.

During the data-collection process, we adhered meticulously to the principles of research ethics. We ensured that all participants took part in the survey with full awareness and provided their informed consent. To safeguard participants' privacy, the questionnaire was designed in an

anonymous format. Moreover, we obtained written informed consent from each individual participant or their guardians.

Results

Common method bias

In this study, all items of the four variables were included in an unrotated factor analysis. The results indicated a KMO value of 0.874, which is above the 0.8 threshold, demonstrating suitability for factor analysis. The first unrotated component explained 28.063% of the variance, which is below the 40% criterion, complying with Harman's single-factor variance test for common method bias. These results indicate that common method bias does not significantly affect the reliability of the study outcomes⁶³.

Reliability and validity analysis

The data were analyzed for reliability and validity using SPSS 26.0 and AMOS 23.0 software. Table 2 presents the analysis results, showing a chi-square to degrees of freedom ratio (χ^2/df) of 1.444 (<3); RMSEA of 0.034 (<0.05); GFI of 0.946, NFI of 0.950, CFI of 0.984, RFI of 0.942, and IFI of 0.984, all of which exceed the 0.9 standard, indicating a good fit of the measurement model⁶⁴.

Additionally, Table 3 presents the Cronbach's alpha coefficients for each variable exceeded 0.8, surpassing the 0.7 standard, which suggests high internal consistency. Except for the last item of psychological ownership, which had a factor loading of 0.692, all other measurement items had loadings above 0.7. Composite reliability (CR) values were above 0.8, and the average variance extracted (AVE) for each variable was above 0.5, indicating good convergent validity⁶⁵. Table 4 summarizes the means, standard deviations, and correlations among the variables. Notably, host–guest value

Table 1 | Demographic variable description (N = 384)

Variable	Category	Frequency	Percentage (%)
Gender	Male	184	47.9
	Female	200	52.1
Age	18-30 years	197	51.3
	31-40 years	115	29.9
	41-50 years	45	11.7
	51-60 years	14	3.6
	Over 60 years	13	3.4
Educational Level	Junior High School and below	59	15.4
	High School and Technical School	90	23.4
	Bachelor's and Associate Degree	195	50.8
	Graduate Studies	40	10.4
Occupation	Worker	49	12.8
	Farmer	9	2.3
	Businessperson	55	14.3
	Public Service	96	25.0
	Student	139	36.2
	Retiree	1	0.3
	Other	35	9.1
Monthly Income	Below 3000 RMB	155	40.4
	3001-6000 RMB	155	40.4
	6001-9000 RMB	65	16.9
	9001-12000 RMB	6	1.6
	Above 12000 RMB	3	0.8
Duration of Visit	Half-day	205	53.4
	One day	108	28.1
	Two days	51	13.3
	Three days or above	20	5.2

Table 2 | Fit index

X ² /DF	RMSEA	GFI	NFI	CFI	RFI	IFI
1.444	0.034	0.946	0.950	0.984	0.942	0.984

co-creation showed a significant positive correlation with tourist environmental responsibility behavior ($r = 0.201$, $p < 0.01$) and psychological ownership ($r = 0.276$, $p < 0.01$). Additionally, psychological ownership was significantly positively correlated with tourist environmental responsibility behavior ($r = 0.157$, $p < 0.01$), providing preliminary support for subsequent hypothesis testing⁶⁶.

Hypothesis testing

Using the SPSS PROCESS plug-in (Models 4 and 7), this study explores the main effects, mediating effects, moderating effects, and the impact of emotional inertia on the mediating effect of psychological ownership among the model variables. As shown in Table 5, after controlling for demographic characteristics (gender, age, education, occupation, monthly income), duration of visit and interaction terms (product of mean-centered values of host-guest value co-creation and emotional inertia), host-guest value co-creation has a significant positive effect on tourist environmental responsibility behavior ($\beta = 0.158^{**}$, $p < 0.01$, 95% CI = [0.066, 0.249]), supporting hypothesis H1. The underlying reason is that the value co-creation activities at agricultural heritage sites stimulate visitors' altruistic tendencies by

fostering a harmonious interactive atmosphere. Concurrently, with the widespread enhancement of public environmental awareness, tourists are more inclined to consciously exhibit environmentally friendly behaviors during their visits to these sites. Host-guest value co-creation also significantly positively influences psychological ownership ($\beta = 0.197^{**}$, $p < 0.01$, 95% CI = [0.114, 0.281]), confirming hypothesis H2. When tourists deeply engage in various activities at agricultural heritage sites and establish close connections with local residents or the heritage site itself, their familiarity with and understanding of the site deepen. This profound interaction and knowledge foster stronger emotional bonds and a sense of belonging among visitors, thereby inducing psychological ownership. Psychological ownership has a significant positive effect on tourist environmental responsibility behavior ($\beta = 0.110^{*}$, $p < 0.05$, 95% CI = [0.010, 0.210]), affirming hypothesis H3. The root cause is that the existence of psychological ownership instills in tourists a strong sense of belonging and responsibility towards the agricultural heritage site. This intrinsic emotional drive motivates visitors to more actively participate in actions to protect the heritage site.

The mediating model testing for tourist environmental responsibility behavior as the dependent variable was conducted using the SPSS PROCESS plug-in (Model 4). The data results indicate in Table 6 that the direct effect of host-guest value co-creation is $\beta = 0.158$ ($p < 0.01$, 95% CI = [0.066, 0.249]), and the indirect effect mediated by psychological ownership is $\beta = 0.027$ (95% CI = [0.001, 0.063]), accounting for 85.27% and 14.73% of the total effect of $\beta = 0.185$ ($p < 0.01$, 95% CI = [0.096, 0.273]), respectively. The confidence intervals for these effects do not include zero, indicating that all effects are significant⁶⁷. Therefore, hypothesis H4 is supported. The underlying mechanism is that host-guest value co-creation effectively stimulates tourists' sense of psychological ownership through promoting deep interaction and understanding between visitors and the heritage site. This sense of belonging, derived from psychological ownership, becomes a crucial factor in inducing tourists to exhibit more positive environmental protection behaviors.

After mean-centering the variables of host-guest value co-creation and emotional inertia, their interaction term was constructed to test the moderating effect of emotional inertia. As shown in Table 5, the interaction term between host-guest value co-creation and emotional inertia significantly negatively impacts psychological ownership ($\beta = -0.125^{**}$, $p < 0.01$, 95% CI = [-0.168, -0.082]), with confidence intervals that do not include zero, indicating that emotional inertia suppresses the positive impact of host-guest value co-creation on psychological ownership. Further, simple slope analysis was conducted, using the mean plus or minus one standard deviation of emotional inertia as the grouping criteria to explore the effect of host-guest value co-creation on psychological ownership at different levels of emotional inertia. Figure 3 reflects the discovery of the impact of host-guest value co-creation on psychological ownership under different levels of emotional inertia. Contrary to the findings at high emotional inertia levels ($\beta = -0.004$, ns, 95% CI = [-0.120, 0.112]), the effect of host-guest value co-creation on psychological ownership is more pronounced at low emotional inertia levels ($\beta = 0.399^{**}$, $p < 0.01$, 95% CI = [0.299, 0.499]). Therefore, hypothesis H5 is supported; fundamentally, tourists with low emotional inertia, whose emotions are more susceptible to change through interactions with the external environment, are more likely to develop psychological ownership.

The results show a moderated mediation effect ($\beta = -0.014$, 95% CI = [-0.031, -0.001]), indicating that emotional inertia moderates the role of psychological ownership in the relationship between host-guest value co-creation and tourist environmental responsibility behavior. As shown in Table 5, when tourists have lower levels of emotional inertia, the mediating effect of psychological ownership between host-guest value co-creation and tourist environmental responsibility behavior is significant ($\beta = 0.044$, 95% CI = [0.001, 0.094]). In contrast, for tourists with higher emotional inertia, the mediating effect of psychological ownership between host-guest value co-creation and tourist environmental responsibility behavior is no longer significant ($\beta = -0.001$, 95% CI = [-0.017, 0.015]). Thus, it can be stated

Table 3 | Reliability and validity test results

Variable	Measurement items	Factor loading	AVE	CR	Cronbach's α
Host-guest value co-creation	Local residents are willing to provide me with transportation, attractions, restaurant, hotel, and other useful information	0.750	0.585	0.894	0.892
	Local residents are willing to introduce their lifestyle, folk customs, and traditional history and culture	0.724			
	Local residents actively greet me	0.768			
	Local residents are willing to provide me with items needed during travel, such as seating, parking, etc.	0.757			
	I am willing to recommend this agricultural cultural heritage site to friends	0.841			
	I am willing to share advertisements for the agricultural cultural heritage site	0.745			
Emotional inertia	After arguing with someone during heritage tourism, it is hard for me to calm down	0.842	0.661	0.886	0.886
	Misunderstandings by others during heritage tourism make me very upset	0.798			
	Misunderstandings by others during heritage tourism make me very upset	0.796			
	Unpleasant events during the day often keep me from sleeping at night	0.816			
Psychological ownership	I feel very relaxed and happy at the agricultural cultural heritage site	0.909	0.677	0.892	0.890
	I keep up with the development trends of the agricultural cultural heritage site to ensure their proper growth	0.855			
	I feel that I can contribute to the development of the agricultural cultural heritage site	0.819			
	I defend the agricultural cultural heritage site when it is negatively commented on by others	0.692			
Tourist environmental responsibility behavior	I will consciously maintain the local environmental sanitation during the heritage tourism process	0.817	0.621	0.891	0.891
	I will cherish the local flora and fauna resources during the heritage tourism process	0.788			
	I am willing to participate in environmental protection projects at agricultural cultural heritage sites	0.787			
	I will consciously abide by the local environmental management regulations during the heritage tourism process	0.809			
	I am willing to provide suggestions for the environmental protection work at agricultural cultural heritage sites	0.735			

Table 4 | Discriminant validity test results

Variable	M	SD	Host-guest value co-creation	Emotional inertia	Psychological ownership	Tourist environmental responsibility behavior
Host-guest value co-creation	4.898	1.486	0.765			
Emotional inertia	4.988	1.614	0.081	0.813		
Psychological ownership	5.577	1.318	0.276**	0.293**	0.823	
Tourist environmental responsibility behavior	5.270	1.292	0.201**	0.105*	0.157**	0.788

Note: ** indicates $p < 0.01$, * indicates $p < 0.05$. The numbers on the diagonal represent the square root of the average variance extracted (AVE).

Table 5 | Regression analysis results

	Psychological ownership		Tourist environmental Responsibility behavior	
	β	95% CI	β	95% CI
Constant	5.784**	(4.939, 6.629)	4.822**	(3.740, 5.904)
Control Variables				
Gender	-0.099	(-0.345, 0.147)	-0.082	(-0.345, 0.181)
Age	0.067	(-0.093, 0.227)	0.158	(-0.012, 0.327)
Educational Level	-0.022	(-0.204, 0.160)	-0.039	(-0.235, 0.157)
Occupation	0.003	(-0.085, 0.092)	0.012	(-0.083, 0.106)
Monthly Income	-0.108	(-0.264, 0.048)	-0.087	(-0.252, 0.079)
Duration of Visit	0.114	(-0.023, 0.251)	-0.073	(-0.220, 0.073)
Independent Variable				
Host-Guest Value Co-Creation	0.197**	(0.114, 0.281)	0.158**	(0.066, 0.249)
Mediating Variable				
Psychological Ownership			0.110*	(0.010, 0.210)
Interaction Terms				
int_1	-0.125**	(-0.168, -0.082)		
Indirect Effects				
M-1SD			0.044	(0.001, 0.094)
M			0.022	(0.001, 0.48)
M + 1 SD			-0.001	(-0.017, 0.015)
R ²	0.230		0.075	
F	11.140**		3.379**	

Note: $N = 384$; * $p < 0.05$. ** $p < 0.01$.

that emotional inertia weakens the mediating effect of psychological ownership between host-guest value co-creation and tourist environmental responsibility behavior, supporting hypothesis H6; essentially, tourists with lower emotional inertia are more affected by their environment and, when experiencing a friendly atmosphere, are more likely to exhibit positive emotions, leading to environmentally responsible behavior.

Discussion

This study, framed by affective events theory, constructed a moderated mediation model and empirically tested the relationship between host-guest value co-creation and tourist environmental responsibility

Table 6 | Mediation effect test

Item	Effect	LLCI	ULCI	Percentage of effect
Total effect	0.185	0.096	0.273	
Direct effect	0.158	0.066	0.249	85.27%
Indirect effect	0.027	0.001	0.064	14.73%

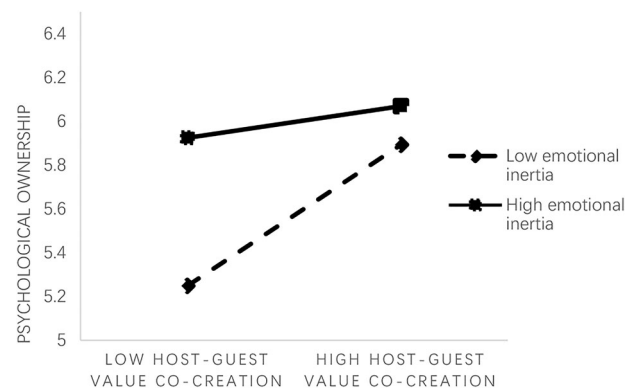


Fig. 3 | The moderating effect of emotional inertia This figure illustrates the moderating effect of emotional inertia through a line graph, visually demonstrating the dynamic relationship between psychological ownership and host-guest value cocreation under different levels of emotional inertia. The horizontal axis represents the degree of "host-guest value co-creation," progressing from left to right to indicate increasing levels of co-creation. The vertical axis represents "psychological ownership." The solid and dashed lines in the figure depict the trends in psychological ownership levels for two groups of tourists—"low emotional inertia" and "high emotional inertia"—as host-guest value co-creation varies. As shown in the figure, tourists with low emotional inertia exhibit significantly higher levels of psychological ownership compared to those with high emotional inertia

behavior using the SPSS PROCESS plug-in (Model 7). The findings are as follows:

First and foremost, in the context of agricultural heritage sites, host-guest value co-creation has a significant positive impact on tourists' environmentally responsible behavior. This study breaks through the limitations of the "unidirectional influence" paradigm in traditional host-guest interaction research (e.g., resident service provision → tourist satisfaction). It is the first to verify the driving mechanism of bidirectional value co-creation on tourists' environmentally responsible behavior within the setting of agricultural heritage sites. This finding resonates with Yu et al.'s "interaction ritual chain" theory but places greater emphasis on the cognitive transformation path of emotional connections during interactions⁶⁸. Meanwhile, this conclusion remains consistent with Tu's viewpoint in the context of agricultural heritage, further underscoring the importance of host-guest value co-creation as a crucial antecedent of tourists' environmentally responsible behavior. Previous research has predominantly focused on the influence of external factors at tourism destinations on

tourists' behavior, such as guiding tourists through conservation measures and local culture. For instance, Wang et al. studied the impact of local cultural atmosphere on tourists' environmental protection and found that rich cultural displays could, to some extent, promote tourists' environmental behavior⁶⁹. However, they did not delve deeply into the role of interactive factors. Yet, tourism is not merely a unilateral experience for tourists; the active participation of residents in agricultural heritage sites is equally vital. Our survey reveals that residents are willing to engage in in-depth interactions with tourists. By sharing local farming knowledge, traditional customs, and lifestyles, they enable tourists to gain a deeper understanding and appreciation of the unique charm of agricultural heritage sites. Such interactions not only facilitate tourists' emotional integration with the heritage sites but also inspire their awareness of co-protecting the sites with local residents. In this amicable and sharing atmosphere, the interactions between local residents and tourists transcend simple exchanges of goods and services, manifesting more in spiritual resonance and profound cultural exchanges. Furthermore, Lu et al., when studying tourists' environmentally responsible behavior in different types of tourism destinations, also pointed out that in destinations with a strong sense of community participation, tourists are more inclined to exhibit positive environmentally responsible behavior, which aligns with our findings in agricultural heritage sites⁷⁰. After obtaining rich emotional interaction experiences, tourists are more likely to consciously regulate their behavior and actively participate in environmental protection and the inheritance of agricultural heritage sites.

Secondly, psychological ownership serves as an effective pathway to transmit the relationship between host–guest value co-creation and tourists' environmentally responsible behavior. Existing research on psychological ownership has predominantly centered on organizational behavior (e.g., employees' sense of ownership toward the organization) or consumer behavior (e.g., customers' sense of ownership toward products). In contrast, this study introduces it into the tourism context, revealing how emotional events trigger tourists' "quasi-resident" role identity through psychological ownership. This conclusion complements Pierce et al.'s "three-dimensional theory of psychological ownership" by validating the dynamic formation path of "familiarity → sense of control → sense of involvement" in non-ownership objects (such as tourism destinations). Our survey finds that the friendly attitudes of residents and the display of cultural heritage in agricultural heritage sites not only enhance tourists' self-efficacy—that is, their belief in their ability to have a positive impact on the heritage sites—but also elevate their self-identity, making the protection of the heritage sites a part of their own values and responsibilities. The accumulation of these positive emotions significantly narrows the emotional distance between tourists and the heritage sites as well as local residents, prompting tourists to establish closer connections with the heritage sites at both cognitive and emotional levels. This is similar to Kim et al.'s findings in their study of the impact of psychological ownership on tourists' recommendation behavior in Korean hiking trails, where they pointed out that the stronger tourists' sense of psychological ownership towards a destination, the more likely they are to adopt recommendation commitments and intentions⁷¹. Meanwhile, Lin et al., when studying the relationship between tourists' psychological ownership and behavior at cultural tourism destinations, also discovered that in cultural tourism destinations, tourists are more prone to developing psychological ownership through in-depth interactions with local culture, which in turn influences their travel behavior, further supporting the viewpoints of our study⁷². Therefore, psychological ownership plays a bridging role in the process of host–guest value co-creation at agricultural heritage sites. In this warm and resonant interactive environment, tourists, due to the enhancement of psychological ownership, cherish the unique value of the heritage sites even more and subsequently translate it into practical actions, namely adopting positive, environmentally responsible behavior to contribute to the protection, inheritance, and maintenance of this precious agricultural heritage.

Finally, emotional inertia can suppress the positive relationship between host–guest value co-creation and psychological ownership, as well

as weaken the mediating effect of psychological ownership in the relationship between host–guest value co-creation and tourists' environmentally responsible behavior. This study reveals that emotional inertia, as a stability characteristic of tourists' emotional systems, can significantly diminish the intervention effects of external emotional events (such as host–guest interactions). This finding engages in a dialog with Gross's emotion regulation theory but places greater emphasis on the interaction between situational factors (such as cultural experiences at heritage sites) and individual traits (such as emotional inertia), providing empirical evidence for understanding the boundary conditions of emotional interventions in tourism contexts⁷³. Moreover, our research also finds that tourists at agricultural heritage sites often enter this unique environment with their own emotional inertia. For tourists with high levels of emotional inertia, they tend to maintain their original emotional states and find it difficult to readily change their inherent emotional tendencies, even when immersed in the warm interactions with residents and rich cultural experiences at the heritage sites. This is similar to Chiang et al.'s findings in their study of the impact of tourists' emotional stability on environmental behavior, where they pointed out that tourists with high levels of emotional stability (akin to emotional inertia) have relatively weaker responses to external emotional stimuli⁷⁴. Consequently, although the friendly atmosphere created by host–guest value co-creation can temporarily elevate their emotions, it is challenging to sustainably evoke their sense of psychological ownership towards the heritage sites. In contrast, tourists with low levels of emotional inertia are more susceptible to the external environment at agricultural heritage sites. Through in-depth exchanges with residents and firsthand experiences of farming culture, they can swiftly and profoundly feel the surge of positive emotions. The accumulation of these emotions helps them establish emotional connections with the heritage sites, thereby generating a strong sense of psychological ownership. This is in line with Lin et al.'s conclusions in their study of the differences in emotional responses to tourism destinations among tourists with different personality traits, where they found that extroverted tourists (likely with low emotional inertia) are more prone to generating positive emotional experiences and psychological connections during tourism interactions⁷⁵. In summary, emotional inertia plays a significant role in tourists' emotional experiences and behavioral responses at agricultural heritage sites. It not only influences the generation of tourists' psychological ownership but also further constrains the mediating effect of psychological ownership in promoting tourists' environmentally responsible behavior.

In summary, this study, utilizing the Affective Events Theory as its framework, constructed a research model to explore the influence mechanism of host–guest value co-creation on tourists' environmentally responsible behavior. Through empirical analysis, we validated the relevant hypotheses and arrived at the following conclusions. Firstly, host–guest value co-creation has a direct and positive impact on tourists' environmentally responsible behavior. Secondly, psychological ownership partially mediates the relationship between host–guest value co-creation and tourists' environmentally responsible behavior. Lastly, emotional inertia, as an individual characteristic, moderates the transmission effect of psychological ownership. These findings hold significant theoretical and practical implications for the sustainable development of agricultural heritage sites.

This study offers three theoretical insights for the existing literature in the field of tourism. Firstly, it explores the traditional boundaries of psychological ownership research from a fresh perspective. Previous studies have predominantly concentrated on the cognitive–affective driving pathways within organizational management contexts. In contrast, this study innovatively incorporates host–guest value co-creation behaviors in agricultural heritage sites into its analytical framework. It unveils the unique mechanism through which tourists satisfy their psychological ownership construction needs through participatory experiences, thereby expanding the antecedent variables of psychological ownership theory within the heritage tourism context. Secondly, it deepens the understanding of the moderating effect of individual characteristics in the affective events theory. By applying emotional inertia to the tourism setting and empirically testing

its suppressive moderating role in the process of psychological ownership induction, as well as its boundary-constraining effect between host–guest value co-creation and environmental responsibility behaviors, this study enhances the theory’s explanatory power regarding tourists’ intrinsic psychological traits. Lastly, it enriches the influence mechanism of tourists’ environmental responsibility behaviors. Addressing the issue of “strong intentions but weak actions, easy knowledge but difficult practice” in existing research, this study, from the perspective of host–guest interaction, constructs an influence pathway of “host–guest value co-creation—psychological ownership—emotional inertia”. It not only validates the applicability of the affective events theory in agricultural heritage sites but also systematically elucidates the interaction between external situational stimuli and internal psychological motivations by introducing the mediating mechanism of psychological ownership and the moderating effect of emotional inertia. This enriches the logical framework of the formation mechanism of tourists’ environmental responsibility behaviors.

This study also provides three practical implications for the management of agricultural heritage sites: Firstly, it emphasizes the significance of host–guest value co-creation for tourists’ environmental responsibility behaviors. Consequently, managers need to strengthen residents’ service awareness and their principal role. Through educational training and community culture cultivation, a community atmosphere that cherishes agricultural heritage and is willing to help others should be created. Special attention should be paid to nurturing residents’ sense of ownership and hospitality etiquette to stimulate the continuous development of value co-creation activities. Secondly, this study suggests that psychological ownership plays a positive role in the relationship between host–guest value co-creation and tourists’ environmental responsibility behaviors. To this end, multi-dimensional tourist experiences should be constructed to enhance the mechanism of psychological ownership. This requires not only improving intangible interaction methods, such as public service facilities, for example, setting up welcome signs and environmental protection reminder boards, but also designing tangible interaction projects like farming experiences and cultural tastings. Through in-depth host–guest interactions, tourists’ psychological connections can be strengthened. Finally, in response to the moderating effect of emotional inertia, it is recommended to implement tourist emotion management strategies. On the one hand, individuals should be guided to build self-confidence through positive self-talk. On the other hand, the image perception of agricultural heritage sites should be optimized through new media communication. This will deepen the public’s understanding of agricultural heritage sites and local residents, strengthen tourists’ positive feelings towards the human-land relationship, and thus weaken the suppressive effect of emotional inertia, thereby fostering positive emotions among tourists.

Although this study has made certain achievements in elucidating the influence mechanism of tourists’ environmental responsibility behaviors in agricultural heritage sites, it still has some limitations. First and foremost, this study employs cross-sectional data, which inherently comes with certain drawbacks. As a result, this study cannot entirely eliminate common method bias; it can only manage to keep it within an acceptable range. Consequently, in future research, the study design could be optimized by utilizing panel data. This would enable a more comprehensive exploration of the macro-level impact of host–guest value co-creation on tourists’ environmental responsibility behaviors. Secondly, the samples in this study are primarily sourced from the Anxi Tieganyin Tea Cultural System. Despite the unique characteristics of these samples, the conclusions drawn from this study still hold a certain degree of reference value for other types of agricultural heritage sites and even a wider range of tourist destinations. In future studies, researchers could further select agricultural heritage sites in other regions of China or similar agricultural heritage sites in different countries as research samples. Through comparative analysis, they can unveil the differences in tourists’ behavioral patterns, thereby exploring the generalizability of the conclusions of this study across various contexts. In addition, this study has conducted an in-depth investigation into the mediating and moderating effects of psychological ownership and

emotional inertia between host–guest value co-creation and tourists’ environmental responsibility behaviors, offering a fresh perspective for relevant research in the tourism field. For future research, it is advisable to further delve into the roles of other individual characteristics or contextual factors in the formation of tourists’ environmental responsibility behaviors. This will help enrich and refine the relevant theoretical framework.

Data availability

The author confirms that all data generated or analysed during this study are included in this published article.

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W.W.: Conceptualization, Data statistics, Writing—original draft. Y.M.: Conceptualization, Data statistics, Writing—original draft. S.F.: Funding acquisition and Writing—review & editing. L.M.: Grammar checking, Validation and Writing—review & editing. Y.L.: Investigation. W.L.: Investigation. C.L.: Investigation. All authors reviewed the manuscript.

Competing interests

The authors declare no competing interests.

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