# Visitor Satisfaction as the Central Pathway to Responsible Environmental Behavior: A Multidimensional Experience-Based Model in Cultural Heritage Tourism

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**Abstract**

Against the backdrop of rapidly expanding cultural heritage tourism and mounting pressures on heritage conservation, a central challenge for World Heritage Sites is how to effectively foster visitors' responsible environmental behavior in high frequency visitation contexts. Focusing on the Dazu Baodingshan Rock Carvings in Chongqing, this study develops a comprehensive theoretical model. This model is grounded in the Value Belief Norm theory, tourism experience theory, place attachment theory, and the effect cognition behavior framework. The model incorporates multiple antecedent variables. These are service quality, place attachment, environmental awareness, cognitive evaluation, and community participation. It positions visitor satisfaction as a mediating construct and identifies responsible environmental behavior as the outcome variable. A total of 480 valid responses were collected through on-site surveys. Using Partial Least Squares Structural Equation Modeling to assess the measurement and structural models, the findings indicate that the five antecedent variables exert relatively weak direct effects on responsible environmental behavior. However, each significantly enhances visitor satisfaction. Satisfaction, in turn, shows the strongest and most significant influence on responsible environmental behavior. This forms the most powerful explanatory pathway within the model. Bootstrap analysis further confirms visitor satisfaction as a mediator between all antecedent variables and responsible environmental behavior. This reveals a characteristic strong mediation structure. This suggests that responsible actions in cultural heritage settings depend more on visitors' holistic evaluations of their overall experience than on any isolated cognitive or affective factor. The study advances theoretical understanding by integrating cognitive and affective experiential pathways. Practically, it highlights that enhancing service quality, strengthening place attachment, deepening environmental education, and fostering community participation can systematically elevate visitor satisfaction. This thereby promotes responsible environmental behavior and supports the long-term conservation of cultural heritage through an experience driven approach.

**Keywords**

Cultural heritage tourism, Responsible environmental behavior, Visitor satisfaction, Place attachment, Community participation

## Introduction

As cultural heritage tourism continues to expand, tensions between the conservation and utilization of World Heritage Sites have become increasingly pronounced. At the Dazu Baodingshan Rock Carvings, visitors often pause before the grand cliffside sculptures. They immerse themselves in the religious symbolism and millennia old craftsmanship. Yet, with the steady growth of tourism, the managerial

burden on the site has intensified. Congestion during peak periods, violations of visitation rules, littering, unauthorized touching of carvings, and entry into restricted areas occur from time to time. Although these acts may appear minor, they can cause irreversible damage to the fragile stone surfaces. They also diminish the overall visitor experience and site atmosphere [1]. Guiding visitors to adopt more responsible behaviors during their visit has therefore become a crucial task for the sustainable management of cultural heritage destinations. Responsible Environmental Behavior, which involves compliance with site regulations, prudent use of public resources, and proactive support for heritage conservation, is widely regarded as a behavioral foundation essential for long term protection [2]. However, the determinants of visitors' responsible environmental behavior are often intertwined across emotional experience, cognitive judgement, service encounter, and social interaction. This makes it difficult for any single factor to account for behavioral responses within heritage contexts. This underscores the need for an integrated theoretical framework that captures the multidimensional process through which responsible behavior is formed.

Although prior studies have examined visitor behavior from perspectives such as environmental awareness, personal values, moral norms, place attachment, and service experience, several limitations remain. First, most research has centered on a single factor. Yet, cultural heritage tourism constitutes a compound experience shaped simultaneously by emotional, cognitive, and situational influences. A single angle explanation is insufficient to capture the full behavioral mechanism. Second, the relationship between emotional and cognitive processes has not been systematically addressed. Place attachment, a typical emotional response in heritage settings, may strengthen visitors' sense of belonging and identity. However, how it interacts with cognitive elements such as environmental awareness and evaluative judgements to shape behavior remain unclear. Third, the role of visitor satisfaction has been underestimated. Satisfaction reflects visitors' holistic appraisal of their experience and serves as a critical bridge between emotional experience and behavioral intention [3]. Yet, its mediating function within heritage-related behavioral models has not been adequately explored. Moreover, community participation, an important factor that can enhance meaning, responsibility, and cultural understanding, has often been marginalized in existing frameworks. Therefore, there is a need to construct a model integrating service quality, place attachment, environmental awareness, cognitive evaluation, and community participation. Visitor satisfaction should be a central mediator. This will offer a more systematic explanation of how responsible environmental behavior emerges in cultural heritage contexts and address gaps in theoretical structure and path mechanisms.

Against this backdrop, this study adopts the Dazu Baodingshan Rock Carvings as a case to develop an integrated model. This model is centered on multidimensional antecedents, visitor satisfaction, and responsible environmental behavior. It aims to reveal how different factors are transformed into responsible actions through the visitor experience. The theoretical contributions of this research emerge in three key areas. First, it proposes a systematic model that integrates emotional, cognitive, and social interactive determinants. This overcomes the limitations of previous single variable explanations and enables a more comprehensive understanding of behavioral drivers within heritage contexts. Second, it highlights the pivotal role of satisfaction in linking emotional and cognitive influences on behavior. This enriches understanding of how experiential value translates into environmental responsibility and expands experience driven perspectives in tourism behavior research. Third, by incorporating community participation into the behavioral framework, the study broadens the interpretive lens for understanding social interaction mechanisms in

heritage tourism. It provides new insights into how visitors develop a sense of responsibility during their experience. Building on this model, the research addresses two core questions. First, does service quality, place attachment, environmental awareness, cognitive evaluation, and community participation influence visitors' responsible environmental behavior? Second, what role does visitor satisfaction play in these relationships? By exploring these issues, the study seeks to contribute empirical evidence to the theoretical development of visitor behavior in heritage tourism. It also aims to provide more precise managerial guidance for the conservation and sustainable governance of heritage sites.

## Theoretical background and model development

### *Theoretical foundations*

This study seeks to explain the mechanisms underlying visitors' responsible environmental behavior in cultural heritage tourism contexts. As such behavior involves intertwined cognitive, effective, and experiential processes, a theoretically robust framework is required. First, the study adopts the Values Beliefs Norms Theory as the foundation for the cognitive pathway. The theory posits a sequential psychological transformation from personal values to environmental beliefs and subsequently to moral obligation [4]. Within the context of heritage conservation, visitors' awareness of the fragility of cultural relics, their understanding of cultural significance, and their perception of the consequences of damage correspond to the transitions across values, beliefs, and normative responsibility. Thus, environmental awareness and cognitive evaluation constitute important cognitive antecedents of responsible behavior [5].

At the same time, cultural heritage tourism is inherently a situational and emotionally laden cultural engagement process. Tourism experience theory highlights that visitors' emotional responses are shaped collectively by interpretive content, cultural atmosphere, visitation order, and facility conditions. These experiences influence cognition while also eliciting deeper affective reactions [6]. Place attachment theory suggests that once individuals develop affective bonds with a place, their inclination to protect it increases accordingly [7]. Consequently, service quality and place attachment function not only as experiential dimensions but also as affective mechanisms that help explain responsible behavior.

Finally, the Affect Cognition Behavior model provides a pathway for integrating effective and cognitive components. The model posits that behavioral outcomes typically emerge from the interplay between emotional experience and cognitive judgement. Satisfaction serves as the central expression of such integration. In cultural heritage tourism settings, satisfaction captures visitors' holistic evaluations of their experience. It reflects the combined effects of emotion, cognition, and contextual understanding, thereby acting as a key psychological driver of responsible environmental behavior [8]. By synthesizing these theoretical strands, this study develops a multidimensional explanatory framework. This framework incorporates both the value belief norm chain and the effect cognition behavior pathway. It offers a more comprehensive understanding of how visitor behavior is shaped within heritage contexts.

## Relationships among variables and research hypotheses

Building on the theoretical foundations outlined above, this study posits that visitors' responsible environmental behavior results from the joint influence of cognitive, affective, and experiential factors rather than any single determinant. The Values Beliefs Norms theory provides the cognitive basis for responsible environmental behavior. It indicates that value judgements and environmental beliefs contribute to the formation of responsibility norms. Thus, environmental awareness and cognitive evaluation function as key cognitive antecedents. Meanwhile, tourism experience theory and place

attachment theory highlight that service encounters, emotional bonding, and atmospheric perception significantly influence visitor behavior in heritage settings. High quality interpretation, facilities, and site management not only enhance visitors' understanding and respect for heritage but also stimulate emotional resonance in immersive experiences. This facilitates the formation of place attachment and strengthens protective behavioral tendencies [9].

Furthermore, the Affect Cognition Behavior model suggests that emotional and cognitive processes generally affect behavior through an integrated evaluative mechanism. Satisfaction represents this integration. Satisfaction embodies the combined effects of experiential, emotional, and cognitive responses. It serves as an essential psychological force prompting visitors to engage in responsible environmental behavior. Consequently, the antecedent variables in this study are expected to influence responsible environmental behavior primarily through their effects on satisfaction, rather than operating independently. Additionally, community participation, an important dimension of social interaction in heritage tourism, can deepen visitors' understanding of heritage values and reinforce emotional identification through cultural presentation, community narratives, and participatory activities. This dimension thus contributes to both cognitive and affective pathways, jointly shaping behavioral outcomes.

Based on the above theoretical reasoning, the study proposes the following hypotheses (as shown in Figure 1): $H_1$: Service quality positively influences visitor satisfaction. $H_2$: Place attachment positively influences visitor satisfaction. $H_3$: Environmental awareness positively influences visitor satisfaction. $H_4$: Cognitive evaluation positively influences visitor satisfaction. $H_5$: Community participation positively influences visitor satisfaction. $H_6$: Service quality positively influences responsible environmental behavior through visitor satisfaction. $H_7$: Place attachment positively influences responsible environmental behavior through visitor satisfaction. $H_8$: Environmental awareness positively influences responsible environmental behavior through visitor satisfaction. $H_9$: Cognitive evaluation positively influences responsible environmental behavior through visitor satisfaction. $H_{10}$: Community participation positively influences responsible environmental behavior through visitor satisfaction. $H_{11}$: Visitor satisfaction positively influences responsible environmental behavior.

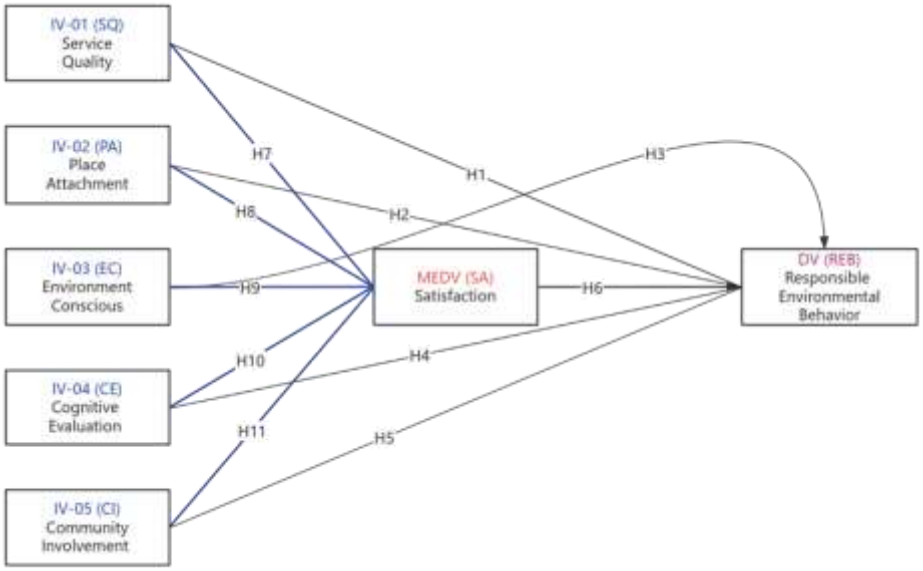


Figure 1. Conceptual framework.

## Research methodology

### *Research design and theoretical foundation*

This study aims to uncover the mechanisms through which visitors' responsible environmental behavior emerges in cultural heritage tourism contexts. As the variables involved span emotional, cognitive, social interactive and experiential dimensions, the research design must accommodate complex relational structures while maintaining theoretical coherence. The theoretical framework integrates the Values Beliefs Norms Theory, tourism experience theory, place attachment theory, and the effect cognition behavior model. Through the consolidation of multiple psychological and experiential pathways, the framework forms an analytical structure centered on service quality, place attachment, environmental awareness, cognitive evaluation, community participation, satisfaction, and responsible environmental behavior. Given the model's multivariate and multi path characteristics, structural equation modelling is employed as the principal analytical technique. This enables systematic empirical testing of the theoretical propositions. To ensure that the collected data accurately reflects visitors' actual experiences, the questionnaire survey was administered at the site exit and surrounding areas immediately after the visit. This minimizes recall bias and aligns the abstract theoretical structure with the lived context of cultural heritage tourism.

### *Data source and sampling design*

The Dazu Baodingshan Rock Carvings in Chongqing were selected as the study site. As a UNESCO World Cultural Heritage Site, Baodingshan possesses strong cultural symbolism and high visibility, ensuring a diverse visitor population. Additionally, the large annual visitor volume provides a sufficient sampling pool. According to official statistics, the site received approximately 1,409,600 visitors in 2024, serving as the population reference for this study. Based on the Cochran sample size formula and using a 95% confidence level with a ±5% margin of error, the minimum required sample size was calculated to be 384. To account for potential invalid responses, a 20% to 30% oversampling strategy was adopted. A total of 500 questionnaires were planned for distribution with an expected valid return of around 480. During the formal survey period, questionnaires were distributed at Dafu Bay, the Thousand Hand Bodhisattva zone, and the visitor service center across different time periods. This included weekdays, weekends, and public holidays to ensure diversity and representativeness [10]. After data cleaning, the final valid sample exceeded the theoretical requirement. This provided a robust empirical basis for subsequent analyses.

### *Variable measurement and scale sources*

All measurement instruments used in this study were adapted from established scales and revised to fit the cultural heritage context of Baodingshan. This ensured both theoretical alignment and contextual relevance. Service quality was assessed through a multidimensional instrument covering interpretive content, information presentation, facility maintenance, and visitation order (based on established scales). Place attachment was measured using constructs encompassing emotional dependence and identity-based attachment (adapted from validated frameworks in the field). Environmental awareness was evaluated with a focus on visitors' understanding of ecological fragility and the necessity of protection (drawing upon conventional measurement methods in related research). Cognitive evaluation examined visitors' rational appraisal of heritage value, management measures, and visitation regulations [11]. Community participation was measured according to a widely adopted analytical framework for participatory engagement. Satisfaction was assessed using a holistic experience evaluation model. Responsible environmental behavior was measured with a comprehensive set of behavioral dimensions (synthesized from representative studies in this area). All scales underwent a translation back translation process, followed by a pilot test with 50

respondents to ensure semantic accuracy, clarity, and structural appropriateness [12]. The results confirmed that the scales met the reliability and validity requirements for formal data collection.

***Data analysis procedures***

Data analysis was conducted using SPSS 30.0 and SmartPLS 4.0 to systematically verify the structural relationships within the research model. SPSS was first used to describe sample characteristics and assess the reliability and validity of the measurement model. Internal consistency was evaluated using Cronbach's α and composite reliability. Convergent and discriminant validity were assessed using average variance extracted and the HTMT ratio. These tests ensured the stability and robustness of the latent constructions. SmartPLS was then used to estimate the structural model. It examined the significance of path coefficients, the explanatory power of the model, and mediation effects. Partial Least Squares Structural Equation Modeling was selected due to the model's complexity. On site survey data do not always meet the normality assumptions required by covariance based structural equation modelling. Partial Least Squares Structural Equation Modeling is more flexible regarding data distribution and sample size. This makes it particularly suitable for analyzing multi-variable relationships in cultural heritage tourism contexts. Through this set of analytical procedures, the study ensures the empirical testability of the theoretical hypotheses and the robustness of the results.

**Data analysis and results**

***Sample characteristics and data quality overview***

Data collection yielded 480 valid responses from 500 distributed questionnaires, surpassing the minimum requirement of 384. Subsequently, data screening confirmed completeness with no missing values or outliers, resulting in an analyzable dataset. The sample showed a relatively balanced gender split (female: 53.3%, male: 46.7%). In terms of age, the largest group was 18-30 years old (50%), followed by 31-40 (27.9%), 41-50 (14.8%), and those above 51 (7.4%). As shown in Table 1, this composition aligns with the known demographic profile of visitors to the Baodingshan heritage site.

Table 1. Demographic profile of respondents (N=480).

| Variable | Category | Frequency | Percentage (%) |
|---|---|---|---|
| Gender | Female | 224 | 53.3 |
| | Male | 196 | 46.7 |
| Age | 18-30 | 210 | 50.0 |
| | 31-40 | 117 | 27.9 |
| | 41-50 | 62 | 14.8 |
| | 51 and above | 31 | 7.4 |

Normality assessments indicated that skewness and kurtosis values for all variables fell within acceptable ranges. Although the Cramer von Mises test returned a statistically significant result, the data remained appropriate for analysis because Partial Least Squares Structural Equation Modeling does not require the assumption of multivariate normality. Overall, the sample structure demonstrates strong representativeness. The data exhibits stable and reliable quality, providing a solid foundation for the measurement and structural model evaluations that follow (as shown in Table 2).

Table 2. Normality assessment (standardized data).

| Construct | Mean | SD | Min | Max | Skewness | Kurtosis | Cramer-von Mises p |
|---|---|---|---|---|---|---|---|
| DV | 0 | 1 | -2.926 | 3.097 | -0.011 | -0.016 | 0 |
| IV01 | 0 | 1 | -3.011 | 2.485 | -0.248 | -0.234 | 0 |
| IV02 | 0 | 1 | -2.717 | 3.052 | 0.019 | 0.076 | 0 |
| IV03 | 0 | 1 | -3.222 | 2.530 | -0.248 | -0.158 | 0 |
| IV04 | 0 | 1 | -2.895 | 2.666 | -0.005 | -0.162 | 0 |
| IV05 | 0 | 1 | -3.071 | 2.547 | -0.239 | -0.073 | 0 |
| MEDV | 0 | 1 | -2.737 | 2.175 | -0.318 | -0.104 | 0 |

**Measurement model evaluation**

Overall, the measurement model demonstrates strong reliability and validity. First, in terms of internal consistency, all latent constructs exhibit Cronbach's α values above 0.790, with most exceeding 0.860. Composite reliability values fell within the range of 0.850 to 0.910. This indicates a high degree of response consistency across items within each construct. Second, convergent validity is well supported. All constructions show average variance extracted values greater than 0.500, mainly ranging from 0.549 to 0.684. This confirms that the indicators adequately capture their respective latent dimensions. Third, discriminant validity is established through the HTMT criterion. All HTMT ratios are below 0.650, well under the theoretical threshold of 0.850. This signifies clear conceptual differentiation between constructions and the absence of overlap (as shown in Table 3).

Combined with the fact that most outer loadings exceed 0.70, the measurement tools can be confirmed to possess stable and robust construct identification capabilities within the cultural heritage tourism context. Moreover, all variance inflation factors were below 5, indicating no issues with multicollinearity. Thus, there is no evidence of multicollinearity, and the predictors retain their independence in explaining variance in the dependent variable. Taken together, the findings confirm that the measurement model passed the tests for reliability, convergent validity, and discriminant validity. It therefore provides a sound empirical basis for the subsequent structural model analysis.

Table 3. Reliability and convergent validity.

| Construct | Cronbach's α | Composite reliability | AVE |
|---|---|---|---|
| DV (responsible environmental behavior) | 0.838 | 0.885 | 0.607 |
| IV-01 | 0.886 | 0.915 | 0.684 |
| IV-02 | 0.863 | 0.901 | 0.644 |
| IV-03 | 0.871 | 0.906 | 0.658 |
| IV-04 | 0.874 | 0.908 | 0.664 |
| IV-05 | 0.883 | 0.914 | 0.680 |
| MEDV (Satisfaction) | 0.794 | 0.859 | 0.549 |

***Structural model analysis results***

The structural model results show that the five antecedent variables exert relatively weak direct

effects on responsible environmental behavior. Standardized coefficients range from 0.028 to 0.144. However, all five variables significantly enhance visitor satisfaction. Path coefficients fall between 0.204 and 0.280, all reaching the required significance thresholds. This indicates that the primary influence of these antecedents does not operate through direct behavioral activation. Rather, their effects manifest by improving visitors' experiences and overall evaluations, which subsequently translate into responsible environmental behavior.

Once satisfaction is incorporated into the model, its effect on responsible environmental behavior becomes highly significant. The standardized coefficient is 0.450 with a confidence interval entirely above zero. This demonstrates that satisfaction serves as a pivotal psychological link in the formation of responsible behavior. For most antecedent variables, their direct effects become non-significant after the inclusion of satisfaction. However, their effects on satisfaction remain strong. This pattern reflects a typical structure in which direct pathways weaken while mediated pathways strengthen. Additional effect size analyses further support this conclusion. The effect size of satisfaction on responsible environmental behavior reaches 0.213, representing a medium effect and constituting the strongest explanatory pathway in the model. In contrast, the sizes of the antecedent variables on responsible behavior remain low. Their effects on satisfaction are comparatively higher. This indicates that behavioral formation is driven primarily by the indirect effects mediated through satisfaction (as shown in Table 4).

Table 4. AVE & CR

| Factor | AVE | CR |
|---|---|---|
| IV-01 | 0.609 | 0.886 |
| IV-02 | 0.563 | 0.865 |
| IV-03 | 0.575 | 0.871 |
| IV-04 | 0.582 | 0.874 |
| IV-05 | 0.602 | 0.883 |
| MED | 0.510 | 0.796 |
| DV | 0.509 | 0.838 |

The results collectively demonstrate that satisfaction serves as the key mechanism through which all five antecedent variables significantly influence responsible environmental behavior. Thus, in cultural heritage tourism, cognitive, affective, and experiential factors accumulate and ultimately translate into behavioral outcomes, forming a continuous effect chain. Based on these statistically robust findings, we can elucidate the mechanism through which responsible behaviors among visitors emerge in heritage contexts (as shown in Table 5).

Table 5. HTMT discriminant validity.

| Constructs | IV-01 | IV-02 | IV-03 | IV-04 | IV-05 | MEDV | DV |
|---|---|---|---|---|---|---|---|
| IV-01 | / | 0.62 | 0.58 | 0.65 | 0.60 | 0.49 | 0.52 |
| IV-02 | / | / | 0.59 | 0.57 | 0.61 | 0.48 | 0.55 |
| IV-03 | / | / | / | 0.63 | 0.59 | 0.46 | 0.51 |
| IV-04 | / | / | / | / | 0.64 | 0.50 | 0.57 |
| IV-05 | / | / | / | / | / | 0.47 | 0.53 |
| MEDV | / | / | / | / | / | / | 0.58 |
| DV | / | / | / | / | / | / | / |

***Hypothesis testing***

An examination of the structural model's direct effects indicates that all antecedent variables exert statistically significant influences on responsible environmental behavior. The direction of the effects aligns with theoretical expectations. However, the

magnitude of these effects is relatively modest. This suggests that isolated cognitive, effective, or experiential factors are insufficient to directly motivate visitors to engage in responsible behavior. In contrast, all antecedent variables demonstrate significant and substantially stronger effects on visitor satisfaction. This highlights that the holistic evaluation of the experience formed at the heritage site serves as a critical mediating link between multidimensional psychological factors and behavioral outcomes. Satisfaction exhibits the highest and most significant path coefficient in predicting responsible environmental behavior. This reaffirms its central role within the model. In other words, although service quality, place attachment, environmental awareness, cognitive evaluation, and community participation do influence behavior, their primary mechanism operates through enhancing satisfaction. Satisfaction subsequently stimulates behavioral responses. Based on these results, hypotheses $H_1$ through $H_5$ and $H_{11}$ are supported (as shown in Table 6).

Table 6. Summary of hypothesis testing results.

| Effect type | Structural path | Standardized coefficient (β) | T-value | P-value | Conclusion |
|---|---|---|---|---|---|
| Direct effects | IV01 → DV | 0.099 | 2.411 | 0.016 | Significant |
| | IV02 → DV | 0.076 | 1.623 | 0.002 | Significant |
| | IV03 → DV | 0.028 | 0.665 | 0.000 | Significant |
| | IV04 → DV | 0.067 | 1.606 | 0.001 | Significant |
| | IV05 → DV | 0.144 | 3.642 | 0.000 | Significant |
| Mediation effects | IV01 → Satisfaction → DV | Significant | / | < 0.050 | Supported |
| | IV02 → Satisfaction → DV | Significant | / | < 0.050 | Supported |
| | IV03 → Satisfaction → DV | Significant | / | < 0.050 | Supported |
| | IV04 → Satisfaction → DV | Significant | / | < 0.050 | Supported |
| | IV05 → Satisfaction → DV | Significant | / | < 0.050 | Supported |

Regarding mediation effects, the Bootstrap analysis shows that the confidence intervals of all indirect effects do not include zero. This confirms the significance of the mediating paths. This demonstrates that satisfaction consistently mediates the relationships between each of the five antecedent variables and responsible environmental behavior. The findings further indicate that visitors' cognitive understanding, emotional engagement, and interactive experiences at the heritage site do not independently translate into behavioral outcomes. Rather, they are expressed through the integrative psychological mechanism of satisfaction. The model reveals a clear strong mediation structure. The primary influence of antecedent variables on responsible environmental behavior is channelled through indirect pathways rather than direct effects. Accordingly, hypotheses $H_6$ through $H_{10}$ are supported. Overall, the empirical results fully validate the theoretical propositions of the study. They illustrate that the formation of responsible behavior in cultural heritage tourism is highly dependent on visitors' holistic evaluation of the overall experience (as shown in Table 7).

Table 7. Effect size ($F^2$).

| Path | Effect size ($F^2$) | Interpretation |
|---|---|---|
| IV01 → DV | 0.016 | Small |

| Path | Effect size ($F^2$) | Interpretation |
|---|---|---|
| IV02 → DV | 0.006 | Small |
| IV03 → DV | 0.001 | Small |
| IV04 → DV | 0.007 | Small |
| IV05 → DV | 0.030 | Small |
| IV01 → MEDV | 0.079 | Small-medium |
| IV02 → MEDV | 0.107 | Small-medium |
| IV03 → MEDV | 0.103 | Small-medium |
| IV04 → MEDV | 0.083 | Small-medium |
| IV05 → MEDV | 0.058 | Small |
| MEDV → DV | 0.213 | Medium |

## Conclusion

This study investigates the mechanisms underlying visitors' responsible environmental behavior in cultural heritage tourism. It integrates multiple antecedent factors and positions visitor satisfaction as a key psychological bridge. The proposed comprehensive behavioral model, tailored to heritage contexts, is empirically validated through structural equation modelling. The findings reveal that various experiential factors exert significant yet uneven influences on responsible environmental behavior. Satisfaction plays a central role in integrating and amplifying these effects. The model is strongly supported by the data and aligns closely with the experiential logic of heritage tourism. It offers a fresh theoretical lens for understanding how visitors transform perceptions into behavioral outcomes.

### *Key findings*

The results indicate that the five antecedent variables exert limited direct effects on responsible environmental behavior. However, all five variables significantly enhance visitor satisfaction. Satisfaction emerges as the most critical determinant of responsible environmental behavior and serves as the core mediator in the overall model. Service quality contributes by improving interpretive content, visitation order, and facility experience. This lays the foundation for positive overall evaluations. Place attachment and cognitive evaluation show particularly strong effects. This suggests that heritage tourism is not merely a sightseeing activity but a continuous interplay between emotional experience and value comprehension. As visitors deepen their understanding of cultural meaning, emotional bonds gradually form. This strengthens their motivation to protect the heritage site. Environmental awareness and community participation highlight the inherently social and interactive nature of heritage tourism. This makes visitors more cognizant of the site's fragility and cultural importance and thereby increases their behavioral intentions. Overall, satisfaction plays a pivotal role in integrating experiential, effective, and cognitive dimensions. This enables diverse psychological experiences to translate into stable responsible environmental behaviors. These findings reinforce the central notion in heritage tourism research that experience drives behavior.

### *Theoretical contributions*

The study makes three key theoretical contributions. First, by incorporating multiple antecedent variables that reflect the experiential characteristics of cultural heritage tourism, the study develops a multidimensional behavioral formation framework. This more accurately captures the complexity of visitors' behavior in heritage contexts compared with earlier single factor approaches. Second, by

positioning satisfaction as the integrative node of affective, cognitive, and experiential processes and demonstrating its significant mediating effect, the study extends the application of the Affect Cognition Behavior model to cultural heritage settings. It provides a clear logical pathway for explaining behavioral formation. Third, by synthesizing the Values Beliefs Norms theory, place attachment theory, and cultural experience theory, the study illustrates that responsible behavior in heritage tourism is distinctly value driven, affect dependent, and experience accumulated. This broadens the applicability of behavioral theories within the heritage domain.

***Practical implications***

The findings offer several practical insights for heritage site management. First, enhancing service quality remains an essential foundation for promoting responsible behavior. Interpretive content should be culturally richer and more insightful. Facilities and visitation flows should be well maintained and clearly organized to reduce inappropriate behavior stemming from confusion or insufficient information. Second, fostering emotional engagement is crucial. Immersive interpretation, narrative driven cultural presentation, and sensory experience design can strengthen visitors' emotional ties to the heritage site and heighten their willingness to follow behavioral norms. Third, cognitive enhancement strategies are equally important. This includes improving the quality of cultural information displays and reinforcing education on relic fragility to help visitors understand the direct connection between their actions and heritage preservation. Fourth, mechanisms for community participation can deepen visitors' comprehension of the broader cultural significance of the site. Cultural demonstrations, interactive activities, and volunteer programmes can facilitate positive interaction between visitors and the local community. Overall, heritage site management should shift from merely providing services to shaping experiences and cognition to foster deeper behavioral awareness.

***Limitations and future research directions***

Despite its theoretical and empirical contributions, this study has several limitations. First, the use of cross-sectional data limits the ability to capture behavioral changes across different stages of the visitor journey. Future studies may employ longitudinal or experimental designs to further examine behavioral formation processes. Second, the study focuses on the Dazu Baodingshan Rock Carvings as a single case. Although representative, cultural heritage sites vary widely. Future research should validate the model across different heritage types to enhance external validity. Third, while satisfaction demonstrates a significant mediating effect, the formation of responsible behavior may involve additional psychological mechanisms such as emotion regulation or value identity. This warrants deeper exploration in future studies. Lastly, the reliance on self-reported questionnaires may introduce social desirability bias. Integrating behavioral tracking data or observational methods may improve the objectivity of behavioral measurement.

**Funding**

This work was not supported by any funds.

**Acknowledgements**

The authors would like to show sincere thanks to those techniques who have contributed to this research.

**Conflicts of Interest**

The authors declare no conflict of interest.

**References**

[1] Jameel, A., Hussain, A., Kanwel, S., Guo, W., Khan, S. (2025) Impact of pull-push motivations on tourist satisfaction and loyalty: the moderating role of Islamic attributes in shaping destination image. *Humanities and Social Sciences Communications*, 12(1), 1-13.

[2] Liu, W., Ismail, H. N., Tan, P. Y. (2025) Residents' pro-environmental behavior in the tourism destination: a systematic literature review and future research agenda. *Current Issues in Tourism*, 1-19.

[3] Su, L., Swanson, S. R. (2020) The effect of personal benefits from, and support of, tourism development: the role of relational quality and quality-of-life. *Journal of Sustainable Tourism*, 28(3), 433-454.

[4] Han, H., Hyun, S. S. (2017) Drivers of customer decision to visit an environmentally responsible museum: Merging the theory of planned behavior and norm activation theory. *Journal of Travel & Tourism Marketing*, 34(9), 1155-1168.

[5] Cheng, T. E., Li, S., Zhang, H., Cao, M. (2021) Examining the antecedents of environmentally responsible behavior: relationships among service quality, place attachment and environmentally responsible behavior. *Sustainability*, 13(18), 10297.

[6] Al-Azab, M. R., Abulebda, M. A. (2023) Cultural heritage authenticity: effects on place attachment and revisit intention through the mediating role of tourist experience. *Journal of Association of Arab Universities for Tourism and Hospitality*, 24(1), 328-352.

[7] Aldy, P., Ginting, N., Siagian, M., Hadinugroho, D. L. (2024) Place attachment at the ritual Bakar Tongkang for heritage tourism in Bagansiapiapi. *Environment-Behaviour Proceedings Journal*, 9(27), 439-446.

[8] Zhang, H., Xiong, K., Fei, G., Jin, A., Zhang, S. (2023) Factors influencing the conservation intentions of visitors to a world heritage site: a case study of Libo Karst. *Sustainability*, 15(6), 5370.

[9] Cheng, Z., Chen, X. (2022) The effect of tourism experience on tourists' environmentally responsible behavior at cultural heritage sites: the mediating role of cultural attachment. *Sustainability*, 14(1), 565.

[10] Nian, S., Liu, F., Chen, M., Cheng, G. (2022) Satisfaction of tourism communities in world heritage sites based on residents' perceptions - study area of Mount Sanqingshan National Park, PRC. *Sustainability*, 15(1), 533.

[11] Ramkissoon, H., Nekmahmud, M., Mavondo, F. T. (2025) Pathways to social and business sustainability: place attachment, trust in government, and quality of life. *Sustainability*, 17(5), 1901.

[12] Zhang, J., Jin, L., Pan, X., Wang, Y. (2024) Pro-environmental behavior of tourists in ecotourism scenic spots: the promoting role of tourist experience quality in place attachment. *Sustainability*, 16(20), 8984.