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Priority Decision-Making for the Regeneration of Traditional Village Landscapes Based on the IPA–EWM Method

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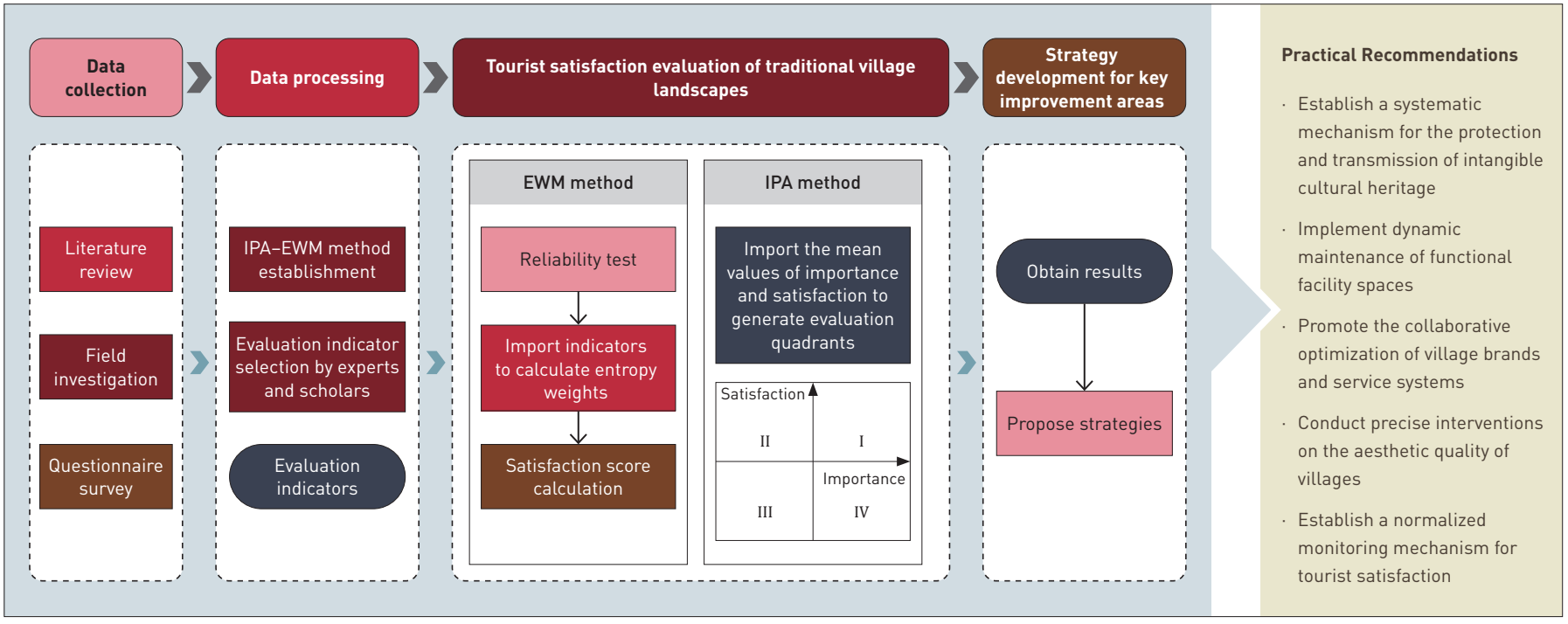
GRAPHICAL ABSTRACT



ABSTRACT

This study focuses on the traditional village landscape of the Yuan River Basin in Hunan Province, aiming to break through the limitations of subjectivity and one-sidedness in existing evaluation methods by coupling the importance-performance analysis (IPA) with the entropy weight method (EWM) to construct a comprehensive evaluation framework for tourists' satisfaction. This study provides an analysis framework that is both scientific and applicable. Based on 569 valid questionnaire data, the study first applies the EWM method to objectively weight 21 landscape factors and then uses the IPA method to analyze the perceived importance and satisfaction of tourists, thereby identifying the optimization level of each factor. The results show that cultural elements account for the highest proportion of the overall weight. Specifically, the continuity of intangible cultural heritage, the adequacy of recreational facilities, and the village popularity and reputation which are classified into the "key improvement area" with IPA indices of 30.957, 27.174, and 20.141, respectively, revealing a significant gap between the current tourist experience

and expectations. This study not only verifies the adaptability and sensitivity of the IPA–EWM method in the satisfaction evaluation of traditional village landscapes, but also provides strong support and decision-making basis for the protection of traditional village landscapes, the optimization of tourism services, and the dynamic inheritance of culture in China. Compared with the previous studies that only use IPA or subjective weighting methods, this method has stronger explanatory power of the results and shows important theoretical innovation and practice guidance in the context of high-quality development of rural cultural tourism.

KEYWORDS

IPA–EWM; Yuan River Basin Traditional Village; Tourist Satisfaction; Landscape Planning and Design; Priority Decision

HIGHLIGHTS

- Integrates IPA and EWM to assess tourists' satisfaction with traditional village landscapes
- Reveals intangible cultural heritage and village reputation as key tourists' satisfaction drivers
- Proposes practical strategies to enhance traditional village landscape construction and rural tourism development

RESEARCH FUNDS

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1 Background

Traditional villages are irreplaceable cultural heritage assets that carry both historical significance and contemporary value[1]. They are not only the physical carriers of local culture transmission but also vividly reflect the historical evolution and cultural characteristics of specific regions through their unique architectural styles, settlement patterns, and natural landscapes. Against the backdrop of rapid rural tourism development, traditional villages have become core resources for attracting tourists[2]. Through the integration of culture and tourism, such villages can not only stimulate local economy but also effectively optimize the employment structure and increase residents' incomes, thereby enhancing socio-cultural identity and promoting sustainable development[3]. However, with the continuous development of rural tourism, tourists' expectations and demands for traditional village landscapes are constantly changing. Accurately evaluating tourist satisfaction, identifying key influencing factors, and proposing targeted priority decisions for landscape optimization have become urgent issues to be addressed.

Importance–performance analysis (IPA) is a strategic analytical tool proposed by John A. Martilla and John C. James in 1977[4]. It is primarily used to analyze the perceived importance and actual performance of various attributes of a product or service, assisting enterprises in identifying areas requiring priority improvement and subsequently formulating optimization strategies. This method has not only been widely applied in fields such as healthcare[5], catering[6], accommodation[7–8], and tourism[9] but has also played a key role in tourist satisfaction research. The IPA method typically uses questionnaires to collect tourists' satisfaction evaluation data, requiring respondents to evaluate relevant factors from importance and satisfaction of their tourist destinations. Importance usually reflects the degree of tourists' expectations or needs for a certain factor, while satisfaction reflects tourists' feelings or evaluations of that factor during their actual experience. Researchers construct an IPA matrix based on the mean values of importance and satisfaction for each factor, visually displaying the relationship between them across four quadrants.

In studies on priority decision-making for landscape regeneration in traditional villages, international scholars have mainly focused on the gap between visitor expectations and actual perceptions, as well as on identifying key attributes requiring improvement, providing theoretical and methodological support for applying IPA to explore satisfaction enhancement and resource optimization. For example, Abraham Pizam et al.[10] pointed out that satisfaction is moderated by tourist expectations, while Metin Kozak[11] and James Wong et al.[12] verified the effectiveness of the IPA method in identifying critical attributes for improvement and optimizing resource allocation in both cross-cultural and urban tourism contexts. Ernest Azzopardi et al.[13] conducted a systematic theoretical evaluation of the IPA method and proposed the potential

of integrating multi-model application methods to improve the accuracy of identifying upgrading priorities. In China, scholars have extensively applied IPA in strategy research for the landscape upgrading of cultural heritage sites such as villages and old towns, and have gradually introduced models such as Long Short-Term Memory (LSTM), Kano Model (Kano), and Structural Equation Modeling (SEM)[14–20] to achieve scientific ranking and optimization of reconstrution schemes. These studies have assessed not only the reconstrution priorities of fundamental elements, including physical space and service facilities in traditional village cultural landscapes[21–26], but also explored the coupling relationships between development factors such as tourism exploitation and visitors' cultural identity, nostalgia, and landscape perception[27–29]. For instance, Wenbin Luo et al.[23] identified the specific shortcomings focused on by tourists in rural tourism landscape quality evaluation through IPA analysis, and formulated reconstrution strategies combined with actual conditions.

However, two limitations remain common in existing research. First, although the IPA method can intuitively and efficiently present differences in visitors' subjective perceptions, its weighting process is vulnerable to subjective bias interference. Second, most studies are primarily based on qualitative analysis and lack a systematic quantitative weighting mechanism, making it difficult to fully reflect the structure of visitor demands and the relative importance of landscape factors[13,19]. For example, Pei Zhang et al.[30] identified key improvement areas in the traditional villages of Bailuyuan using IPA, but failed to effectively address the subjective bias in importance weighting. Si Liu et al.[31] introduced an AHP–IPA model in a waterfront-space study and built a systematic indicator system, yet the results were still limited by expert experience, particularly lacking in the refinement of cultural dimensions. Yunning Zhang et al.[25] emphasized the significant effect of intangible cultural experience on tourist satisfaction in the Anyi Ancient Village Cluster, but focused on a single factor rather than systematically integrating the cognitive structure across multiple landscape elements. To address these shortcomings, the Entropy Weight Method (EWM), as an objective weighting tool, has been introduced into landscape and environmental studies. By calculating indicator weights through information entropy, EWM can effectively reduce the interference of human bias[32]. EWM has been widely applied in green space system evaluation[33], water environment analysis[34–35], visual landscape assessment[36], and ecological conservation and sustainable development[37–38], demonstrating strong applicability and scientific rigor in multi-criteria decision-making contexts.

In summary, the coupling of IPA and EWM can strengthen the logical completeness of satisfaction research and provide a efficient pathway for the precise identification of weak links in traditional village landscapes. Accordingly, this study aims to systematically analyze tourists' perceived importance and actual experience satisfaction regarding various landscape elements of traditional villages in the Yuan River Basin of Hunan Province using the IPA-EWM method. From four aspects—aesthetics, ecology, society, and culture—it identifies landscape elements in urgent need of upgrading, constructs a multi-dimensional and multi-level evaluation system, and proposes priority decisions for landscape improvement, providing a scientific and feasible decision-making reference for traditional village landscape protection and rural tourism development.

2 Study Area and Data Sources

2.1 Study Area

The Yuan River, also known as the Yuanshui, is an important tributary of the Dongting Lake system, flowing through Guizhou and Hunan Provinces. In Hunan, the river extends for 568 km with a basin area of 51,066 km^2, accounting for 24.11% of the province's total land area[39]. The development of traditional villages in this basin can be traced back to the Southern Song Dynasty. These settlements are characterized by clusters of timber buildings and a distinctive spatial pattern of "adapting to the terrain" shaped by rivers and surrounding mountains. Infrastructure such as roads and bridges also preserve traditional construction techniques, reflecting the synergy of nature and humans. As a typical gathering area of traditional villages in southern China, the Yuan River Basin is known for the continuity and long historical accumulation of its cultural heritage. A total of 412 villages in the basin have been included in the Chinese Traditional Villages List, accounting for 58.5% of the total traditional villages in Hunan. These villages completely preserve cultural heritages such as ancient academies, ancestral halls, and wharves. Meanwhile, the village landscape system has the composite characteristics of ecological conservation, agricultural production, and residential functions, forming a multi-scale "mountain–water–field–residence" cultural landscape. Furthermore, as a rural tourism hotspot in Hunan, this basin is facing multiple challenges such as the continuation of traditional culture, infrastructure upgrades, and tourist experience optimization. The contradiction between its protection and development provides a typical sample for tourist satisfaction research.

2.2 Data Sources

The sample villages comprise eight villages: Shibadong, Zhumu, Niuxi, Jinyuan, Shanbei, Chongmudang, Suoyixi, and Gaoping, covering the main landscape types in the upper, middle, and lower reaches of the Yuan River Basin. To improve the seasonal adaptability and sample representativeness of the satisfaction assessment, this study conducted field investigations in three stages in 2024, simultaneously distributing questionnaires through a combination of offline and online methods.

1) 15–22 May, 2024: this stage mainly conducted field observation and offline questionnaires, focusing on vegetation landscapes and village greening during the spring farming season.

2) 10–18 June, 2024: this stage combined offline investigation with supplementary online questionnaires to observe riverine landscapes and the use of waterfront spaces during the plum-rain season.

3) 5–12 July, 2024: matching the summer tourist peak, this stage distributed both offline and online questionnaires and conducted in-village interviews to ensure that the survey context matched actual tourism experiences.

A five-point Likert scale was used to quantify landscape satisfaction, with scores of 5, 4, 3, 2, and 1 corresponding to "satisfied," "relatively satisfied," "generally satisfied," "relatively dissatisfied," and "dissatisfied," respectively. A total of 580 questionnaires were distributed, including 360 offline and 220 online, of which 569 were valid, yielding an effective response rate of 98.1%[①]. To avoid cognitive bias, the offline respondents received one-to-one verbal explanations supported by a plain-language guide, while the online survey included pop-up descriptions and visual examples for each indicator.

The criteria for valid respondents were as follows: age 18 or above, staying in the village for at least 30 min, having direct experience of the landscape, and the ability to complete the questionnaire independently. The average age of the sample was 37 yr, with respondents aged 21–40 accounting for the largest share. In terms of geographic origin, 45% were local residents from the Yuan River Basin, 40% were visitors from other cities in Hunan, and 15% were visitors from the other province, mainly from neighboring provinces. The occupational composition included students, service industry personnel, agricultural practitioners, and retirees; the gender ratio was 55% female and 45% male. The above sample structure exhibits strong diversity and adaptability, providing a reliable foundation for the subsequent comprehensive IPA–EWM analysis.

3 Research Methods

Figure 1 presents the analytical workflow of the study. First, by reviewing literature and combining the characteristics of traditional villages in the Yuan River Basin, a landscape

① The criteria for identifying invalid questionnaires are as follows: 1) completion rate is less than 80%; 2) obvious logical contradictions in answers; 3) selecting the same score for five or more consecutive scale items (regarded as random filling).

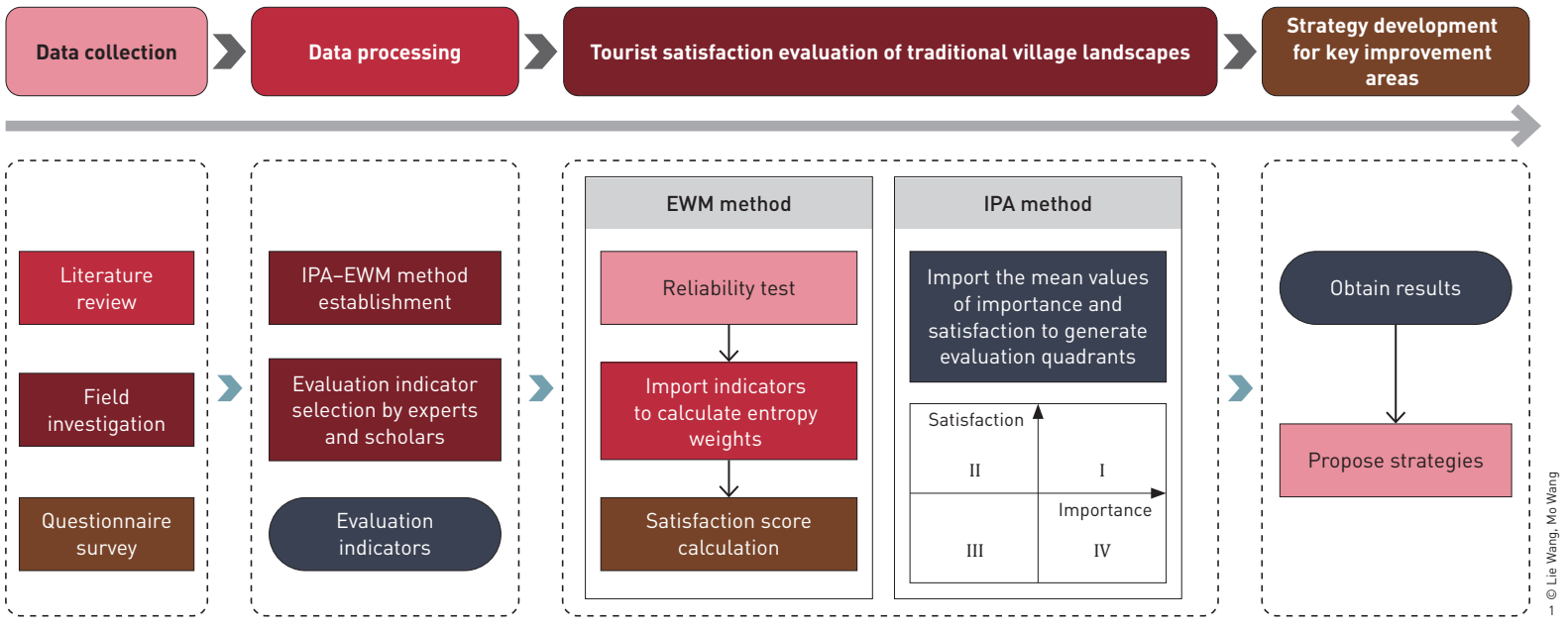

Fig. 1 Technical route map.

evaluation indicator system was constructed; subsequently, field investigations and questionnaire surveys were conducted; after data collection, it was preprocessed and subjected to reliability and validity testing using SPSS; then, the EWM method was used to determine the objective indicator weights, and IPA method was applied to plot the importance–satisfaction four-quadrant matrix of the landscape factors, ultimately clarifying the improvement directions and priorities of each factor, providing a theoretical basis for traditional village landscape optimization.

3.1 Indicator Selection

Drawing on previous studies[10–11,26,40–43], the research objectives, and the complexity of traditional villages, the study initially selected 40 landscape factors. After two rounds of expert consultation involving five cross-disciplinary specialists, the list was reduced to 30 items. It was then further refined through pilot investigation, corrected item–total correlation (CITC) analysis, and exploratory factor analysis (EFA). The tourist satisfaction evaluation indicators for the Yuan River Basin in Hunan were constructed into a three-tier indicator system of "target–landscape element–landscape factor", comprising four elements and 21 landscape factors in total (Table 1).

3.2 EWM Method

EWM determines indicator weights by measuring the degree of information dispersion of the indicators, reflecting their contribution to system uncertainty, thereby reducing subjective bias in manual weighting[38].

1) Standardize the original data matrix in positive or negative form, with the standardized value denoted as x_{ij}, where i = 1, 2, 3, …, m represents the sample, and j = 1, 2, 3, …, n, with n represents the indicator.

2) Compute the proportion p_{ij} of sample i under indicator j:

$$p_{ij} = \frac{x_{ij}}{\sum_{i=1}^{m} x_{ij}}; \quad (1)$$

3) Calculate the information entropy e_j of indicator j based on Shannon entropy, where k is the normalization coefficient:

$$e_j = -k \sum_{i=1}^{m} p_{ij} \ln p_{ij}; \quad (2)$$

4) Derive the entropy redundancy d_j:

$$d_j = 1 - e_j; \quad (3)$$

5) calculate the entropy weight w_j:

$$w_j = \frac{d_j}{\sum_{j=1}^{n} d_j}. \quad (4)$$

Table 1: Evaluation index system of tourists' overall satisfaction (target)

Landscape element	Landscape factor	Definition
Aesthetics	Landscape orderliness (A1)	Degree of order in the overall layout and planning of the village landscape
	Landscape coordination (A2)	Degree of coordination and balance among landscape elements
	Spatial aggregation/dispersion (A3)	Degree of aggregation or dispersion in the spatial distribution of landscape elements
	Environmental cleanliness (A4)	Cleanliness and maintenance condition of the village environment
Ecology	Air quality (B1)	Concentration of pollutants in the air
	Noise pollution (B2)	Intensity of environmental noise
	River water quality (B3)	Pollutant content and clarity of river water
	Use of local materials (B4)	Application of locally distinctive materials in village landscape design
	Vegetation coverage (B5)	Extent of vegetation cover within the village
	Landscape diversity (B6)	Richness and variation of the village landscape

(Continued)

Table 1: Evaluation index system of tourists' overall satisfaction (target) (Continued)

Landscape element	Landscape factor	Definition
Society	Residents' friendliness (C1)	Degree of residents' acceptance of and friendliness toward tourists
	Adequacy of recreational facilities (C2)	Completeness and usability of recreational facilities in the village
	Visitor safety and convenience (C3)	Visitors' sense of safety and convenience in the village
	Richness of recreational activities (C4)	Variety of recreational activities provided by the village
	Tourism management and service quality (C5)	Standardization of tourism management and professionalism of service staff
	Village popularity and reputation (C6)	Public recognition of the village and visitors' evaluations
Culture	Diversity of folk culture (D1)	Richness and diversity of folk culture in the village
	Cultural identity (D2)	Sense of identity and belonging toward village culture among residents and visitors
	Distinctiveness of landscape symbols (D3)	Recognizability of iconic symbols in the village landscape
	Distinctiveness of landscape morphology (D4)	Morphological characteristics and uniqueness of the village landscape
	Continuity of intangible cultural heritage (D5)	Status of transmission and development of intangible cultural heritage in the village

3.3 Reliability Test

To ensure the scientificity and reliability of the questionnaire a reliability analysis was conducted in SPSS 24.0. The overall Cronbach's α coefficient was 0.801 (≥ 0.80), indicating strong internal consistency. A linear regression was then performed to examine the relationship between satisfaction and importance (Table 2). The results indicate a significant positive relationship between the two variables ($I = 2.222 + 0.529P$). The regression coefficient for satisfaction was 0.529, the t value was 4.185, and the relationship was significant at the 0.01 level ($p = 0.001 < 0.01$), indicating that satisfaction significantly influences perceived importance.

To examine the normality assumption of the regression residuals, the standardized residuals of the model were further tested using the questionnaire data on importance and satisfaction. The distribution of standardized residuals was broadly close to normal, centered around zero, and approximately symmetric (Fig. 2). In addition, the normal P–P plot of the standardized

Table 2: Linear regression results for the relationship between tourist satisfaction and importance

Model	Unstandardized coefficient		Standardized coefficient	*T*	*p*
	B	*SD*	*Beta*		
Constant	2.222	0.490	—	4.534	0.000
Satisfaction	0.529	0.126	0.693	4.185	0.001

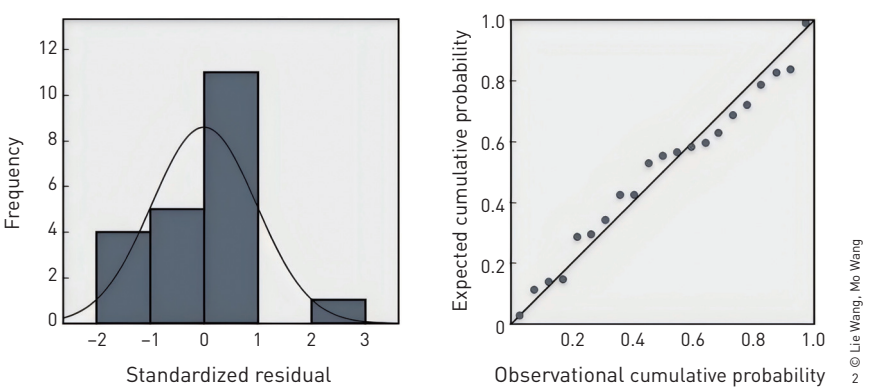

Fig. 2 Histogram of standardized residuals and normal P–P plot of regression standardized residuals.

residuals showed that, although not all points fell exactly on the diagonal, the overall pattern closely followed the reference line, suggesting that the normality assumption was acceptable (Fig. 2).

3.4 Importance–Performance Analysis

The IPA index was calculated using Eq. (5):

$$IPA = (I - P)/I \times 100\,, \tag{5}$$

where I represents importance and P represents satisfaction②. Lower IPA values indicate higher levels of satisfaction.

To observe the impact of different indicators on satisfaction, this study divided the IPA values into 5 levels[41]: very satisfied (no more than 5.00), relatively satisfied (5.01–10.00), moderately satisfied (10.01–20.00), dissatisfied (20.01–30.00), and very dissatisfied (no less than 30.01). Subsequently, taking importance as the horizontal axis, satisfaction as the vertical axis, and the mean of the two as the intersection point to create vertical coordinate axes, it is divided into four quadrants to form the *IPA* matrix chart: 1) Quadrant I: both importance and satisfaction are high, belonging to the advantage maintenance area; 2) Quadrant II: importance is low, but satisfaction is high, belonging to the status quo maintenance area; 3) Quadrant III: both importance and performance are low, belonging to the low-priority development area; 4) Quadrant IV: importance is high but satisfaction is low, belonging to the key improvement area.

4 Results and Analysis

4.1 EWM Analysis

4.1.1 EWM Analysis of the Landscape Elements

The EWM values of the four landscape elements ranked as follows: culture (2.504) > ecology (2.302) > aesthetics (1.428) > society (1.352), indicating that tourists highly value cultural experiences during their travels, with slightly lower attention paid to other elements.

4.1.2 EWM Analysis of the Landscape Factors

The landscape factors with relatively high EWM values were A1 (0.766), B2 (0.751), B1 (0.673), D1 (0.650), and C4 (0.645), indicating that tourists attach great importance to environmental quality, cultural atmosphere, and recreational experience. Factors with relatively low weights included C3 (0.168), B6 (0.137), C6 (0.046), C2 (0.029), and D5 (0.013), showing there is still obvious potential for improvement in the completeness of facility services and the protection and transmission of cultural heritage in traditional villages.

4.2 IPA Analysis

4.2.1 IPA Analysis of the Landscape Elements

The IPA analysis results for the landscape elements (Table 3) show that the mean importance scores ranked as culture > ecology > society > aesthetics, while the mean satisfaction scores ranked as culture > ecology > aesthetics > society.

The mean importance–satisfaction gap ($I - P$) ranked as society > culture > ecology > aesthetics. All four dimensions showed positive gaps, indicating that the visitor expectations exceeded actual experience across the board. The results exhibit that traditional villages need to focus on improving the social environment, recreational facilities, tourism management, and service levels while strengthening cultural construction and ecological protection, to meet the diversified needs of tourists. At the same time, it is also necessary to enhancing the aesthetic quality of the village to provide tourists with a better rural tourism experience.

The mean IPA index ranked as society > culture > ecology > aesthetics, with an overall mean of 9.43, corresponding to the "relatively satisfied" level. Visitors were relatively satisfied with aesthetics, ecology, and culture, whereas society reached only the "moderately satisfied" level overall. Within the social dimension, visitors were very satisfied with the richness of recreational activities and relatively satisfied with residents' friendliness but dissatisfied with the adequacy of recreational facilities and with

Table 3: IPA and EWM analyses of the landscape elements

Landscape element	Importance	Satisfaction	*I* – *P*	IPA index	EWM	Satisfaction level
	Mean	Mean				
Aesthetics	3.93	3.64	0.29	7.379	1.428	Relatively satisfied
Ecology	4.33	4.01	0.32	7.390	2.302	Relatively satisfied
Society	4.18	3.61	0.57	13.636	1.352	Moderately satisfied
Culture	4.51	4.09	0.42	9.313	2.504	Relatively satisfied

② In this research, performance is evaluated with tourists' satisfaction.

village popularity and reputation, making these factors key constraints on overall satisfaction.

4.2.2 IPA Analysis of the Landscape Factors

The IPA analysis of the landscape factors (Table 4) show that the landscape factors rated as "very satisfied" were A1, B1, B2, B3, B4, C4, D1, D2, D3, and D4. Only A1 was a negative value with a high absolute value, indicating its satisfaction is higher than importance, and tourists were very satisfied with this. This may be because the overall layout and planning of the village landscape are orderly, and the elements are harmonious and unified, leaving a deep impression on tourists. While the IPA indices of the remaining landscape factors were all positive, although their absolute values were small, meaning that tourists' satisfaction with these factors is already relatively high, but not reached a level matching their importance. Therefore, under limited resources, priority should be given to improving those factors with larger absolute IPA index values.

Four factors—A2, A3, C1, and C5—fell into the "relatively satisfied" category, suggesting generally high satisfaction and importance perceived by the tourists, which are aspects worth continuing to maintain and optimize in village tourism development. A4, B5, B6, and C3 were classified as "moderately satisfied." The higher IPA indices of these factors indicate that their perceived importance is relatively high, while satisfaction is relatively low, making them aspects that need key attention and improvement in

Table 4: Importance, satisfaction, IPA, and EWM values of the landscape factors

Landscape element	Landscape factor	Importance	Satisfaction	*I* – *P*	IPA index	EWM value	Satisfaction level
		Mean	Mean				
Aesthetics	A1	3.63	3.77	−0.14	−3.857	0.766	Very satisfied
	A2	4.01	3.62	0.39	9.726	0.224	Relatively satisfied
	A3	3.55	3.22	0.33	9.296	0.246	Relatively satisfied
	A4	4.53	3.96	0.57	12.583	0.192	Moderately satisfied
Ecology	B1	4.94	4.85	0.09	1.822	0.673	Very satisfied
	B2	4.80	4.73	0.07	1.458	0.751	Very satisfied
	B3	4.16	3.98	0.18	4.327	0.285	Very satisfied
	B4	3.81	3.64	0.17	4.462	0.279	Very satisfied
	B5	4.19	3.58	0.61	14.558	0.177	Moderately satisfied
	B6	4.07	3.26	0.81	19.902	0.137	Moderately satisfied
Society	C1	4.29	3.87	0.42	9.790	0.206	Relatively satisfied
	C2	3.68	2.68	1.00	27.174	0.029	Dissatisfied
	C3	4.39	3.66	0.73	16.629	0.168	Moderately satisfied
	C4	4.43	4.29	0.14	3.160	0.645	Very satisfied
	C5	4.02	3.73	0.29	7.214	0.258	Relatively satisfied
	C6	4.27	3.41	0.86	20.141	0.046	Dissatisfied

(Continued)

Table 4: Importance, satisfaction, IPA, and EWM values of the landscape factors (Continued)

Landscape element	Landscape factor	Importance	Satisfaction	*I* – *P*	IPA index	EWM value	Satisfaction level
		Mean	Mean				
Culture	D1	4.75	4.66	0.09	1.895	0.650	Very satisfied
	D2	4.41	4.25	0.16	3.628	0.631	Very satisfied
	D3	3.86	3.71	0.15	3.886	0.593	Very satisfied
	D4	4.63	4.46	0.17	3.672	0.617	Very satisfied
	D5	4.91	3.39	1.52	30.957	0.013	Very dissatisfied

village landscape management and planning. By contrast, C2 and C6 were rated as "dissatisfied," and D5 as "very dissatisfied." These factors are very important to tourists, but the tourists' satisfaction is low, which may affect their overall impression of the village and their willingness to visit again.

4.2.3 Quadrant Analysis of the IPA Matrix

Using the mean values of importance and satisfaction (4.25, 3.84) as the intersection point, the 21 factors were mapped into four quadrants (Fig. 3).

1) Quadrant I (strength maintaining area) included A4, B1, B2, C1, C4, D1, D2, and D4. For these factors, their advantages in both importance and satisfaction and should be maintained while seeking further refinement to consolidate tourist satisfaction and loyalty.

2) Quadrant II (status quo maintenance area) included B3.

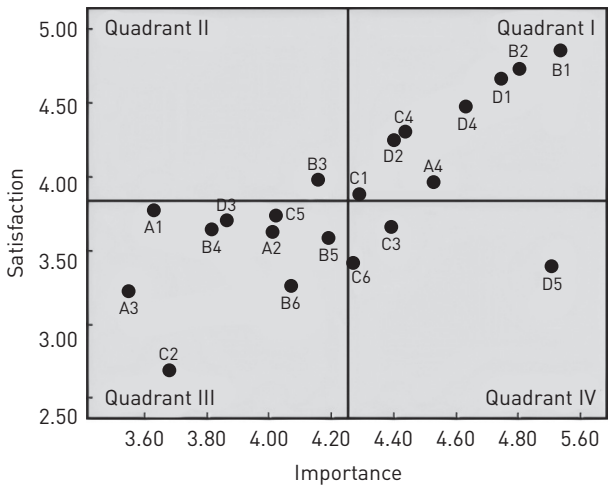

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Fig. 3 Four-quadrant IPA matrix of importance and satisfaction.

This factor was neither overly important nor showed an obvious performance deficit, the status quo can be maintained, although continued monitoring for potential development opportunities is still advisable to prevent future decline.

3) Quadrant III (low-priority development area) included A1, A2, A3, B4, B5, B6, C2, C5, and D3. These factors had relatively high importance but relatively low satisfaction, suggesting that improvement is needed to better match tourists' expectations and demands.

4) Quadrant IV (key improvement area) included C3, C6, and D5. These factors combined high importance with very low satisfaction and should therefore be treated as the primary targets for intervention. Their underlying problems require careful diagnosis and prompt action in order to enhance tourist satisfaction and improve village competitiveness.

5 Discussions

Compared with single IPA analysis or methods relying entirely on subjective weighting, the IPAEWM framework integrates perceived importance with objective weighting and thus provides a more scientific and precise assessment of tourist satisfaction. The results show that cultural factors received the highest EWM value (2.504), highlighting the central role of cultural experience in visitors' overall perceptions. In particular, the continuity of intangible cultural heritage showed a high importance score (4.91) but a relatively low satisfaction score (3.39), resulting in an IPA index as high as 30.957, which falls into the very dissatisfactory category This indirectly corroborates the sensitivity and effectiveness of the IPA–EWM method in identifying key weak

links. The findings further support the view of Fengqun Wei et al.[44] that deficiencies in cultural transmission significantly affect visitor perception, highlighting the urgency for its improvement. In addition, by combining field questionnaires with statistical modeling, this study provides more actionable evidence for interpreting spatial indicators such as landscape coordination and spatial aggregation/dispersion, complementing the nostalgia perception research path based on online texts adopted by Ziling Wang et al.[27].

In the importance–satisfaction four-quadrant matrix, factors located in the Quadarant IV, such as the continuity of intangible cultural heritage, adequacy of recreational facilities, and village popularity and reputation, carry high expectations from tourists but fail to satisfy them, urgently requiring priority intervention. This finding echoes the study by Yunning Zhang et al.[25] on the Anyi Ancient Village Cluster, which similarly pointed out that intangible cultural experiences significantly affect tourist satisfaction, yet implementation is often insufficient in practice. In Quadrant III, factors such as landscape coordination, spatial aggregation/dispersion, and local materials score relatively low in both importance and satisfaction, suggesting that further efforts are needed to improve spatial aesthetics and cultural imagery expression in villages. Additionally, the quadrant division of some factors further shows the need for a coupled analysis. For example, local materials in Quadrant III have a relatively high satisfaction score (3.64) but slightly lower importance (3.81), suggesting that interpretation should integrate EWM weights and actual mean values for comprehensive judgment to avoid misjudgments caused by a single criterion. Therefore, the IPA–EWM approach demonstrates stronger adaptability and explanatory power in balancing subjective expectations and objective evaluations, providing theoretical support and practical guidance for the optimization of traditional village landscape construction.

The IPA–EWM-based evaluation on tourists' satisfaction indicates deficiencies to varying degrees in the protection and transmission of intangible cultural heritage, the adequacy of recreational facilities, village popularity and reputation, and aesthetic quality, all of which require coordinated improvement measures. First, a sound mechanism for the protection and transmission of intangible cultural heritage should be established. Regional cultural activities such as Meishan Nuo Opera, Xinhua folk songs, and Meishan paper-cutting can be organized to enhance visitors' awareness of and participation in traditional culture. This would not only strengthen the continuity of intangible heritage, but also enrich visitors' cultural experiences and improve overall satisfaction[43]. Second, functional spaces such as rest areas, viewing platforms, and cultural exhibition halls should be rationally planned and added to improve the utility and convenience of facilities. In addition, existing facilities should also be properly maintained and updated to ensure efficient operation and service quality, thereby improving the visitor experience. Village popularity and reputation should be enhanced through fully utilization of diversified platforms such as social media and tourism websites by publishing high-quality graphic and video content to expand influence and attract potential visitors. On this basis, there is also a need to continuously optimize the tourism service system by strengthening practitioner training, rational route design, and upgrading catering and accommodation services, so as to establish a positive service image and enhance tourist loyalty and revisit intention. In addition, while respecting and preserving the original features of the village, aesthetic elements should be further optimized by improving landscape planning and design, particularly in terms of order, coordination, and cleanliness. Increasing vegetation coverage and landscape diversity would further improve visual quality and environmental comfort, thereby enhancing the aesthetic experience of visitors. To ensure the continuous and effective implementation of the above measures, it is recommended to establish a dynamic monitoring mechanism for tourist satisfaction, regularly conduct questionnaire surveys and interviews, comprehensively grasp tourist feedback, and adjust and optimize tourism products and services in a timely manner, thereby promoting the scientific, systematic, and sustainable development of traditional village tourism[45–46].

6 Conclusions

This study evaluated tourist satisfaction with traditional village landscapes in the Yuan River Basin of Hunan Province through the IPA and EWM methods, drawing the following conclusions:

1) The traditional village landscapes in this basin are generally relatively satisfying, with a mean IPA index of 9.43. However, society has the highest IPA index (13.636), indicating the large gap between visitor expectations and actual perceptions and thus needs improvement.

2) The analysis of landscape elements shows that culture rank first in both importance (4.51) and satisfaction (4.09), highlighting tourists' high recognition of cultural value. Among landscape factors, air quality and diversity of folk culture receive relatively high weights, reflecting their key role in shaping tourist satisfaction;

In summary, this study provides optimization directions for the landscape construction of traditional villages in the Yuan River Basin, particularly in social elements (adequacy of recreational facilities, village popularity and reputation) and cultural elements (continuity of intangible cultural heritage). However, this study is limited to the Yuan River Basin in Hunan Province, and the applicability of the outcome in other regions remains to be tested. Meanwhile, although the IPA–EWM method combines the advantages of objective weighting and subjective evaluation, it may still be affected by region, season, and tourist group characteristics in practical applications, unable to comprehensively reflect the actual situation of tourist satisfaction with traditional village landscapes in the basin. Furthermore, when constructing the IPA matrix chart, this study has not fully considered the internal connections and mutual influences among the indicators, leading to certain limitations in judging improvement directions and priorities. Future research could conduct deeper explorations of tourist satisfaction regarding the above aspects.

Competing interests | The authors declare that they have no competing interests.

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基于IPA-EWM法的传统村落景观改造优先级决策研究

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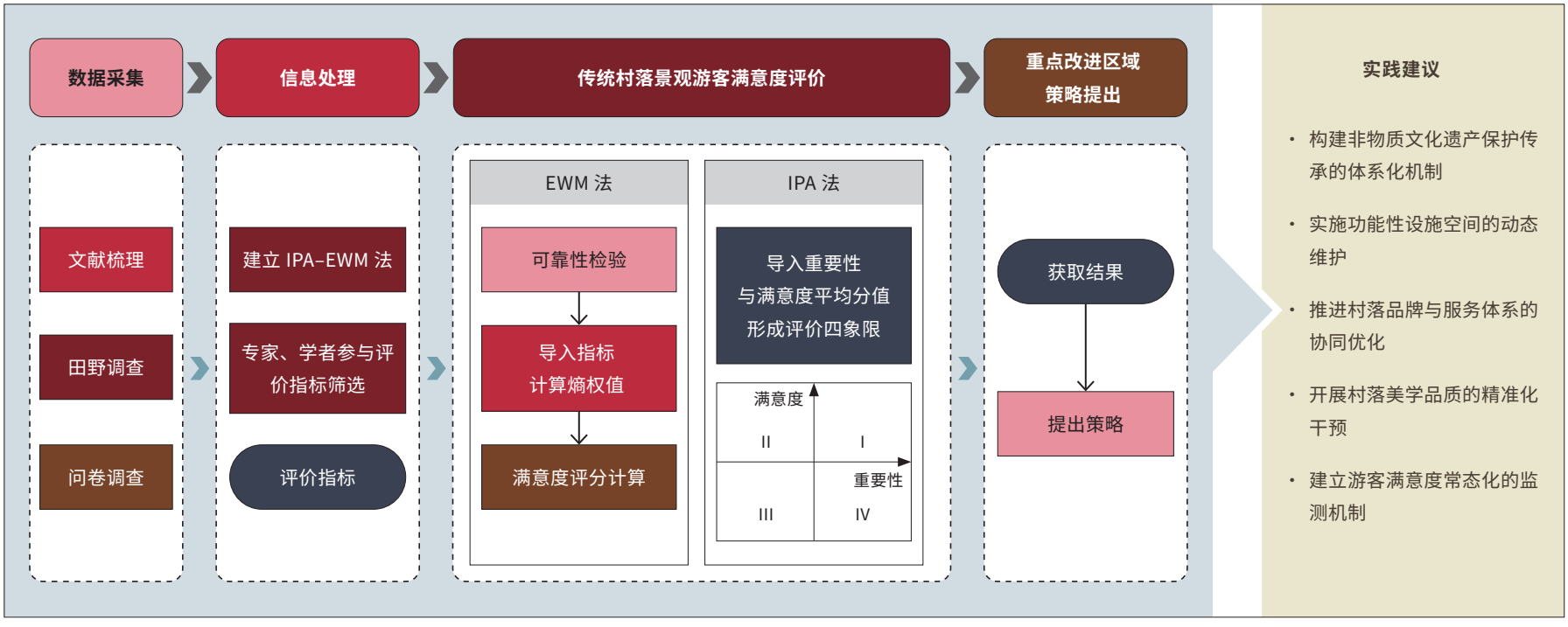
图文摘要



摘要

本研究聚焦湖南沅水流域传统村落景观，通过结合重要性-绩效分析法（IPA）与熵权法（EWM）构建游客满意度综合评价体系，旨在突破现有评价方法中主观性与片面性并存的局限，提供一种兼具科学性与适用性的分析框架。基于569份有效问卷数据，研究首先运用EWM法对21项景观因子进行客观赋权，随后结合IPA法对游客感知的重要性与满意度进行定位分析，从而识别各因子的优化优先级。结果显示，文化要素在整体权重中占比最高，尤其是非物质文化遗产延续性、游憩设施完善度及村落知名度与口碑等因子被归入“重点改进区”，其IPA指数分别高达30.957、27.174和20.141，揭示出当前游客体验与期望之间的显著落差。研究不仅证实IPA－EWM法在传统村落景观满意度评价中的适配性与敏感性，也为我国传统村落景观保护、旅游服务优化及文化活态传承提供了有力支撑与决策依据。相比以往单一使用IPA或主观赋权方法的研究，该方法具有更强的结果解释力，在乡村文化旅游高质量发展背景下展现出重要的理论创新与实践导向。

关键词

IPA-EWM；沅水流域；传统村落；游客满意度；景观规划与设计；优先级决策

文章亮点

- 结合IPA与EWM方法评估传统村落景观的游客满意度
- 揭示非物质文化遗产与村落声誉对游客满意度的关键驱动作用
- 为提升传统村落景观建设和乡村旅游发展提供了实践性策略

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1 研究背景

传统村落作为不可再生的文化遗产，兼具历史传承与当代利用的双重价值[1]。它不仅是地域文化传承的物质载体，还可通过独特的建筑特色、聚落格局及自然景观集中体现特定区域的历史演进与文化特征。在乡村旅游快速发展的背景下，传统村落已成为吸引游客的核心资源[2]。通过文旅融合，这类村落不仅可为地方经济注入活力，还能有效促进就业结构优化与居民收入增长，进而增强社会文化认同并推动可持续发展[3]。然而，随着乡村旅游的持续发展，游客对传统村落景观的期望和需求也在不断变化。如何准确评估游客满意度、识别关键影响因素，并提出有针对性的景观改造优先级决策，已成为亟待解决的问题。

重要性–绩效分析法（importance–performance analysis，IPA）是一种战略分析工具，由约翰·A．马蒂拉和约翰·C．詹姆斯于1977年提出[4]。它主要用于分析产品或服务的各项属性的重要性和实际绩效，以帮助企业识别需要重点改进的领域或区域，进而制定优化策略。这种方法不仅已被广泛应用于医疗[5]、餐饮[6]、住宿[7–8]、旅游[9]等领域，还在游客满意度研究中发挥了关键作用。IPA方法通常使用调查问卷收集游客的满意度评价数据，要求受访者从重要性和满意度两个方面对旅游地相关因素进行评价。重要性通常反映了游客对某一因素的期望或需求程度，而满意度则反映了游客在实际体验中对该因素的感受或评价。研究人员依据每个因素的重要性和满意度均值构建IPA图，并以4个象限直观展示二者之间的关系。

传统村落景观改造优先级决策的研究中，国外学者多关注游客期望与实际感知之间的差异及重点提升对象的识别，为应用IPA展开满意度提升与资源优化探索提供了理论与方法支持。例如，亚伯拉罕·皮赞等[10]指出满意度受游客期望的调节，梅廷·科扎克[11]与詹姆斯·黄等[12]则分别在跨文化背景与城市旅游环境下验证了IPA方法在关键改进属性识别和资源配置优化两方面的有效性。同时，欧内斯特·阿佐帕尔迪等[13]对IPA方法进行了系统性理论评估，提出集成多模型应用方法以提升改造重点识别准确性的潜力。国内学者广泛将IPA应用于乡村、古镇等文化遗景观改造的策略研究中，并逐步引入长短期记忆网络（Long Short–Term Memory，LSTM）、Kano模型、结构方程模型（Structural Equation Modeling，SEM）等多元模型[14–20]，从而实现改造方案的科学排序与优化。这些研究不仅评估了传统村落文化景观所涉及的物质空间、服务设施等基本要素的改造优先级[21–26]，还进一步探讨了旅游开发等发展要素与游客文化认同、乡愁情感与景观感知之间的耦合关系[27–29]。例如，罗文斌等[23]在乡村旅游景观质量评价中，通过IPA分析识别出游客关注的短板要素，并结合实际情况制定了改造策略。

然而，现有研究普遍存在两点不足：第一，虽然IPA方法可直观高效地呈现游客主观感知差异，但在权重设定上易受到主观偏差干扰；第二，多数研究以定性分析为主，缺乏系统的定量权重机制，难以全面反映游客需求结构与景观因子的相对重要性[13,19]。例如，张沛等[30]对白鹿原传统村落的研究通过IPA方法识别关键改进区域，但未能有效应对重要性赋权中的主观偏差问题；刘思等[31]在滨水空间研究中引入AHP–IPA模型，尽管在指标体系构建上具备系统性，但仍受到专家经验的限制，尤其在文化维度的细化上存在不足。张蕴宁等[25]对安义古村群的研究强调非物质文化体验对游客满意度的显著作用，但其聚焦于单一因子，未系统整合各类景观要素之间的认知结构。为弥补这些不足，熵权法（Entropy Weight Method，EWM）作为一种客观赋权工具被引入景观与环境研究领域，通过信息熵计算指标权重，能够有效降低人为偏倚的干扰[32]。EWM已广泛应用于绿地系统评价[33]、水环境分析[34–35]、视觉景观评估[36]、生态保护与可持续发展[37–38]等领域，在多指标决策场景中具有良好的适用性与科学性。

综上，IPA和EWM的耦合不仅能提升满意度研究的逻辑完备性，也为精细化识别传统村落景观薄弱环节提供了高效路径。因此，本文旨在通过IPA–EWM方法，系统分析湖南沅水流域传统村落各景观要素的游客重要性感知与游客实际体验满意度，从美学、生态、社会、文化4方面识别出亟需改造的景观要素，构建多维度、多层级的评价体系，提出景观改造的优先级决策，为传统村落景观保护与乡村旅游发展提供科学、可行的决策参考。

2 研究区域概况与数据来源

2.1 研究区域概况

沅江，又称沅水，是洞庭湖水系的重要支流，流经贵州省与湖南省。其中湖南省境内河段全长568 km，流域面积达51 066 km^2，占全省国土面积的24.11%[39]。该流域传统村落的营建历史可追溯至南宋时期，其聚落空间以木构建筑群为核心，依托水系与山脉形成“因势赋形”的独特格局。道路、桥梁等基础设施亦保留传统营建技艺，体现了自然与人文的协同。作为我国南方传统村落的典型聚集区，其代表性源于文化遗产的时空连续性。沅水流域共有412个村落入选国家级传统村落名录，占湖南省总村落数量的58.5%。这些村落完整保留了古书院、祠堂、码头等文化遗产。同时，村落景观系统兼具生态保育、农业生产与居住功能的复合特征，形成了多尺度“山–水–田–居”文化景观。此外，该流域作为湖南省乡村旅游热点区域，正面临传统文化延续、基础设施升级与游客体验优化等多重挑战，其保护与开发的矛盾性为游客满意度研究提供了典型样本。

2.2 数据来源

样本村落共包含十八洞村、株木村、牛溪村、尽远村、山背村、崇木凼村、蓑衣溪村及高坪村8个村落，涵盖沅水流域上游–中游–下游的主要景观类型。为增强满意度评价的季节适应性与样本代表性，本研究于2024年分3阶段开展田野考察，并同步通过线下与线上相结合的方式开展问卷发放：

1）2024年5月15日—22日，以田野勘察与线下问卷为主，聚焦春耕背景下的植被景观与聚落绿化状态；

2）2024年6月10日—18日，结合线下调研与线上问卷补充，重点观察梅雨汛期的水系景观与亲水空间使用情况；

3）2024年7月5日—12日，匹配暑期游客高峰，同步开展线下问卷发放、线上问卷回收及入村访谈，确保调查场景与旅游实际旅游体验相一致。

问卷采用李克特五级量表对景观满意度进行量化评分，分值设定为5、4、3、2、1，分别代表“满意”“比较满意”“基本满意”“比较不满意”和“不满意”5个评价等级。发放问卷580份，其中线下360份、线上220份，有效回收569份，有效率为98.1%①。为避免认知偏差，线下采用“一对一口头讲解+通俗手册辅助”方式说明指标含义，线上设置“指标说明弹窗”并配以示意图。

受访者遴选标准包括：年龄≥18岁；在村落停留≥30min；对景观有直接观察体验；可独立完成答题。样本平均年龄为37岁，其中21—40岁占比较高。地域来源构成如下：沅水流域本地居民45%、湖南省内其他城市游客40%、省外游客15%（以周边省份为主）。职业结构包括学生、服务业人员、农业从业者及退休人员；性别比例为女性55%、男性45%。上述样本结构具有较强多样性和适配性，为后续IPA－EWM综合评价提供了可靠基础。

3 研究方法

本研究技术路线如图1所示。首先通过梳理文献，并结合沅水流域传统村落特征，构建景观评价指标体系；随后开展田野调查与问卷调查；回收数据后经预处理并借助SPSS做信效度检验；随后以EWM法确定各景观因子的客观权重，并应用IPA分析法绘制景观因子的重要性－满意度四象限图，最终明确各因子的改进方向与优先级，为传统村落景观优化提供理论依据。

3.1 指标筛选

基于现有研究成果[10-11,26,40-43]，结合研究目的和传统村落的复杂性，本研究初步选取40项景观因子，随后经过5位跨领域专家两轮论证删至30项。最后，通过预调研并结合校正项－总分相关系数分析与探索性因子分析，将湖南沅水流域游客满意度评价指标构建为“目标–景观要素–景观因子”3层结构的指标体系，共4个要素、21项景观因子（表1）。

3.2 EWM法

EWM法通过度量指标的信息离散度，反映其对系统不确定性的贡献程度，从而确定各评价指标的权重，避免人为赋权带来的主观偏差[38]。

1）对原始数据矩阵进行正向或负向标准化处理，设标准化后数据为x_{ij}，其中i=1，2，3……，m，m为样本个数，j=1，2，3……，n，n为评价指标个数。

2）计算第i个样本在第j个指标下所占的比重p_{ij}：

$$p_{ij} = \frac{x_{ij}}{\sum_{i=1}^{m} x_{ij}} ; \quad (1)$$

3）基于Shannon信息熵定义，计算第j个指标的信息熵e_j，其中，k为信息熵的归一化系数：

$$e_j = -k \sum_{i=1}^{m} p_{ij} \ln p_{ij} ; \quad (2)$$

4）计算指标的熵冗余度d_j：

$$d_j = 1 - e_j ; \quad (3)$$

① 判定无效问卷的标准如下：1）填写完整度低于 80%；2）答案存在明显逻辑矛盾；3）连续 5 项及以上量表题项选择相同分值（视为随意填写）。

表 1：游客整体满意度（目标）评价指标体系

景观要素	景观因子	释义
美学	景观有序性（A1）	村落景观整体布局和规划的有序程度
	景观协调感（A2）	景观元素之间的协调与平衡程度
	景观空间聚散度（A3）	景观元素空间分布的密集或分散程度
	景观环境整洁度（A4）	村落环境的清洁程度和维护状况
生态	空气质量（B1）	空气中污染物的浓度
	噪音污染（B2）	环境噪音的强度
	河流水质（B3）	河流中污染物的含量和河水的清澈程度
	乡土材料（B4）	在村落景观设计中使用具有地方特色的材料
	植被覆盖率（B5）	村落中植被覆盖的程度
	景观多样性（B6）	村落景观的丰富性和变化性
社会	村落居民友好度（C1）	村民对游客的接纳程度和友好态度
	游憩设施完善度（C2）	村落中游憩设施的完备程度和实用性
	游客安全与便利性（C3）	游客在村落中的安全感和便利性
	娱乐活动丰富度（C4）	村落所提供的娱乐活动种类
	旅游管理与服务水平（C5）	村落旅游管理的规范性和服务人员的专业水平
	村落知名度与口碑（C6）	村落的知名度和游客的评价
文化	民俗文化多样性（D1）	村落中民俗文化的丰富性和多样性
	文化认同度（D2）	村民和游客对村落文化的认同感和归属感
	景观符号鲜明度（D3）	村落景观中标志性符号的识别度
	景观形态特征度（D4）	村落景观的形态特征和独特性
	非物质文化遗产延续性（D5）	村落中非物质文化遗产的传承和发展状况

5）计算各指标的熵权值w_j:

$$w_j = \frac{d_j}{\sum_{j=1}^{n} d_j} 。 \quad （4）$$

3.3 可靠性检测

为了确保问卷量表的科学性和可靠性，本研究使用SPSS 24.0软件进行可靠性分析。结果显示，整体量表的Cronbach's α系数为0.801（≥0.80），表明量表具有良好的内部一致性信。进一步地，通过线性回归分析（表2）检验满意度与重要性之间的关系，结果显示两者呈显著正相关（I=2.222+0.529P）。满意度的回归系数为0.529，t值为4.185，且显著性水平达到0.01（p=0.001＜0.01），表明满意度对重要性具有显著的正向影响。

为检验线性回归分析中残差项的正态性假设，本研究基于问卷调查所得的游客满意度与重要性数据，对回归模型的标准化残差进行了分布检验。结果表明，标准化残差的分布形态整体接近正态分布，其中心位置位于零值附近，且残差在零值上下呈对称分布（图2）。此外，从回归标准化残差的常态P–P图可观察到，数据点虽未完全落在斜线上，但整体分布高度接近，表示结果符合正态分布（图2）。

3.4 IPA分析

IPA指数的计算方式如下：

$$IPA = (I - P)/I \times 100 \ ， \quad （5）$$

其中，I代表重要性值，P代表满意度②，IPA数值越低表示其满意度越高。

为观察不同指标对满意度的影响程度，本研究将IPA分成5个等级[41]：非常满意（不大于5.00）、比较满意（5.01~10.00）、一般满意（10.01~20.00）、不满意（20.01~30.00）和非常不满意（不小于30.01）。

② 在本研究中，通过游客的满意度衡量绩效。

表 2：游客满意度与重要性关系的线性回归分析结果

模型	非标准化系数		标准化系数	T	p
	B	标准错误	$Beta$		
常数	2.222	0.490	—	4.534	0.000
满意度	0.529	0.126	0.693	4.185	0.001

随后，以影响重要性为横轴、满意度为纵轴，并以二者的均值为交叉点作垂直坐标轴，划分为4个象限，形成IPA矩阵图：1）第一象限，其重要性和满意度都较高，属于优势保持区；2）第二象限，其重要性低，但满意度高，属于现状维持区；3）第三象限，其重要性和绩效都较低，属于低优先发展区；4）第四象限，其重要性高但满意度低，属于重点改进区。

4 结果与分析

4.1 EWM分析

4.1.1 景观要素EWM分析

景观要素的EWM值由高到低排序为：文化要素（2.504）＞生态要素（2.302）＞美学要素（1.428）＞社会要素（1.352），表明游客在旅游过程中非常看重文化方面的体验，对其他要素的关注度稍低。

4.1.2 景观因子EWM分析

EWM值较高的景观因子包括A1（0.766）、B2（0.751）、B1（0.673）、D1（0.650）和C4（0.645），表明游客高度重视景区环境、文化氛围和游憩体验。权重相对较低的因子则包括C3（0.168）、B6（0.137）、C6（0.046）、C2（0.029）和D5（0.013），说明传统村落在设施服务完善度和文化遗产的保护与传承方面仍有明显改进空间。

4.2 IPA分析

4.2.1 景观要素IPA分析

景观要素IPA分析结果（表3）显示，重要性均值的排序结果是文化要素＞生态要素＞社会要素＞美学要素；满意度均值的排序结果是文化要素＞生态要素＞美学要素＞社会要素。

重要性满意度均值差（*I–P*）的排序结果为社会要素＞文化要素＞生态要素＞美学要素。值得注意的是，各要素的均值差均为正，表示游客对四类景观要素的需求与实际体验均存在落差。由此可知，传统村落需要在加强文化建设和生态保护的同时，重点关注社会环境、游憩设施、旅游管理与服务水平等方面的提升，以满足游客的多元化需求。同时，也需注重提升村落的美学品质，为游客提供更加美好的乡村旅游体验。

IPA指数均值排序为社会要素＞文化要素＞生态要素＞美学要素，4类要素的均值为9.43，整体属于比较满意范畴。游客对美学要素、生态要素和文化要素比较满意；社会要素整体属于一般满意范畴，其中，游客对娱乐活动丰富度非常满意、村落居民友好度比较满意，但对游憩设施的完善度、村落知名度与口碑不满意，成为影响整体满意度的关键因素。

表 3：景观要素 IPA 和 EWM 分析

景观要素	重要性	满意度	*I − P*	IPA 指数	EWM	满意程度
	均值	均值				
美学	3.93	3.64	0.29	7.379	1.428	比较满意
生态	4.33	4.01	0.32	7.390	2.302	比较满意
社会	4.18	3.61	0.57	13.636	1.352	一般满意
文化	4.51	4.09	0.42	9.313	2.504	比较满意

4.2.2 景观因子IPA分析

景观因子IPA分析结果（表4）可知，IPA指数显示非常满意的景观因子有A1、B1、B2、B3、B4、C4、D1、D2、D3和D4。仅有A1为负值且绝对值较高，表示其满意度高于重要性，游客对此非常满意。这可能是因为村落景观的整体布局和规划确实井然有序，元素之间和谐统一，给游客留下了深刻的印象。而其余的景观因子的IPA指数均为正值，虽然它们的绝对值较小，意味着游客对这些因子的满意度已经相对较高，只是还没有达到与重要性完全匹配的程度。因此，在资源有限的情况下，需优先考虑改进那些IPA指数绝对值较大的因子。

让游客比较满意的景观因子有A2、A3、C1和C5。这些因子在IPA指数中表现较好，说明它们在游客心中具有较高的满意度和重要性，是村落旅游发展中值得继续保持和优化的方面。让游客一般满意的景观因子有A4、B5、B6和C3。这些因子IPA指数较高，说明它们在游客心中的重要性较高，而满意度却相对较低，是村落景观管理和规划中需要重点关注和改进的方面。结果显示不满意的景观因子有C2、C6；非常不满意的景观因子有D5。这些因子对于游客来说非常重要，但实际的满意度却较低，这可能会影响游客对村落的整体印象和再次游览的意愿。

4.2.3 IPA象限分析

本研究以重要性值和满意度的均值（4.25，3.84）为交叉点，将21个因子统计均值置于4个象限内（图3）。1）第一象限（优势保持区）：该象限的景观因子有A4、B1、B2、C1、C4、D1、D2、D4。对于这些因子，应继续保持其优势，并寻求进一步提升的空间，以巩固游客的满意度和忠诚度。2）第二象限（现状维持区）：该象限的景观因子有B3。该因子既不过于重要也不过于令人不满意，可维持现状，但也要关注其潜在发展机会，避免向低满意度方向发展。3）第三象限（低优先发展区）：该象限的景观因子有A1、A2、A3、B4、B5、B6、C2、C5和D3。该区域中的景观因子的重要性较高，但满意度较低。故应加大投入改

表 4：景观因子的重要性、满意度性及 EWM 值分析

景观要素	景观因子	重要性 均值	满意度 均值	$I-P$	IPA 指数	EWM 值	满意程度
美学	A1	3.63	3.77	−0.14	−3.857	0.766	非常满意
	A2	4.01	3.62	0.39	9.726	0.224	比较满意
	A3	3.55	3.22	0.33	9.296	0.246	比较满意
	A4	4.53	3.96	0.57	12.583	0.192	一般满意
生态	B1	4.94	4.85	0.09	1.822	0.673	非常满意
	B2	4.80	4.73	0.07	1.458	0.751	非常满意
	B3	4.16	3.98	0.18	4.327	0.285	非常满意
	B4	3.81	3.64	0.17	4.462	0.279	非常满意
	B5	4.19	3.58	0.61	14.558	0.177	一般满意
	B6	4.07	3.26	0.81	19.902	0.137	一般满意
社会	C1	4.29	3.87	0.42	9.790	0.206	比较满意
	C2	3.68	2.68	1.00	27.174	0.029	不满意
	C3	4.39	3.66	0.73	16.629	0.168	一般满意
	C4	4.43	4.29	0.14	3.160	0.645	非常满意
	C5	4.02	3.73	0.29	7.214	0.258	比较满意
	C6	4.27	3.41	0.86	20.141	0.046	不满意
文化	D1	4.75	4.66	0.09	1.895	0.650	非常满意
	D2	4.41	4.25	0.16	3.628	0.631	非常满意
	D3	3.86	3.71	0.15	3.886	0.593	非常满意
	D4	4.63	4.46	0.17	3.672	0.617	非常满意
	D5	4.91	3.39	1.52	30.957	0.013	非常不满意

善这些方面的表现，以满足游客期望和需求。4）第四象限（重点改进区）：该象限的景观因子有C3、C6、D5。这些景观因子的重要性较高，但满意度极低，应作为重点改进对象。需深入分析问题根源，尽快制定针对性改进措施并加以实施，从而提升游客满意度和村落竞争力。

5 讨论

相比单一的IPA分析或仅依赖主观赋权方法，本研究所采用的IPA–EWM耦合方法融合了主观感知与客观权重的双重维度，使满意度评价更具科学性与精准性。结果显示，文化要素的EWM值为2.504，在4类景观要素中权重最高，显示出文化体验在游客整体感知中的核心地位；而非物质文化遗产延续性虽重要性得分为4.91，但满意度仅为3.39，导致IPA指数高达30.957，处于非常不满意的范畴，这从侧面印证了IPA－EWM法在识别重点薄弱环节方面的敏感性与效能。研究结果进一步印证了魏峰群等[44]关于文化传承短板显著影响游客感知的观点，突显出其改进的迫切性。此外，本文通过实地问卷与统计建模相结合的方式，在景观协调感、空间聚散度等空间性指标上获得了更具操作性的结论，与王梓凌等[27]基于网络文本所开展的“乡愁感知”研究路径形成互补。

在重要性－满意度四象限矩阵图中，非物质文化遗产延续性、游憩设施完善度、以及村落知名度与口碑等位于第四象限的因子受游客的期望较高，但未能令其满意，亟需优先干预。这一发现与张蕴宁等[25]对安义古村群的研究形成呼应，其研究同样指出非物质文化体验对游客满意度具有显著影响，但在实践层面往往落实不足。第三象限中景观协调感、空间聚散度、乡土材料等因子的重要性与满意度均处于低位，反映出村落在空间美学设计与文化意象表达方面尚有提升空间。此外，部分因子的象限划分亦揭示出耦合分析的必要性。如第三象限中的乡土材料，满意度偏高（3.64）但重要性略低（3.81），提示在解释结果时需结合EWM权重与实际均值进行综合判断，避免因单一标准造成误判。因此，IPA－EWM方法在统筹主观期望与客观评价方面表现出更强的适应性和解释力，为传统村落景观建设优化提供了理论支撑与实践依据。

基于IPA－EWM分析法的游客满意度评价结果显示，村落在非物质文化遗产的保护与传承、游憩设施的完善程度、村落知名度及美学要素等方面均存在不同程度的不足，亟需综合施策加以改进。首先，应构建健全的非物质文化遗产保护与传承机制，通过开展梅山傩戏、新化山歌、梅山剪纸等富有地域特色的文化活动，有效提升游客对传统文化的认知与参与度。此举不仅有助于增强非物质文化遗产的延续性，也将进一步丰富游客的文化体验，提升其整体满意度[43]。其次，应合理规划并增设游客休憩区、观景平台和文化展览馆等功能空间，提升设施的实用性与便捷性。同时，重视现有设施的维护与更新，确保其运行效率与服务质量，进而优化游客的游览体验。再者，进一步提升村落知名度与口碑，应充分借助社交媒体、旅游网站等多元平台，发布高质量图文与视频内容，扩大村落影响力，吸引更多潜在游客。在此基础上，还需持续优化旅游服务体系，通过加强从业人员培训、科学设计旅游线路、提升餐饮与住宿水平等方式，树立良好的服务形象，增强游客忠诚度与重游意愿。另外，还应在尊重和保护村落原有风貌的基础上，进一步优化美

学要素，强化景观规划设计，提升有序性、协调性与整洁度。通过增加绿化覆盖率与提升景观多样性，进一步改善视觉感受与环境质量，增强游客审美体验。最后，为确保上述措施的持续有效实施，建议建立游客满意度动态监测机制，定期开展问卷调查与访谈，全面掌握游客反馈意见，及时调整和优化旅游产品及服务内容，从而推动传统村落旅游的科学化、系统化与可持续发展[45-46]。

6 结论

本研究通过IPA方法和EWM方法对湖南省沅水流域的传统村落景观游客满意度进行评价，得出以下结论：

1）该流域的传统村落景观总体比较满意，IPA指数均值为9.43。然而，社会要素的IPA指数（13.636）最高，表明游客对社会要素的期望与实际感知差距较大，亟需改进；

2）景观要素分析显示，文化要素在重要性（4.51）和满意度（4.09）上均位居首位，凸显游客对文化价值的高度认同。景观因子中，空气质量和民俗文化多样性获得较高权重，反映其在游客满意度中的关键地位；

综上所述，本研究为沅水流域传统村落景观建设提供了优化方向，尤其是社会要素（游乐设施完善度、村落知名度与口碑）和文化要素（非物质文化遗产延续性）方向。然而，本研究主要集中在湖南省沅水流域，研究成果在其他地区的适用性可能有限。同时，尽管IPA－EWM法结合了客观赋权和主观评价的优点，但其在实际应用中仍可能受到地域、季节及游客群体特征等方面的影响，无法全面反映该流域传统村落景观游客满意度的真实情况。此外，本研究在构建IPA图时，尚未充分考虑各指标之间的内在联系和相互影响，导致对改进方向和重点的判断存在一定局限性。未来可就以上方面进行更深入的游客满意度探索。

图 1.　技术路线图
图 2.　标准化残差直方图和回归标准化残差的常态 P-P 图
图 3.　重要性 – 满意度 IPA 四象限矩阵图