

## Article

# From Stakeholder Value Perceptions to Collaborative Interpretation in World Cultural Heritage Management: Evidence from the Longmen Grottoes (China)

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## Abstract

UNESCO promotes multi-stakeholder collaborative planning in World Cultural Heritage management. However, while previous studies on heritage interpretation have identified differences in stakeholder values, they have rarely shown how such differences can be translated into decision-relevant evidence to support collaborative interpretation. Using the Longmen Grottoes, a World Cultural Heritage site in China, as a case study, this study aims to transform stakeholders' perceptions of value into evidence for collaborative interpretation within the context of World Cultural Heritage management. This study uses a mixed-methods design, integrating semi-structured interviews, questionnaire surveys, analytic hierarchy process (AHP) analysis, and semantic analysis of official policy discourse. This study compares the value perception of experts, the religious group, residents, tourism operators, and visitors, as well as the value priorities of experts and non-experts, and examines the alignment of these values with official management discourses. The findings indicate that divergences among stakeholder groups in value priorities and the official discourse system are structured primarily around expert-driven priorities, while the discourse of the religious group and the secular public are not fully reflected. This study integrates bottom-up stakeholder data with top-down policy discourse, demonstrating how value differences can be transformed into structured evidence to inform collaborative interpretation. These findings provide empirical support for management strategies in World Cultural Heritage.

**Keywords:** UNESCO sites; stakeholder participation; collaborative planning; value interpretation; analytic hierarchy process; decision-making support; heritage



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## 1. Introduction

The interpretation of cultural heritage is critical to demonstrating its value. Interpretation presents the historical and cultural significance of heritage and mediates the identification, clarification, and negotiation of a wide range of individual and group interests. Cultural heritage exists in a complex social context; consequently, its interpretation and management require the involvement of multiple stakeholder groups rather than just relying on experts.

The traditional heritage value framework was expert-led, emphasizing material authenticity and commemorative significance [1]. Experts have typically viewed heritage as possessing intrinsic attributes and have established definitions and evaluation frameworks for the various types of cultural heritage through professional cultural heritage institutions and professionals working in the field of cultural relic protection [2,3]. While such an expert-led approach provides a foundation for a value framework and value identification, many researchers doubt that it is sufficient to reflect the diverse perceptions of non-expert stakeholders [4,5].

Stakeholder identification is a necessary step in the management of World Cultural Heritage, as it helps clarify who the relevant stakeholders are, when and how they should be addressed, and the roles and responsibilities they may play in the management of the site. An approach driven solely by science or experts risks overlooking other aspects of World Cultural Heritage, including their roles as tourism assets, economic drivers, educational assets, tools for intercultural communication, and potential points of connection among stakeholders [6]. Some studies also point out that decision-making regarding World Cultural Heritage has traditionally relied on a top-down approach, which may overlook the perspectives of stakeholders and limit effective management and sustainable development. In the context of World Heritage tourism, local actors and visitors are also regarded as key participants in cultural heritage management and stakeholder participation. Tourists and the local community are seen as co-producers, and the importance of local concerns should be addressed [7].

Studies show two ways of thinking about the different stakeholder groups involved in World Heritage Sites: through formal and informal forms of influence. The formal influences come from entities with a clear institutional structure, including governmental agencies responsible for the protection and preservation of heritage, such as local governments and heritage management agencies, as well as professionals involved in conservation and management activities. They possess professional knowledge related to heritage protection, research, planning, and interpretation. The informal influences comprise groups without a legally recognized or formalized decision-making role in the management of World Heritage Sites (i.e., without formal authority). However, they are critical in helping to define how people view, use, transmit, and contest heritage value via daily practice, economic activities, cultural identity, spiritual significance, or experiential engagement. Informal influences may include residents, tourists, tourism operators, the local community, and cultural or religious custodians.

As attention to stakeholders has grown, research on cultural heritage values has also evolved into a broader framework for developing heritage value perceptions that includes instrumental elements related to the economic, educational, and social aspects of cultural heritage [8–10]. Therefore, cultural heritage has been redefined as both intrinsic attributes and a means of providing social benefits, economic vitality, and collective well-being. By emphasizing these instrumental elements, the value framework increasingly reflects the actual experiences, use-based connections, and practical concerns of non-expert stakeholders, thus expanding the concept of heritage value beyond the definitions by the experts.

The current literature shows that management mechanisms and institutional arrangements are components of the heritage value framework, emphasizing that heritage value is discovered via an expert assessment as well as being co-constructed by all the stakeholders via planning systems and policy framework [11–14]. This movement indicates a shift from protection-based management, which assesses value in terms of individual intrinsic qualities, to a more participatory and cohesive approach to managing heritage value by supporting the co-creation of values derived from cultural heritage.

In response to this shift, many studies have examined stakeholders' perceptions of value. While researchers have effectively captured differing and similar perspectives, most existing studies remain descriptive and provide reviews of stakeholder value perceptions without developing decision-support methodologies to facilitate heritage management activities [15–18].

In this context, collaborative planning has been valued by international heritage policies and guidelines for its emphasis on dialogue and consultation among diverse stakeholders in the decision-making process [19–22]. Collaborative planning theory is increasingly being applied to heritage interpretation, as evidenced by international frameworks that promote participatory and inclusive interpretive practice.

The five-stage model proposed by UNESCO WHIPIC offers one of the most comprehensive frameworks for collaborative interpretation, covering value identification, evidence development, co-creation, and expression, and subsequent management [23]. Based on this framework, this study focuses on the first two stages: identifying stakeholders' value perceptions and transforming value differences into structured empirical evidence. These provide the foundation for subsequent collaborative management and interpretation practices.

In summary, current value frameworks and international heritage interpretation generally emphasize procedural participation, dialogue, consultation, and policy advocacy; however, there remains a gap between stakeholder value pluralism and actionable evidence for collaborative heritage interpretation.

The Longmen Grottoes provides an appropriate case for this study. It was one of the first national key cultural relics protection units designated by the State Council of China in 1961 and is one of the best examples of Chinese Buddhist caves. In 2000, it was inscribed on the UNESCO World Heritage List [24].

The Longmen Grottoes, situated in the southern region of Luoyang, Henan Province, is renowned as part of the 'Ancient Capital of Thirteen Dynasties'. This site extends for one kilometer along both banks of the Yi River. Its construction commenced in 493 AD, coinciding with Emperor Xiaowen of the Northern Wei Dynasty relocating the capital to Luoyang, which then served as the dynasty's capital. The construction persisted through several subsequent dynasties, reaching its peak during the Northern Wei and Tang periods. The sculptural art of the Longmen Grottoes, characterized by the early "Central Plains style" and the later "Tang Dynasty style," has significantly influenced both Chinese and global sculptural art, contributing notably to the development of sculptural art in other Asian countries [25].

This heritage reflects the close relationship between political power, religious patronage, and artistic creation, highlighting the political, religious, and aesthetic functions embodied in Buddhist cave art under royal sponsorship.

Current Periodic Reporting Cycle 3 of the Longmen Grottoes suggests the improvements in the interpretation of its Outstanding Universal Value (OUV). The report points out that stakeholder engagement and collaboration with the tourism industry are insufficient to develop interpretation strategies. Local enterprises, the industrial sector, and landowners have a weak understanding of its heritage-related value. Additionally, the rating for "Interpretation and Community Participation and Inclusion" is fair. This evidence indicates that, with respect to value interpretation and participation, the Longmen Grottoes requires enhancement [26]. This concern is also reflected in China's recent heritage policies. The 2022 "14th Five-Year Plan for Cultural Heritage Protection and Scientific and Technological Innovation" emphasizes the interpretation of value. Moreover, the corresponding special plan for grotto temples stresses the need to strengthen research and interpretation of their historical significance and cultural connotations, addressing the insufficient exploration

and interpretation of the cultural connotations of some grotto temples [27]. In addition, first-hand materials from interviews with stakeholders reveal that different groups have varying understandings of the value of heritage, while effective channels for incorporating these perspectives into interpretation remain limited.

Existing studies on the Longmen Grottoes have primarily focused on visitors' perceptions [28,29] and traditional value classifications [30,31], with limited attention to stakeholders' value perspectives and collaborative interpretation. Therefore, current research has not yet established an empirical foundation for collaborative interpretation planning by bridging top-down institutional discourse and bottom-up stakeholder perceptions.

Accordingly, this study aims to develop an empirical methodology to examine how different stakeholders in World Cultural Heritage sites perceive heritage value and how these differences translate into action within official policy. This study systematically compares stakeholder perceptions with institutional value narratives, thereby transforming these differences into comparable, structured empirical evidence to support value reconciliation and decision-making in collaborative interpretation and cultural heritage management. This method contributes to a clearer understanding of how to reconcile and negotiate different value perspectives during collaborative planning processes. This study needs to fulfill the following objectives to achieve this aim: (1) to identify the perceptions of different stakeholder groups regarding the multivocal values of cultural heritage; (2) to analyze the divergence between stakeholders and official discourse; and (3) to transform these empirical results into an evidence-based conclusion to guide collaborative interpretive practices.

## 2. Materials and Methods

The study was conducted at the World Cultural Heritage site, Longmen Grottoes, in Luoyang, Henan Province, China. The Longmen Grottoes is located in the southern suburbs of Luoyang, 13 km from the city center, at 34°33' north latitude and 112°28' east longitude. As shown in Figure 1, the Longmen Grottoes is located within the landscape formed by the Longmen Mountains and the Yi River valley. The Yi River traverses the Longmen Mountains, forming the eastern and western hills and the intervening river valley. These hills ascend steeply alongside the river, with precipitous cliffs extending approximately one kilometer, where the Longmen Grottoes has been carved into the limestone cliffs on both sides of the river. The high-quality limestone offered a natural foundation for extensive excavation and sculpting [24]. Therefore, the region's advantageous natural environment, strategic transportation location, and proximity to the ancient capital Luoyang collectively supported the development of Buddhist culture in the Longmen area. The integration of natural scenery, geological conditions, and imperial patronage progressively established Longmen as one of China's most significant centers of ancient Buddhist cave art.

From the regional perspective, the Longmen Grottoes is located in Luoyang, a city rich in cultural resources, which includes 6 World Cultural Heritage sites, 51 nationally protected cultural relic sites, 115 provincially protected cultural relic sites, and 286 municipally protected cultural relic sites. Luolong District, where the Longmen Grottoes is situated, has been recognized as a provincial-level demonstration zone for cultural and tourism consumption and leads the city in the tertiary industry proportion. From 2014 to 2019, the annual number of visitors to the Longmen Grottoes exceeded 3 million, and the considerable ticket and operating revenues generated by tourism have provided a certain level of funding to support heritage conservation efforts. From 2014 to 2019, 8% of funding for various conservation projects at the Longmen Grottoes came from heritage tourism revenue. In addition, continuously improving supporting facilities in the surrounding areas have provided some employment opportunities for local residents [32]. These conditions make

the Longmen Grottoes not only a protected cultural heritage site but also a vital node in the local socioeconomic and tourism systems.

Although the Longmen Grottoes is one of the most important cultural tourism destinations in the area, the average income of the nine administrative villages and communities surrounding the site remains below the average disposable income of Luoyang [32], indicating that the socioeconomic benefits brought by heritage tourism may not be fully reflected at the local community level. Existing management plans have further identified the necessity of strengthening mechanisms for sharing conservation benefits with stakeholders. These characteristics make the Longmen Grottoes a suitable case for studying how different stakeholder groups perceive heritage values and how these differences can be transformed into collaborative interpretation and management strategies.

This study focuses on the first two stages of collaborative interpretation planning rather than the subsequent implementation stages. This focus is justified because the first two stages constitute the cognitive foundation of collaboration, which must be established before the effective development of participatory co-design and management mechanisms. This study focuses on identifying and ranking stakeholder values, thus providing empirical data to support the subsequent collaborative interpretive process. It uses a sequential mixed-methods research design.

Stakeholder value cognition in heritage research is examined using statistical analyses of surveys and interviews to measure differences in perceptions across stakeholder groups [15–18]. Moreover, multi-criteria decision analysis (MCDA) is widely applied in planning, environmental management, and tourism development, using the analytic hierarchy process (AHP) to support collective decision-making among multiple stakeholder groups [33–35]. These three data collection approaches are aligned with our overall research aim.

This study employs a value framework, comprising intrinsic, instrumental, and institutional values, to systematically compare stakeholder value perceptions [11]. This framework encompasses both traditional expert-led value assessments (such as historical and aesthetic significance) and emerging participatory and institutional management-oriented value concerns (such as social function, identity, and sustainability). It provides a coherent structure for analyzing value pluralism within a collaborative interpretive context.

Therefore, this study employs semi-structured interviews to identify the heritage values of multiple stakeholders and to develop a value framework that does not rely solely on expert and institutional perspectives. Value categories are derived and organized into a hierarchical structure of intrinsic, instrumental, and institutional value using content analysis of interview transcripts and policy documents. The final items reflect the Authorized Heritage Discourse (AHD) and include the bottom-up value perception. Questionnaires are used to measure stakeholders' judgments of the importance of identified heritage values, providing data to support the AHP modeling process. Finally, a semantic analysis of the policy will be compared with the value priority rankings derived from the AHP and interview analyses to assess the alignment between official discourse and the perspectives of different stakeholders. Consequently, the methodological framework, shown in Figure 2, provides an empirical basis for collaborative perspectives.

This study uses a sequential mixed-methods design. The investigation was conducted between September 2024 and September 2025. Firstly, in September 2024, qualitative content analysis, using Nvivo (v15), was performed on official policy documents related to the Longmen Grottoes (Longmen Grottoes Nomination 1999, Longmen Grottoes Area Planning 1999, Longmen Grottoes Scenic Area Planning 2008, and Longmen Grottoes Conservation and Management Plan 2022) to create an initial official framework for intrinsic, instrumental, and institutional values. These policies and management documents were formulated

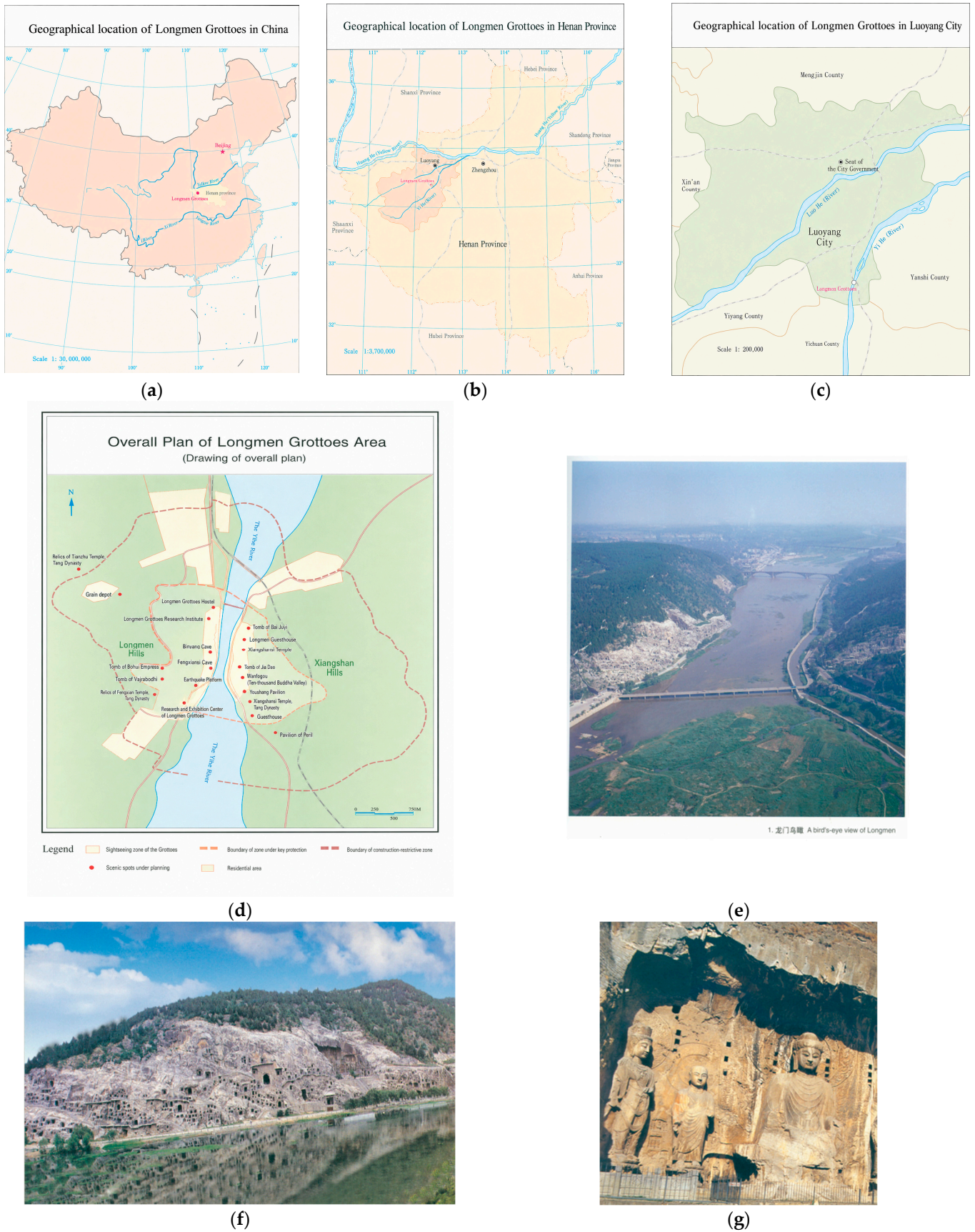
by the National Cultural Heritage Administration of the People’s Republic of China, the Longmen Grottoes Research Institute, the China Academy of Urban Planning and Design, the Henan Provincial Department of Construction, the Longmen Cultural Tourism Zone Management Committee, the Henan Provincial Academy of Urban and Rural Planning, and the Design Institute of Cultural Heritage of China. No clear evidence was found in the documents to suggest that visitors, residents, tourism operators, or members of religious groups were directly involved in their formulation; therefore, the documents are regarded as official and institutional texts and are analyzed as top-down authority discourse. Secondly, from October 2024 to November 2024, semi-structured interviews were conducted with five stakeholder groups (the religious group, residents, tourism operators, visitors, and experts) at the Longmen Grottoes site. The interview questions are provided in Appendix A. This study constructs a stakeholder category matrix, with five categories included in the empirical investigation, to clarify the stakeholder background of the Longmen Grottoes (Table 1). The matrix distinguishes between formal and informal forms of influence and identifies the potential impact of each group to explain the rationale behind stakeholder selection. An expert is defined as follows: within the governance structure of cultural heritage in China, the distinction between academic expertise and administrative authority is often integrated; unlike overseas models, where “experts” may refer strictly to independent scholars, the stakeholders listed under “experts” in this analysis represent Institutional Technical Authorities.

**Table 1.** Stakeholder category matrix.

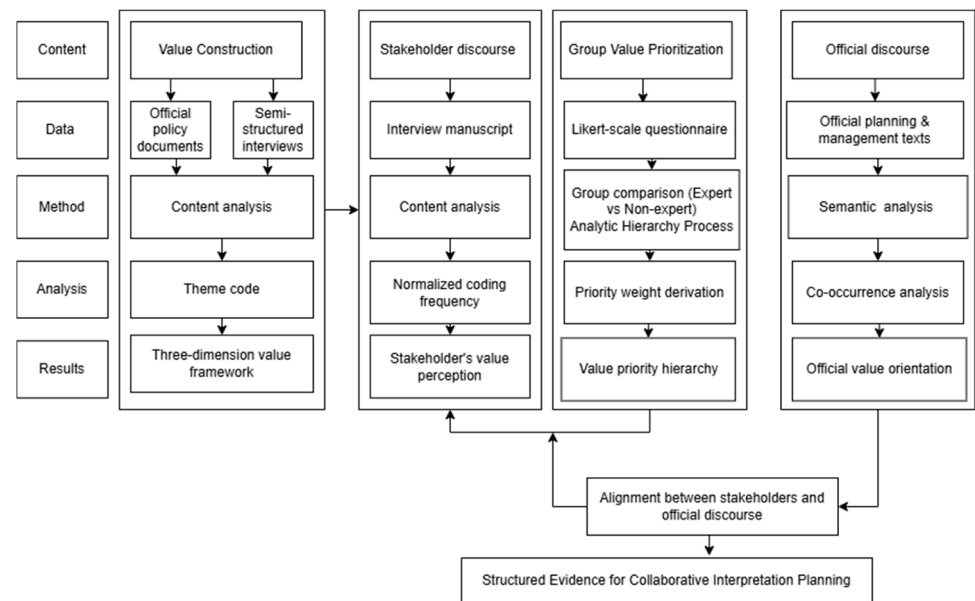
Stakeholder Category	Main Actors in the Longmen Grottoes Context	Form of Influence	Potential Impact
Experts	Longmen Grottoes institution, Luoyang cultural relics, Luoyang urban planning, and design institution	Formal influence	Policy direction, protection, planning, conservation priorities, research, and design
Visitors	Tourists and public audiences	Informal influence	Visitor experience and public understanding
Residents	Local communities and nearby residents, including relocated residents where relevant	Informal influence	Local memory, place attachment, daily life relationship with the heritage site, and community identity
Tourism operators	Tour guides, tourism service providers, surrounding businesses, and tourism-related enterprises	Informal influence	Visitor services, tourism experience, local livelihoods, and commercial operation of heritage
The religious group	Members of the religious group associated with the Buddhist meanings of the site	Informal influence	Buddhist meanings, sacred memory, religious continuity, and spiritual interpretation of heritage

These entities (e.g., the Longmen Grottoes Research Academy, Luoyang Cultural Relics Administration, and Planning Institutes) are the de facto decision-makers. They possess both the technical knowledge and the formal legislative power to draft conservation plans and enforce regulations. Therefore, their “Influence Form” is classified as formal, reflecting a centralized model where policy direction is driven directly by state-designated expert institutions.

Experts are the formal influence actors; informal influence actors include residents, visitors, tourism operators, and the religious group. The sample was intentionally selected without weighting by influence. Interviews focused on stakeholders’ understanding of heritage value. Selection was based on stakeholder roles: tourists ( $n = 15$ ), residents ( $n = 10$ ), tourism operators ( $n = 10$ ), the religious group ( $n = 5$ ), and experts ( $n = 5$ ). These interview data were used to identify and refine stakeholder-based value dimensions.



**Figure 1.** Study area and site characteristics of the Longmen Grottoes (China): (a) location in China; (b) location in Henan Province; (c) location in Luoyang City; (d) heritage area layout; (e) aerial view of the site; (f) landscape features; (g) representative cave.



**Figure 2.** Methodological framework.

Interview transcripts were coded by Nvivo, following three stages. (1) Open coding: Extracting the value description text. (2) Main axis coding: Inductively forming preliminary value dimensions. (3) Selective coding: Integrating these into three major categories—*intrinsic value*, *instrumental value*, and *institutional value*—to construct a preliminary non-expert value dimension. An illustrative example of the coding process from stakeholder statements to value perceptions is provided in Appendix B, Table A1.

Thirdly, from December 2024 to January 2025, official and bottom-up values were synthesized to generate the final value dimension, thereby constructing an integrated framework of heritage value for the Longmen Grottoes.

The integrated three-dimensional value framework was developed in February 2025 into a survey, in which respondents rated the importance of value using a Likert scale from 1 to 5. The questionnaire used in this study is provided in Appendix D, Table A2. The questionnaire survey was used to quantitatively assess the perceived importance of the value dimensions identified via the earlier qualitative phase and to provide the empirical basis for the subsequent AHP weighting and ranking analysis. The interview sample and the questionnaire sample represent two distinct phases in a sequential mixed-methods research design.

A pilot study was completed first to test the reliability and validity of this study. The reliability and validity statistics are reported in Appendix E, Figure A1. After completion of the pilot study, the formal distribution of questionnaires took place in March 2025 at multiple time points throughout the month. Different sampling methods will be utilized for each sampling group. The samples comprise 40 tourists, 30 residents, 30 operators, 5 individuals in the religious group, and 5 experts. The total number of distributed questionnaires was 110; the total number of usable returned questionnaires was 102.

The analytic hierarchy process (AHP) was used to supplement the Likert analysis. All mean Likert scores from residents, tourism operators, the religious group, and tourists were summed to provide a composite non-expert stakeholder judgment; all mean scores from experts were summed to provide a composite expert judgment. These aggregated mean scores were then converted into pairwise comparison matrices, enabling the calculation

of relative value weights with the AHP. Likert-scale mean scores were transformed into ratio-scale judgments as follows:

$$a_{ij} = \frac{\bar{X}_i}{\bar{X}_j}$$

In the weight extraction process, the “column normalization–row average method” was used to derive the priority weights for each indicator [35].

$$w_i^* = w_i / \left( \sum_{i=1}^n w_i \right)$$

This study employs the normalized column mean and row mean method to derive priority weights. First, each column element of the comparison matrix is normalized by dividing it by the column sum. Next, the row means of these normalized values are calculated to obtain the initial weight vector, which is then normalized again to ensure a total sum of 1. The maximum eigenvalue is computed using the following formula:

$$\lambda_{max} = \frac{1}{n} \sum_{i=1}^n \frac{(Aw)_i}{w_i}$$

where A denotes the comparison matrix, and w represents the priority vector. Subsequently, the consistency index (CI) and consistency ratio (CR) are computed:

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

Both the public stakeholder matrix and expert matrix achieved  $CR < 0.1$ , indicating acceptable consistency and validating the derived weights.

$$CR = \frac{CI}{RI}$$

Stakeholder value-orientation comparisons were constructed from interview transcripts to illustrate how various stakeholder groups perceive heritage value at the narrative level. The radar charts were used to compare the expert and different stakeholder groups individually. The radar charts were constructed based on normalized coding frequencies. Specifically, the number of coded references for each value dimension within each stakeholder group was divided by the number of participants and by the group’s total interview duration to control for differences in group size and interview length. This normalization enabled cross-group comparison of relative emphasis on value, the detailed calculation procedure for the radar charts is presented in Appendix C.

To explore management priorities in official discourse, semantic co-occurrence analysis was used on official planning and management-related documents using ROSTCM6 [36]. This involves algorithms for segmenting Chinese words and conducting co-occurrence analysis to construct a semantic structure of the policies under review. Ultimately, the policy semantic structure obtained is compared with the AHP value hierarchy and the stakeholder value perception derived from the interview to assess the alignment between stakeholders’ value priorities and the official semantics.

### 3. Results

#### 3.1. Three-Dimensional Value Framework

A three-dimensional value framework comprising 13 sub-dimensions was formed via the qualitative coding of official documents and stakeholder interviews, covering intrinsic value, instrumental value, and institutional value (Table 2). This framework laid the foundation for the subsequent questionnaire and comparative analysis of stakeholder value priorities.

**Table 2.** Final three-dimensional value framework.

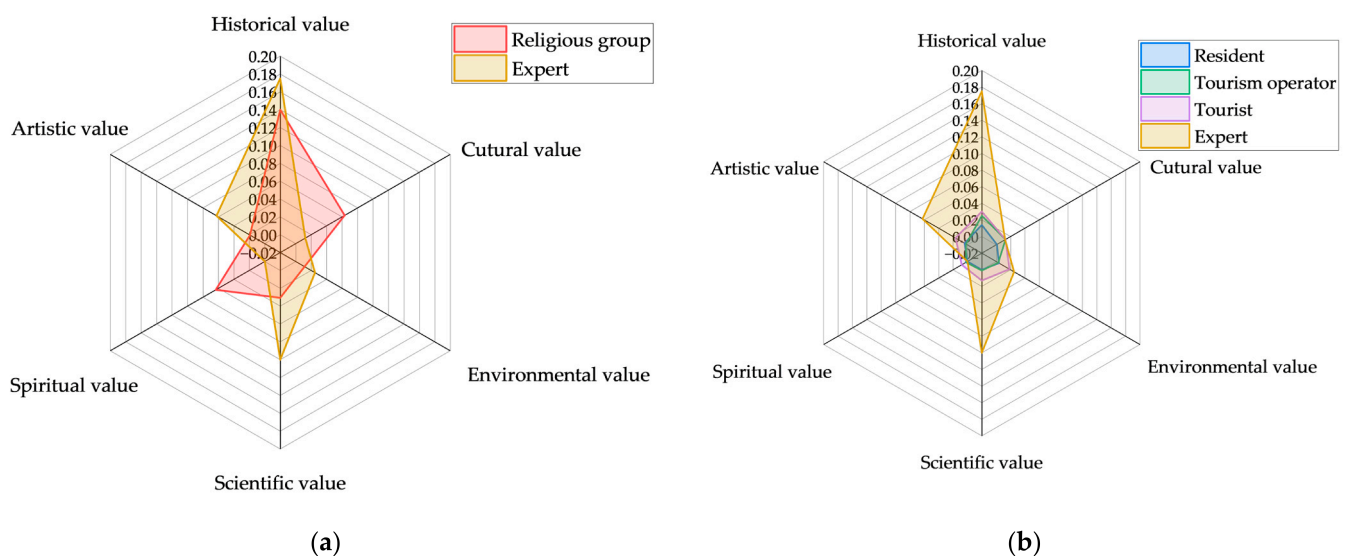
Value Typology	Value Dimensions
Intrinsic value	Historical value, cultural value, environmental value, scientific value, spiritual value, and artistic value
Instrumental value	Educational value, service value, economic value, and social value
Institutional value	Collaborative value, sustainable value, and identity value

### 3.2. Divergence Value Perception Characteristics of Different Stakeholders from the Interviews

The radar charts reveal differences in value perceptions between experts and every other stakeholder group. Given that the three-dimensional value composition observed among residents, tourists, and tourism operators is similar, these groups are compared with an expert for clarity of presentation. The religious group, however, exhibits specific characteristics and is, thus, compared separately with experts.

#### 3.2.1. Divergence in Intrinsic Value

The results of the intrinsic value interviews (Figure 3) reveal that among experts and the religious group, experts exhibit a highly concentrated pattern, placing greater emphasis on historical and scientific value, followed by artistic value. Spiritual value receives the least attention. The religious group, however, exhibits a more balanced pattern. While historical values remain important, they place greater emphasis on spiritual and cultural values. The two groups differ most significantly in the domains of cultural and spiritual values, with the religious group emphasizing these domains more than experts. In addition, experts place significantly greater emphasis on artistic and scientific values than the religious group.



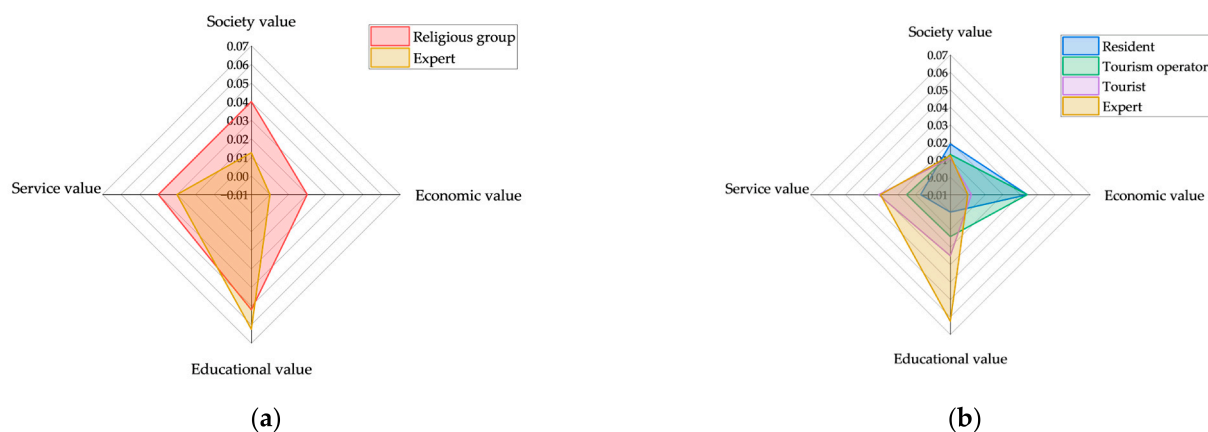
**Figure 3.** This shows the divergence value perception in intrinsic value: (a) divergence between experts and the religious group; (b) divergence between experts and the secular public group. The measure unit is coded references per participant per minute of interview.

Simultaneously, the results reveal differences between the expert group and secular public groups (residents, tourists, and tourism operators). Compared with experts, residents, tourism operators, and tourists exhibit a more balanced value structure; they distribute attention across multiple value dimensions rather than focusing on a single value. Across the dimensions of spiritual, cultural, and environmental value, these secular public groups show no significant differences relative to expert assessments. However,

experts demonstrate significantly greater focus on the dimensions of historical, artistic, and scientific value than other secular public groups.

### 3.2.2. Divergence in Instrumental Value

The results of the instrumental value interview (Figure 4) reveal that the expert group shows a strong education-oriented value structure. In contrast, the religious group exhibits a more balanced distribution pattern, placing greater emphasis on social, economic, and service values than the expert group. Although educational value is important to both groups, the expert group emphasizes it more than the religious group.



**Figure 4.** This shows the divergence value perception in instrumental value: (a) divergence between experts and the religious group; (b) divergence between experts and the secular public group. Unit: Coded references/(person·min).

The results also reveal that divergence among experts, tourism operators, tourists, and residents in social value is relatively small, whereas divergence in educational and economic value is pronounced. Residents and tourism operators emphasize economic value significantly more than experts. Experts pay more attention to service value than residents and tourism operators, similar to the amount of attention paid by tourists. Meanwhile, experts are more concerned with educational value than these stakeholders.

### 3.2.3. Divergence in Institutional Value

The results of the institutional value interviews (Figure 5) reveal that experts, residents, tourism operators, and tourists share highly consistent priorities across value dimensions, including collaboration, sustainability, and identity value. While the expert group emphasizes sustainable value slightly more than the other three groups, the other three groups are slightly more concerned with the value of identity than the experts. However, the religious group exhibited markedly different results, placing significantly greater emphasis on these three institutional values than the expert group.

## 3.3. Value Priority Results

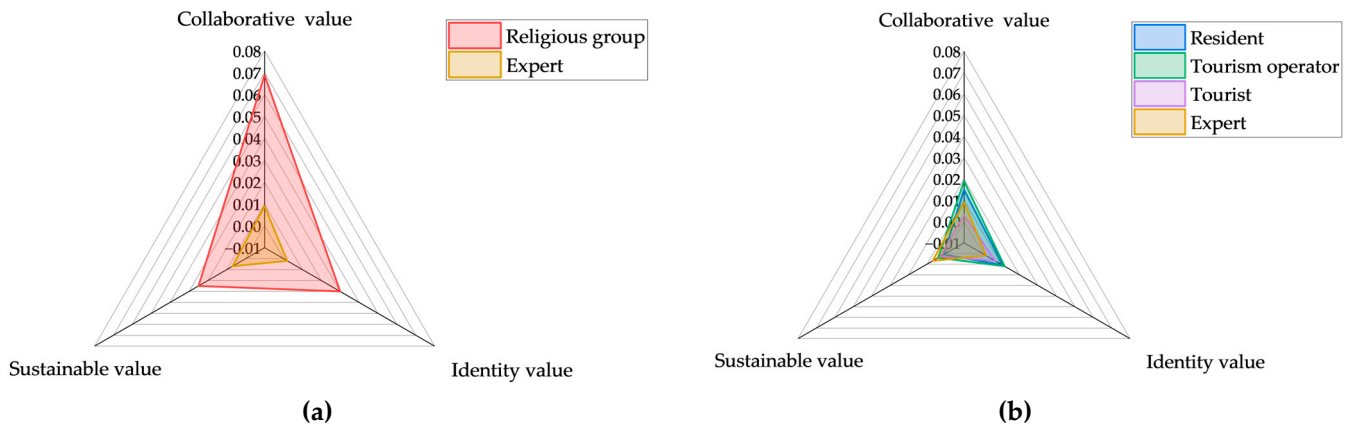
### 3.3.1. Judgment Matrix Construction and Consistency Check

The consistency of the pairwise comparison matrices was assessed before comparing value priorities; both matrices achieved satisfactory consistency (Table 3). This indicates that the priority weights are valid and internally consistent.

### 3.3.2. Overall Value Priority Results

The scores from all non-professional stakeholders, including residents, tourism operators, tourists, and the religious group, were aggregated to represent the perspective of public stakeholders to conduct the analysis using the analytic hierarchy pro-

cess (AHP). Expert judgments were analyzed separately. This aggregation method enables a clear comparison of the value priorities of professionals and non-professionals in collaborative decision-making.



**Figure 5.** This shows the divergence value perception in institutional value: (a) divergence between experts and the religious group; (b) divergence between experts and the secular public group. Unit: Coded references/(person·min).

**Table 3.** Consistency check results of AHP matrices.

Criteria	$\lambda_{max}$	CI	CR	Consistency Test	Results
Experts	13.06516451	0.005430376	0.00348101	<0.01	Acceptable
Non-experts	13.06852697	0.005711	0.003661	<0.01	Acceptable

The priority weights were derived from the AHP pairwise comparison matrices after the matrices passed the consistency tests. Table 4 presents the priority weights and rankings of the 13 heritage value dimensions for experts and non-expert stakeholders.

**Table 4.** Value priority ranking of heritage values between experts and non-experts.

Value Typology	Non-Expert Weight	Expert Weight	Sort by Rank (Public)	Sort by Rank (Expert)
Sustainable value	0.080534855	0.079333142	1	4
Identity value	0.079676143	0.078183386	2	6
Historical value	0.078986107	0.080195458	3	2
Scientific value	0.078388076	0.07703363	4	8
Social value	0.078204067	0.077608508	5	7
Artistic value	0.077958721	0.079333142	6	3
Educational value	0.077560033	0.081057775	7	1
Collaborative value	0.076854663	0.079333142	8	5
Cultural value	0.076639985	0.076746191	9	9
Environmental value	0.075811942	0.076746191	10	10
Service value	0.075029902	0.074159241	11	12
Economic value	0.074891894	0.074734119	12	11
Spiritual value	0.069463612	0.065536074	13	13

Although the absolute weight differences are modest, ranking differences are observed between expert and non-expert stakeholders. Both groups rank economic, service, environmental, and spiritual values as the lowest. Their rankings remain consistent

across the two groups. However, the value-weight priority structures differ between non-experts and experts. For non-expert stakeholders, the three most important values are sustainability value (0.0805), identity value (0.0797), and historical value (0.0790). Experts assign the highest ranks to educational value (0.0811), historical value (0.0802), and artistic/collaborative/sustainable value (approximately 0.0793).

### 3.4. Official Semantic Analysis

An analysis of the Longmen Grottoes management policy documents based on word co-occurrence is shown in Table 5. It presents the value perceptions of official semantics and the corresponding value dimensions by identifying high- and low-frequency semantic co-occurrence terms. The results from the analysis of the official semantic network indicate that official discourse is densely connected around “protection, management, and planning,” suggesting that official management logic is oriented toward institutionalization, control, and formal management tools. Additionally, semantic clusters associated with “research, grottoes, and research institutions” exhibit a high degree of connectivity, suggesting that knowledge generation and scientific inquiry are the primary support mechanisms for the structure of official management. Finally, there are considerable connections among “protection, engineering technology, monitoring, and measures,” illustrating the technology-oriented nature of official management logic.

**Table 5.** Co-occurring analysis.

Semantic Cluster	Co-Occurring Terms	Related Value
Protection–management–planning	Management–protection (238); planning–protection (165); planning–management (137)	Historical value; scientific value; sustainability value
Engineering–monitoring–measures	Engineering–protection (72); monitoring–protection (59); measures–protection (68)	Scientific value; sustainable value
Research–research institutions–protection	Research–Grottoes (122); research–protection (114); research institute–Grottoes (79)	Scientific value; educational value
Culture–cultural relics–heritage	Heritage–culture (131); Grottoes–culture (127); protection–cultural relics (114)	Cultural value; artistic value
Environment–range–protection	Environment–Grottoes (86); environment–Longmen (83); range–protection (78)	Environmental value; sustainability value
Utilization–development–protection	Protection–utilization (70); development–Grottoes (70); utilization–Longmen (62)	Service value; economic value
Tourists–exhibition–service experimental	Grottoes–tourists (52); exhibition–Grottoes (83); exhibition–protection (58)	Service value; experiential value
Absence of social participation and identity	Public (23); residents (17); participation (26)	Identity value; social value

Moreover, the cultural significance within official semantics is primarily expressed through associations with tangible physical objects. The co-occurrence analysis of the words “heritage, culture, grottoes, and cultural relics” supports this point.

In addition to the environmental management semantic cluster, terms indicating policymakers’ views of the environment include “environmental,” “scope,” and “protection.” The presence of this semantic cluster indicates that in official documents, environmental issues are addressed via both spatial zoning and ecological regulation or control.

Furthermore, several terms refer to both use and development and are also associated with protection-oriented language. In this context, the use of protection-oriented language

suggests that policymakers emphasize the need to use and develop it responsibly, while adhering to protection-oriented principles.

Moreover, the reference to “grottoes” is primarily associated with the term “tourist.” Additionally, the types of exhibitions being developed for tourists co-occur with both “grottoes” and “protection.” Therefore, policymakers tend to incorporate tourists into policy formulation primarily using exhibition-based methods.

However, the co-occurring words related to residents, social participation, and identity recognition are absent, and only single terms appear.

Overall, the results of the official semantic analysis reveal that the management logic of the Longmen Grottoes is expert-oriented and technologically structured, with protection as the core organizing principle and closely integrated with planning, management, engineering, and scientific research. Other stakeholders are rarely mentioned.

## 4. Discussion

### 4.1. Divergence Value Perception Among Different Stakeholders

The results of value perception among different stakeholders and the value priorities support previous critiques of the expert-led heritage value framework, showing that the concerns of non-expert stakeholders differ from the experts’ priorities in the Longmen Grottoes. Non-experts tend to understand heritage value through their own roles and relationships to the heritage.

Experts’ perceptions in terms of intrinsic value are based on archaeological authenticity, scientific research, and knowledge production. This character aligns with the AHD. This statement holds that academic expertise and material evidence are the main carriers of heritage value [5]. In contrast, residents, tourism operators, and tourists exhibit much more diverse value perceptions, indicating a broader understanding of heritage value. The perception of heritage value for each of these groups is informed by their life experiences and the context in which they are engaged [37]. What distinguishes these two groups is that the religious group regards heritage as a space of meaning with enduring spiritual functions and cultural continuity, rather than as an object for scientific assessment. Consequently, heritage sites primarily serve religious purposes of worship, contemplation, and the maintenance of religious significance, and the religious group interprets heritage in the sacred tradition of the religion, not a secular managerial structure [38,39].

The distinction in instrumental value perception underscores the role-based, functionally expected focus. The education orientation of the experts aligns with their respective institutional roles in interpretation, knowledge dissemination, and heritage education. This aligns with the AHD, in which experts serve as legal agents responsible for defining and conveying heritage value [5,40]. Compared with experts, visitors also emphasize educational benefits but place greater emphasis on service quality. This finding is consistent with the view that heritage sites provide important learning opportunities for tourists. However, such learning is not experienced in isolation; it is embedded within broader experiential and service contexts [41]. This can explain why visitors emphasize the educational value and service value of the Longmen Grottoes. In contrast, residents and tourism operators emphasize the importance of economic value more than experts, which reflects their livelihood ties with the heritage and their expectations for earning from the heritage [42,43]. Meanwhile, the religious group shows a more balanced distribution. Compared with the expert group, they pay more attention to social, economic, and service values, indicating that their understanding of the function of heritage is closer to a comprehensive social practice space, rather than being limited to a single purpose.

The emphasis on collaborative and identity value by the religious group in the institutional value outcomes indicates that they view heritage management as a relational and par-

ticipatory process, closely linked to collective identity and sustained social engagement [39]. This contrasts with an expert-driven approach, which primarily advances sustainability via institutional planning, regulation, and technical conservation expertise [4,5]. Non-experts tend to emphasize higher levels of identity-value than experts, indicating that their desire for recognition, belonging, and inclusion is important to them in the management process. Such orientations align with the view that heritage is a site where narratives of inclusion and exclusion shape identity in plural societies [37,44]. In contrast, experts emphasize sustainability in line with their professional role in long-term planning. These differences are relatively minimal, indicating a high level of agreement on institutional values. This aligns with collaborative planning perspectives, which emphasize shared understanding and strategic orientations, even when the stakeholder priorities differ [19,45].

#### *4.2. Alignment and Misalignment Between Stakeholder Values and Official Discourse*

The results of the official discourse analysis indicate that stakeholders' value perceptions have not been fully reflected in the current heritage management of the Longmen Grottoes.

The results show that a conservation-oriented framework has been established and implemented via management, planning, engineering, research, and monitoring. Such policies related to conservation technology provide a clear channel for expressing values such as history, education, and science; this explains why experts prioritize these values, as they can effectively manage their value orientations via research institutions, planning documents, and technical means.

Although the environment constitutes a semantic cluster in official discourse, its overt manifestation is through zoning, boundary control, and technical measures. Hence, environmental value in current management is construed more as a control mechanism than as a value embedded in daily life experiences. Similarly, while the terms "utilization" and "development" appear in policy texts, they primarily emphasize their subordination to and normative role in protecting heritage, rather than responding to non-expert demands to use heritage to develop local livelihoods or experiences. Additionally, official discourse acknowledges the presence of tourists, but tourists can be engaged only through exhibition practices closely associated with the promotion of protection objectives. Tourists are participants in presentations as audiences but not as active participants in the governance of heritage.

Conversely, stable co-occurrence among terms related to public participation, residence, and social identity is lacking, suggesting that the current heritage management of the Longmen Grottoes has not incorporated policies that encompass non-experts and their respective values.

In addition, the pursuit of spiritual values by the religious group and their strong inclination toward cooperation are not reflected in the policies.

Alignment and misalignment results are significant to heritage management in interpretation. Values closely aligned with the protection, management, and planning framework, such as science, research, education, and history, are more likely to find clear official policy support. Meanwhile, values related to identity, emotional investment, visitor experience, community participation, and spiritual pursuit require further interpretation under the official discourse. These findings address the limitations of previous descriptive stakeholder studies, which have often identified value differences but have insufficient studies to explore how official policies align with the value perceptions of these various stakeholders to support collaborative interpretation. This study demonstrates how to transform value differences into structured evidence to facilitate collaborative interpretation and management in the context of world heritage.

## 5. Conclusions

This study used the World Cultural Heritage Longmen Grottoes as an example to demonstrate how to systematically translate stakeholders' perceptions of value into evidence that supports collaborative interpretation and heritage management. This study integrated qualitative interviews, questionnaire surveys, AHP analysis, and official semantic analysis, thereby completing the first two stages of collaborative interpretation: identifying stakeholders' values and transforming value differences into structured empirical evidence.

In this study, the Longmen Grottoes case was classified into three distinct groups: expert authorities, the religious group, and the secular public, including residents, tourism operators, and visitors.

Moreover, this study revealed an important difference between the groups' perceptions of heritage's value. The religious group tended to emphasize the spiritual value and enduring sanctity of the heritage, as well as the importance of collaborative heritage management. Secular groups generally regarded cultural heritage as more closely linked to their identity, emphasizing livelihood and experience. Meanwhile, experts were more likely to view cultural heritage as a de-subjectified object, tending to prioritize values that can be more easily interpreted via formal management and research systems. These differences indicate that different stakeholders interpret heritage through distinct social roles and actual relationships with cultural heritage; their respective cultural logics shape their perceptions.

The findings indicate that current policy for heritage management at the Longmen Grottoes aligns with an expert-oriented value orientation; however, other groups (religious and secular) are insufficiently represented in official discourse. Values related to identity, experience, livelihoods, participation, and sacred significance lack institutional interfaces.

This study identifies differences in values and provides evidence that these differences can be translated into decision-making knowledge to support collaborative planning for the future management of cultural heritage interpretation. This means moving away from an exclusively expert-based management system to one that incorporates input from both secular and religious voices, with experts providing technical assistance, protective measures, and implementation pathways. This approach will enable the application of collaborative planning theories to cultural heritage management practice and prompt the development of sustainable cultural heritage management.

Although the conclusion is drawn from the specific context of the Longmen Grottoes, the proposed methodology can serve as a general analytical framework applicable to other cultural heritage sites that face similar tensions between official discourse and the diversity of stakeholder values.

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**Informed Consent Statement:** All participants were provided with a consent form to sign. The consent form was reviewed and approved by the Research Ethics Committee (UMREC).

**Data Availability Statement:** The original contributions presented in this study are included in this article. Further inquiries can be directed to the corresponding author. The interview transcripts and raw questionnaire data containing personally identifiable information cannot be made fully available due to ethical and privacy considerations. The research procedure and supporting materials are provided in the appendices, including the semi-structured interview questions (Appendix A), an

illustrative example of interview coding (Appendix B, Table A1), the questionnaire (Appendix D, Table A2), and the questionnaire reliability and validity results (Appendix E).

**Acknowledgments:** The authors appreciate all participants who took part in the field research. They were cultural relic protection experts, researchers on the Longmen Grottoes, and designers specializing in urban planning and Longmen tourism. Additionally, tourists, the religious group (including monks and abbots from surrounding temples), tourism operators (including souvenir shop owners, hotel managers, and venue managers), and community members are covered by the Longmen Grottoes policy. The authors extend gratitude to both the professors and the anonymous reviewers for their valuable feedback and comments.

**Conflicts of Interest:** The authors declare no conflicts of interest.

## Appendix A. Semi-Structured Interview Questions

1. When you mention the Longmen Grottoes, what comes to your mind first?
2. What does the Longmen Grottoes, as a World Cultural Heritage Site, mean to you?
3. When talking about the value of the Longmen Grottoes, what key words would you think of?

## Appendix B. Illustrative Example of NVivo Coding from Stakeholder Statements to Value Dimensions

**Table A1.** This is the religious group three-layer coding table (value dimension).

Code	Selective Coding	Axial Coding	Open Coding	Original Statement
IV01a	Intrinsic value	Historical value	Historical figures	"Emperor Xiaowen greatly expanded the construction of temples."
IV01b	Intrinsic value	Historical value	Temple history	"The Guanghua temple, the ancestral temple of Tang Mi Buddhism, is adjacent to the Longmen Grottoes."
IV02a	Intrinsic value	Cultural value	Buddhist culture	"The Longmen Grottoes embody the prosperity of Buddhism during the Tang Dynasty."
IV02b	Intrinsic value	Cultural value	Site culture	"The Huangjue temple has a well that is over a thousand years old."
IV04a	Intrinsic value	Scientific value	Restoration and conservation	"Heritage preservation is crucial; restoration and maintenance must adhere to the principle of 'restoring old structures to their original condition' without altering their original appearance."
IV04b	Intrinsic value	Scientific value	Construction methods	"The project is massive, especially the uniqueness of the Lushena Great Buddha."
IV05a	Intrinsic value	Spiritual value	Pilgrimage	"Worshiping the Buddha, temple meditation, sitting meditation and chanting sutras."
IV05b	Intrinsic value	Spiritual value	Religious atmosphere	"The removal of the monks from Xiangshan Temple has left the temple without a soul."
IV06a	Intrinsic value	Artistic value	Carving details	"The carving of Wu Zetian's face is exquisite."
IN01a	Instrumental value	Educational value	Integration of ancient and modern elements	"Tea ceremony, incense ceremony, flower arrangement, and Zen meditation classes." "Fun activities such as counting the Arhats to learn about their different images and meanings."

Table A1. Cont.

Code	Selective Coding	Axial Coding	Open Coding	Original Statement
IN01b	Instrumental value	Educational value	A contemporary approach	"Eliminating rigid religious elements, using culture as a medium to transform the teachings of Buddhist sages into a cultural form."
IN02a	Instrumental value	Service value	Facility services	"The temple provides tea and other refreshments free of charge to everyone."
IN02b	Instrumental value	Service value	A contemporary approach to pilgrimage	"Adapting to the development of the new era and people's spiritual needs."
IN03a	Instrumental value	Social value	Improvement of the surrounding environment	"Improving the surrounding environment, widening roads, and enhancing greenery."
IN03b	Instrumental value	Social value	Cultural confidence	"Longmen Grottoes is one of China's four major stone grottoes and is very famous."
IN04a	Instrumental value	Economic value	Facility costs	The government should provide more financial support to the surrounding temples to improve the appearance."
IS01a	Instrumental value	Collaborative value	Surrounding area synergy	"More media should be used to promote the temples with profound historical significance around the World Heritage Site."
IS01b	Instrumental value	Collaborative value	Departmental collaboration	"The government's current policies have played a good role in protecting ancient buildings."
IS01c	Instrumental value	Collaborative value	Multi-cooperate	We must unite all available resources.
IS02a	Instrumental value	Sustainable value	Intergenerational memory	"It is important to make more people know these temples' relationship with Longmen Grottoes to enhance the memory."
IS02b	Instrumental value	Sustainable value	Religious atmosphere and spiritual continuity	"but first we must resolve internal matters within the temple."
IS03a	Instrumental value	Identity value	World Cultural Heritage status	"If the monks can be invited back, the Buddhist significance of the Longmen Grottoes can be better preserved."
IS03b	Instrumental value	Identity value	Pride	"As a member of the religious group, I feel proud to see current development of Longmen Grottoes."

### Appendix C. Calculation for Radar Charts

The radar chart is used to compare stakeholders' perceptions of value at the descriptive level, with data representing the frequency of mentions. However, presenting coding results directly may over- or underestimate a particular group's perception of value due to the varying interview durations and participant numbers across stakeholder groups. Therefore, this study standardized the coding results. The calculation method is as follows: normalized frequency = (number of coded references ÷ number of participants ÷ total interview duration).

## Appendix D. Questionnaire

**Table A2.** This is the questionnaire to survey the value perceptions of different stakeholders.

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Dear Participants:  
 Hello! I am a student at the University of Malaya and I am conducting a survey on the perceived value of visitors to the Longmen Grottoes. Thank you very much for taking the time to fill it out. We will conduct a statistical analysis of the questionnaire. The respondents and the content will be anonymous and not made public. Please make your choice based on the actual situation, and thank you again for your support!

Your gender:

Male  Female

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Your age is:

A. 18–24

B. 25–34

C. 35–44

D. 45–54

E. 55–64

F. >65

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Your educational background is:

A. Primary school

B. Junior high school

C. High School

D. College

E. Master's degree

F. Doctor

G. Others \_\_\_\_\_

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Your profession:

A. Civil servants

B. Staff of public institutions

C. Enterprise unit personnel

D. Individual business owner

E. Farmer/Worker

F. Retirees

G. Others \_\_\_\_\_

---

For the purpose of visiting Longmen Grottoes:

<input type="radio"/> Heritage enthusiasts who come specifically to learn about the history and culture of the heritage	<input type="radio"/> Mainly for leisure and entertainment, with a certain interest in heritage
<input type="radio"/> Leisure sightseeing	<input type="radio"/> Interested in religion, worship Education, family trips
<input type="radio"/> Academic research, field trips	<input type="radio"/> Education, family trips
<input type="radio"/> Have a special interest in architecture, art, etc.	<input type="radio"/> Local tourists
<input type="radio"/> Not the main destination, just drop by	<input type="radio"/> Others

---

Your place of residence (city/province): [Fill-in-the-blank]  
 \_\_\_\_\_

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Please rate the importance of the following historical values: Completely disapproving = 1, Disapproving = 2, Neutral = 3, Approving = 4, Very approving = 5

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Table A2. Cont.

Historical value item	1	2	3	4	5
The figures associated with the Longmen Grottoes (such as Jin Gang Zhi, Shan Wu Wu, Wu Zetian, Emperor Xiaowen of the Northern Wei Dynasty, Bai Juyi, etc.) and related historical events are important components of the historical value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The Longmen Grottoes are the largest existing grotto temple site in China, representing the high achievements of Chinese Buddhist art from the 5th to the 10th century AD, and are an important part of the historical value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The various temples associated with the Longmen Grottoes (Xiangshan Temple, the Ten Temples of Longmen, Fengxian Temple, Qianxi Temple, the site of Fengxian Temple, the site of Tang Dynasty Xiangshan Temple and unearthed artifacts, etc.) are important components of the historical value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The Longmen Grottoes, which witnessed the development and changes in many fields such as politics, economy, religion and culture in ancient China, are an important part of the historical value of the Longmen Grottoes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please rate the importance of the following cultural values: Completely disapproving = 1, Disapproving = 2, Neutral = 3, approving = 4, very approving = 5					
Cultural value item	1	2	3	4	5
Buddhist culture is an important part of the cultural value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grotto temple culture is an important part of the cultural value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The Longmen Grottoes are a witness to the cultural exchange and integration between China and the West along the Silk Road, and have had a profound influence on grotto and sculpture art in China and Asia. They are an important part of cultural value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Folk activities and some intangible cultural heritages (such as peony stones, Tang Sancai, etc.) are important components of the cultural value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please rate the importance of the following environmental values: Completely disapproving = 1, Disapproving = 2, Neutral = 3, Approving = 4, Very approving = 5					
Environment value item	1	2	3	4	5
The site landscape formed by the Longmen Grottoes and the surrounding East and West Hills as well as the Yi River is a masterpiece of the perfect integration of human sculptural art and natural mountain and water beauty, and it is an important component of the environmental value of the Longmen Grottoes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The overall appearance of the important viewing points (Baiyuan, Linggutai, Fengxian Temple) is an important part of the environmental value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Table A2. Cont.

Environment value item	1	2	3	4	5
The stone quality of the Longmen Grottoes is an important component of the environmental value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The ecological forest, the Yique Wetland, the riverside park and the willows along the river in the scenic area are important components of the environmental value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please rate the importance of the following scientific values: Completely disapproving = 1, Disapproving = 2, Neutral = 3, approving = 4, very approving = 5					
Scientific value item	1	2	3	4	5
The construction technology of the Longmen Grottoes, as well as the paintings, costumes and medicines, are important components of the scientific value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The restoration and 3D restoration techniques of the Longmen Grottoes are important components of their scientific value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Continuous archaeological excavations are important components of the scientific value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please rate the importance of the following spiritual values: Completely disapproving = 1, Disapproving = 2, Neutral = 3, approving = 4, very approving = 5					
Spiritual value item	1	2	3	4	5
People visiting the Longmen Grottoes to worship and burning incense at the surrounding temples are important components of the spiritual value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The religious atmosphere of the Longmen Grottoes themselves and the surrounding temples are important components of the spiritual value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please rate the importance of the following artistic values: Completely disapproving = 1, Disapproving = 2, Neutral = 3, approving = 4, Very approving = 5					
Artistic value item	1	2	3	4	5
The carving details of the Buddha statues, the elegant and graceful figures of the Northern Wei Dynasty, the wide sleeves of the robes, and the plump bodies and round faces of the Tang Dynasty are important components of the artistic value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The style of the statues from different dynasties, the difference between the early "Central Plains style" and the late "Great Tang style", are important components of the artistic value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The inscriptions on the steles of the Longmen Grottoes, especially the calligraphy art of the "Twenty Masterpieces of Longmen", are an important part of the artistic value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please rate the importance of the following educational values: Completely disapproving = 1, Disapproving = 2, Neutral = 3, approving = 4, Very approving = 5					

Table A2. Cont.

<b>Educational value item</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
People will make comparisons between the past and the present and raise awareness of the heritage and its protection is an important part of educational value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The strong desire to bring the stolen relics home after the viewing is an important part of the educational value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The fact that everyone has different details of the grottoes that they want to know further is an important part of the educational value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The educational value of the Longmen Grottoes is reflected in various interesting forms (tea ceremony, flower arrangement, counting arhats, etc.) to introduce people to the Buddhist culture, dynasty history, etc., of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please rate the importance of the following service values: Completely disapproving = 1, Disapproving = 2, Neutral = 3, approving = 4, very approving = 5					
<b>Service value item</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Whether the service facilities of the Longmen Grottoes (catering, rest, toilets, shops, etc.) are sufficient is important for the service value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Whether the presentation facilities of the Longmen Grottoes (display boards, museums, etc.) are sufficient to help visitors understand the value connotation of the Longmen Grottoes is important for the service value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The convenience of parking electric bikes, motor vehicles and public transportation is important for the service value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Whether the tour and visiting patterns of the grottoes can be arranged from the perspective of tourists is important for the service value of Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please rate the importance of the following social values: Completely disapproving = 1, Disapproving = 2, Neutral = 3, approving = 4, very approving = 5					
<b>Social value item</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
The title of World Heritage attracts more visitors, which is an important manifestation of the social value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The cultural and commercial activities (performances, themed events, and exhibitions) organized by the Longmen Grottoes enrich the Luoyang city tour experience and serve as a key manifestation of the Longmen Grottoes' social value.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The Longmen Grottoes are of great significance in promoting cultural inheritance and enhancing national confidence, and they are important parts of the social value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The improvement of the surrounding environment of the Longmen Grottoes is an important manifestation of its social value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please rate the importance of the following economic values: Completely disapproving = 1, Disapproving = 2, Neutral = 3, approving = 4, Very approving = 5					

Table A2. Cont.

Economic value item	1	2	3	4	5
The economic value of the Longmen Grottoes is reflected in whether the entrance fee, museum fee, tour guide fee, and accommodation, food and transportation are reasonable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Whether the villagers and merchants around the Longmen Grottoes can increase their income by taking advantage of the World Heritage status of the Longmen Grottoes is an important indicator of economic value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Longmen Grottoes can drive the overall economic development of the surrounding area and even the city is an important manifestation of economic value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please rate the importance of the following collaborative values: Completely disapproving = 1, disapproving = 2, Neutral = 3, approving = 4, very approving = 5					
Collaborative value item	1	2	3	4	5
Whether the Longmen Grottoes can drive the tourism promotion of other surrounding attractions (Guanghua Temple, Guanlin, Peony Pavilion, etc.) is an important manifestation of the value of the Longmen Grottoes' collaboration and cooperation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Whether the government and the Longmen Grottoes Research Institute can listen to the suggestions of other stakeholders (tourists, residents, merchants, religious figures) and cooperate to promote the scenic spots together is an important manifestation of the value of the Longmen Grottoes' collaboration and cooperation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The transparency of the planning information of the Longmen Grottoes is an important manifestation of the collaborative and cooperative value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please rate the importance of the following sustainable values: Completely disapproving = 1, Disapproving = 2, Neutral = 3, Approving = 4, Very approving = 5					
Sustainable value item	1	2	3	4	5
Making the next generation remember the Longmen Grottoes is an important part of the sustainable value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Developing tourism while maintaining a religious atmosphere is important for the sustainable value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Constantly improving the service facilities of the Longmen Grottoes, exploring their connotations and expanding their extensions are reflection of the sustainable value of the Longmen Grottoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please rate the importance of the following Identity values: Completely not recognized = 1, not recognized = 2, Neutral = 3, recognized = 4, very recognized = 5					
Identity value item	1	2	3	4	5
Whether the image of the Longmen Grottoes can meet people's expectations for the title of World Heritage is an important manifestation of identity value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling proud and shocked after seeing the grottoes is an important part of the identity value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Table A2. Cont.

Identity value item	1	2	3	4	5
The understanding and support from all sides for the protection and promotion of the Longmen Grottoes is an important manifestation of the value of identity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
What other value classifications and contents do you think are missing, please add: [Fill-in-the-blank question]					

## Appendix E. Questionnaire Reliability and Validity

Reliability Statistics	
Cronbach's Alpha	N of Items
0.964	44

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.799
Bartlett's Test of Sphericity	Approx. Chi-Square	3589.529
	df	946
	Sig.	0.000

**Figure A1.** Questionnaire reliability and validity results, including Cronbach's alpha and KMO and Bartlett's test.

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