



A Study on the Value Evaluation System of Recreational Sports and Leisure Resources from the Perspective of Tourists' Psychology

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Abstract

The aim of this study is to construct a value evaluation system for leisure sports and recreational resources based on tourists' psychological perspectives. Using the Analytic Hierarchy Process (AHP), the study analyzed the weights of four criteria factors, namely diversity of recreational resources, service quality, pricing strategy, and environmental quality, with a focus on tourists' intention to revisit. Among these factors, environmental quality has the highest weight, accounting for 46.811%. At the secondary indicator level, among the diversity of recreational resources, environmental landscape diversity has the highest weight, reaching 45.793%; among service quality factors, the weight of service quality level is the highest, accounting for 44.343%; among pricing strategy factors, the weight of pricing rationality is the highest, accounting for 54.995%. In the scheme level, the study selected three schemes, namely Xi'an Olympic Sports Center, Xi'an Sports Stadium, and Xi'an Urban Sports Park. After the single sorting of indicators and the overall sorting of scheme level, Xi'an Olympic Sports Center obtained the highest score of 4.517 points, indicating that it is the leisure sports and recreational resource with the highest intention for tourists to revisit. The study's CR value was verified by a one-time test, demonstrating its reliability. The AHP hierarchy analysis method used in this study is a commonly used multi-index decision-making method that can accurately evaluate the weight of different factors and assess leisure sports and recreational resources. The quantified analysis of the scores of different factors and schemes provides a reference for decision-makers, helping to optimize the management and service of leisure sports and recreational resources, and improve tourist satisfaction and intention to revisit.

Keywords: Leisure sports, Psychology, Recreation resource value, Willingness to revisit.

1. Introduction

Leisure sports and recreational resources play an increasingly important role in people's daily lives, as they provide not only entertainment and relaxation opportunities but also promote physical and mental health development. With the development of the economy and society, the leisure sports and recreation industry has gradually grown into an important industry sector (Keane et al, 2019). However, how to conduct a comprehensive and scientific value assessment of leisure sports and recreational resources, as well as how to provide visitors with better quality and diverse services and experiences, are still urgent issues to be addressed (Millington et al, 2022).

Currently, many studies on the evaluation of leisure sports and recreational resources have emerged both domestically and internationally, but these studies mostly focus on certain aspects, lacking systematic and comprehensive analysis. Visitors' needs and psychological factors are among the important factors that affect the value of leisure sports and recreational resources. Therefore, constructing a comprehensive value evaluation system for leisure sports and recreational resources based on visitors' psychological perspectives can not only better meet visitors' needs, improve their satisfaction and willingness to revisit but also promote the sustainable development of the leisure sports and recreation industry (Farkić et al, 2020).

This study aims to construct a value evaluation system for leisure sports and recreational resources based on visitors' psychological perspectives. The AHP hierarchical analysis method is employed to analyze the weights of factors such as diversity, service quality, price strategy, and environmental quality of recreational resources, and several representative leisure sports and recreational resources are selected for evaluation and comparison. The results of this study not only provide scientific reference for decision-makers but also help visitors to better choose leisure sports and recreational resources, thereby enhancing their experience and satisfaction.

2. Research review

As modern people continue to pursue a better quality of life, the importance of leisure and sports recreation resources in daily life is increasing. Globally, more and more people are beginning to focus on the development and utilization of leisure and sports recreation resources, making the leisure and sports recreation industry gradually

become one of the most promising industries in the world. Therefore, a comprehensive evaluation of the value of leisure and sports recreation resources and optimized management has become one of the hot topics in the field of leisure and sports recreation research.

A large number of studies on leisure and sports recreation resources have been conducted both domestically and internationally, covering the classification, characteristics, influencing factors, management models, and experiential aspects of leisure and sports recreation resources. Domestic research mainly focuses on the classification and management models of leisure and sports recreation resources, while foreign research places more emphasis on the needs and satisfaction of tourists.

In current academic research, Robert Arlinghaus argues that the development of recreational sports and leisure resources is closely related to the needs of tourists (Arlinghaus et al, 2021). Meanwhile, Nelly Isigi Kadagi emphasizes the uniqueness of recreational sports and leisure resources, proposing five elements of tourist demand for such resources: physical, psychological, social, cultural, and emotional (Kadagi et al, 2021). Yen E. Lam-González identifies factors affecting tourist satisfaction with recreational sports and leisure resources, including environmental quality, service quality, pricing strategy, facilities and equipment (Lam-González et al, 2019). In China, Xia Jiangtao and other scholars have conducted in-depth research on the classification and management models of recreational sports and leisure resources (Xia et al, 2023). In addition to the views of these scholars, other research has also explored recreational sports and leisure resources. For example, Wu Wei analyzes the supply and demand of recreational sports and leisure resources and proposes measures to promote sustainable development of the recreational sports and leisure industry (Wu et al, 2022). Some scholars also explore the planning and design issues of recreational sports and leisure resources, such as the impact of local attachment on value co-creation behavior of ice and snow sports tourists proposed by Liang Cairong and others (Liang et al, 2023), and the integration of sports and exhibition industries: theoretical logic, practical development, and future prospects proposed by Yi Wenyu and Yang Qian (Yi & Yang, 2022).

Internationally, some studies have explored the impact of recreational sports and leisure resources on the psychology and health of tourists. For example, Buckley and Westaway found that participating in outdoor activities has a positive effect on tourists' emotional and psychological health (Buckley & Westaway, 2020). In addition, some studies have also examined the impact of recreational sports and leisure resources on the local community and economy, such as Tse and others who studied the contribution of recreational sports and leisure resources to the local economy and community in Hong Kong (Tse et al, 2018).

3. Research Methods

3.1. Overview of Research Objects

We conducted research on three comprehensive sports and recreational sites in Xi'an, namely the Xi'an Olympic Sports Center, the Xi'an Stadium, and the Xi'an City Sports Park.

In this study, we employed the AHP (Analytic Hierarchy Process) to construct a value evaluation system for leisure sports and recreational resources. The AHP is a decision-making analysis method established by Professor T.L. Saaty, an American operations researcher, in his work "Analytic Hierarchy Process." It can qualitatively and quantitatively handle complex problems with multiple objectives and has been widely applied by many scholars in various fields (Guo et al., 2008). The goal layer of our evaluation system is the visitors' willingness to revisit. In the first-level indicator layer, we included four indicators: diversity of leisure sports and recreational resources, service quality, pricing strategy, and environmental quality. In the second-level indicator layer, we included twelve sub-indicators: diversity of entertainment projects, diversity of venue facilities, diversity of environmental landscapes, degree of service attitude enthusiasm, level of service efficiency, level of service quality, high-low ticket prices, strength of preferential policies, reasonableness of prices, degree of noise pollution, degree of ground cleanliness, and convenience of activity flow line. In the scheme layer, the three sites were Xi'an Olympic Sports Center, Xi'an Stadium, and Xi'an City Sports Park.

Based on the comprehensive analysis of the sports and recreational resources of the three sites in Xi'an and the practical situation, we established a value evaluation system for leisure sports and recreational resources, as shown in Figure 1.

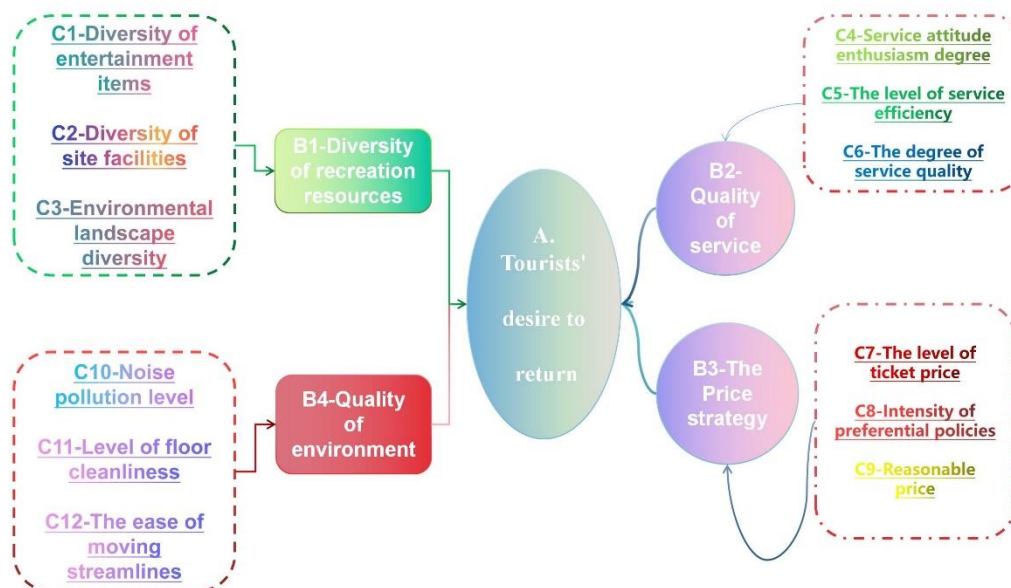


Figure 1. Hierarchical structure model of leisure sports recreation resources value evaluation.

3.2. Research Model Construction

3.2.1. Judgment Matrix Model

For the criterion layer A, we can construct Formula (1).

$$A = (a_{ij})_{m \times n} = (a_{11}, a_{12} \sim a_{1n})$$

where the elements in A satisfy:

$$\begin{aligned} 1) & a_{ij} > 0 \\ 2) & a_{ij} = \frac{1}{a_{ji}} \\ 3) & a_{ii} = 1 \end{aligned}$$

3.2.2. Hierarchical Single Sorting and Consistency Checking Model

3.2.2.1. Hierarchical Single Ranking

Hierarchical single sorting refers to the process of pairwise comparisons of all elements in the current layer with respect to an element in the previous layer, and conducting hierarchical sorting to arrange the order of importance. The specific calculation can be based on the judgment matrix A, ensuring that it meets the conditions of the characteristic roots and eigenvectors of $AW = \lambda_{max}W$. Here, the maximum characteristic root of A is λ_{max} , and the normalized eigenvector corresponding to λ_{max} is W, where W_i represents the weight or weighting factor corresponding to the single sorting of the respective element. The weighting coefficients of each element a_{ij} towards the target layer can be calculated using the judgment matrix. The calculation of the weight vector (W) and the maximum characteristic root (λ_{max}) can be done using the square root method or sum method as shown in equations (2), (3), and (4):

Equation (2) is as follows:

$$\bar{W}_i = \sqrt[m]{\prod_{j=1}^m a_{ij}} \quad i, j = 1, 2, \dots, n$$

Calculate the product of each row raised to the power of m to obtain an m-dimensional vector.

The formula (3) is shown as follows:

$$W_i = \frac{\bar{W}_i}{\sum_{j=1}^m \bar{W}_i}$$

Normalizing W (making the sum of all vector elements equal to 1) yields the ranking weight vector, denoted as W (the elements of W represent the ranking weights of the same-level factors with respect to the previous-level factor). The vector $w = (W_1, W_2, \dots, W_n)^T$ is the desired characteristic vector, which is also the result of single-ranking for the judgment matrix.

After obtaining the weight matrix, the maximum eigenvalue can be calculated, with formula (4) as follows:

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

Here, n represents the dimensionality, such as when constructing the judgment matrix for diversity of recreational sports resources, service quality, price strategies, and environmental quality, $n=4$; AW represents the judgment matrix multiplied by the normalized weight, followed by the cumulative sum of rows.

2) Solving the Maximum Eigenvalue and CI Value Model

Suppose the n-order judgment matrix is B, then the maximum eigenvalue λ_{max} can be obtained by the following method: $BW = \lambda W$, where W is the eigenvector of B. In the analytic hierarchy process, we use the consistency index CI to check the consistency of the judgment matrix, which is given by formula (5) as follows:

$$C.I. = \frac{\lambda_{max} - n}{n - 1}$$

3) Computing the CR value based on CI and RI values to determine if the consistency is acceptable or not, as shown in formula (6) below:

$$C.R. = \frac{C.I.}{R.I.}$$

If $C.R. < 0.1$, it indicates that the consistency of the judgment matrix A is considered to be within the allowable range, and the eigenvectors of A can be used to calculate the weight vectors. If $C.R. \geq 0.1$, then the judgment matrix A should be revised.

3.3. AHP Method for Determining Factor Weights

3.3.1. Construction of Judgment Matrix

By formulating evaluation factor questionnaires, expert investigation questionnaires were used to calculate the weights of evaluation factors. A total of 516 questionnaires were distributed, with 498 questionnaires returned, yielding a response rate of 96.5%. Experts, including relevant teachers and graduate students, were invited to compare the evaluation index factors pairwise. Based on the questionnaire survey results, the weight calculation, consistency check (CR) and maximum characteristic value of the weight vector (λ) were calculated using the Yaahp software. The evaluation in this study used a 1-9 point scale method, as shown in Table 1.

Table 1. 1-9 scale for judgment matrices and their meanings.

The scale	Meaning
1	Expressing equally important factors: A and B are considered equally important.
3	Expressing slightly more important factor: A is slightly more important than B.
5	Expressing clearly more important factor: A is significantly more important than B.
7	Expressing strongly more important factor: A is strongly more important than B.
9	Expressing extremely more important factor: A is extremely more important than B.
2、4、6、8	Expressing importance rating on a scale of 1-9: If two factors are being compared, and their importance is rated on a scale of 1-9, where 1 represents the least important and 9 represents the most important, then if the importance of the two factors lies between any two adjacent numbers on the scale, such as 2, 4, 6, 8, the rating is expressed as falling between these numbers. If one factor is inversely proportional to the other, a decimal is used to indicate their relative importance.

3.3.2. Expert Rating Determines the Evaluation Factor Weights and Consistency Test.

After 19 teachers specializing in sports and tourism and 498 graduate students assigned values to each index of the evaluation system, a judgment matrix was constructed. The Yaahp software was used to calculate the weights, consistency ratio (CR), and the maximum characteristic value of the weight vector (λ) of each judgment matrix. Through calculation, the CR values of each judgment matrix were all less than 0.10 (CR represents the random consistency ratio of the judgment matrix), indicating that the judgment matrix passed the consistency test. Using the above method, the weight values of the criterion layer, sub-criterion layer, and factor layer in the evaluation system of leisure sports and recreational resources were obtained and are shown in Table 2.

Table 2. Overview of evaluation factor weights.

Layer of object	Layer of criterion	Weight (%)	Layer of indicators	Weight (%)	The scheme layer
Tourists' willingness to revisit	Diversity of recreation resources	23.406	Diversity of entertainment items	41.606	Xi'an Olympic Sports Center
			Diversity of site facilities	12.601	
			Environmental landscape diversity	45.793	
	Quality of service	21.149	Service attitude enthusiasm degree	38.737	Xi'an Stadium
			The level of service efficiency	16.92	
			The degree of service quality	44.343	
	The Price strategy	8.634	The level of ticket price	20.984	Xi'an Urban Sports Park
			Intensity of preferential policies	24.021	
			Reasonable price	54.995	
	Quality of environment	46.811	Noise pollution level	54.995	Xi'an Urban Sports Park
Level of floor cleanliness			20.984		
The ease of moving streamlines			24.021		

4. Evaluation Results and Analysis

4.1. Scheme Score Analysis

Based on the perspective of tourist psychology, a value evaluation system for leisure sports and recreation resources was constructed, and an evaluation was conducted on three comprehensive sports and recreation venues in Xi'an City, namely Xi'an Olympic Sports Center, Xi'an Stadium, and Xi'an City Sports Park. The study adopted the AHP hierarchy analysis method to construct the value evaluation system for leisure sports and recreation resources, and 19 teachers in sports and tourism-related fields and 498 graduate students scored each indicator, constructed a judgment matrix, and calculated the weight and consistency test through Yaahp software to obtain the weight values of the criterion layer, sub-criterion layer, and factor layer. In the scheme layer, Xi'an Olympic Sports Center scored the highest at 4.517, followed by Xi'an Stadium at 0.585, and Xi'an City Sports Park at 0.512. By conducting single sorting of the indicator hierarchy and total sorting of the scheme hierarchy, Xi'an Olympic Sports Center was determined to have the highest intention of revisiting among tourists, with a quantitative score of 4.517 (Figure 2).

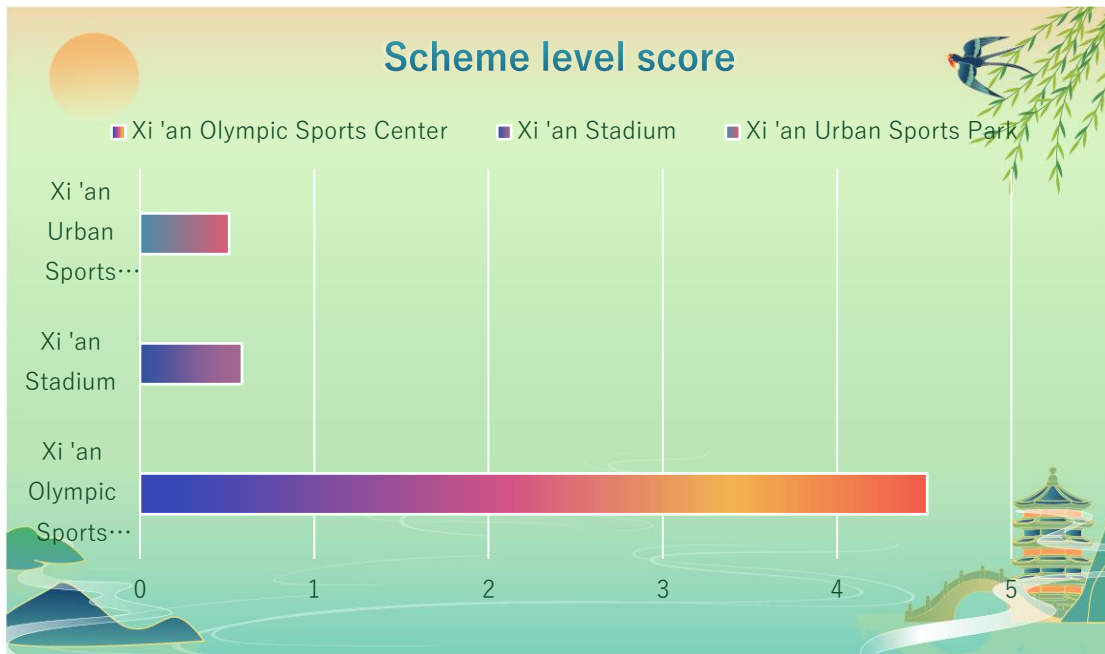


Figure 2. Shows the score chart of the scheme layer.

4.2. Weight Analysis of Criterion Layer

In the Analytic Hierarchy Process (AHP), the criterion layer is second only to the objective layer in the evaluation system and serves as the foundation of the entire system. The evaluation indicators in the criterion layer are the foundation for building the entire system and the comprehensive embodiment of other level indicators. By calculating the weight of criterion layer indicators, a basis for subsequent indicator evaluation can be provided (Table 3).

In this paper, the criterion layer indicators include diversity of recreational resources, service quality, pricing strategy, and environmental quality. Using the square root method in the AHP, the weight of environmental quality was found to be the highest at 46.811%, followed by diversity of recreational resources at 23.406%, service quality at 21.149%, and pricing strategy at the lowest of 8.634%. This indicates that from the perspective of tourists' psychology, environmental quality is the most important factor affecting the value evaluation of leisure sports and recreational resources, followed by the diversity of recreational resources and service quality, while the impact of pricing strategy is relatively small.

In addition, the maximum eigenvalue was calculated to be 4.062, and by consulting the corresponding RI value from the RI table, it was found to be 0.882. The calculated CR value was 0.024, which is less than 0.1, indicating that the consistency of the hierarchy structure has been well guaranteed and the results obtained have high reliability.

Table 3. Detailed results of the AHP criterion layer analysis.

Item of nodes	Diversity of recreation resources	Quality of service	The Price strategy	Quality of environment	Vector of features	Weight value (%)
Diversity of recreation resources	1	1	3	0.5	1.107	23.406
Quality of service	1	1	3	0.333	1	21.149
The price strategy	0.333	0.333	1	0.25	0.408	8.634
Quality of environment	2	3	4	1	2.213	46.811

4.3. Weight Analysis of Secondary Index Layer

The detailed results of AHP hierarchical analysis for the secondary indicators are presented in Table 4 and Table 5.

The weight calculation (based on the root square method) of the "diversity of recreational resources" secondary indicator layer shows that the weight of the diversity of entertainment projects is 41.606%, the weight of the diversity of venue facilities is 12.601%, and the weight of the diversity of environmental landscapes is 45.793%. The maximum value of the indicator weight is the diversity of environmental landscapes (45.793), while the minimum value is the diversity of venue facilities (12.601). The maximum eigenvalue is 3.009, and the corresponding RI value from the RI table is 0.525. Thus, the $CR = CI/RI = 0.009 \leq 0.1$, passing the consistency test.

For the "service quality" secondary indicator layer, the weight calculation based on the root square method showed that the weight of enthusiasm in service attitude was 38.737%, the weight of service efficiency was 16.92%, and the weight of service quality was 44.343%. The maximum weight value was for service quality (44.343), and the minimum weight value was for service efficiency (16.92). The maximum eigenvalue was 3.018, and based on the RI table, the corresponding RI value was 0.525. Therefore, $CR=CI/RI=0.017 \leq 0.1$, and the result passed the consistency check.

Regarding the "price strategy" secondary indicator layer, the weight calculation based on the root square method showed that the weight of ticket price was 20.984%, the weight of discount policy was 24.021%, and the weight of price rationality was 54.995%. The maximum weight value was for price rationality (54.995), and the minimum weight value was for ticket price (20.984). The maximum eigenvalue was 3.018, and based on the RI table, the corresponding RI value was 0.525. Therefore, $CR=CI/RI=0.017 \leq 0.1$, and the result passed the consistency check.

For the "environmental quality" secondary indicator layer, the weight calculation based on the root square method showed that the weight of noise pollution was 54.995%, the weight of ground cleanliness was 20.984%, and the weight of convenience in activity flow was 24.021%. The maximum weight value was for noise pollution (54.995), and the minimum weight value was for ground cleanliness (20.984). The maximum eigenvalue was 3.018, and based on the RI table, the corresponding RI value was 0.525. Therefore, $CR=CI/RI=0.017\leq 0.1$, and the result passed the consistency check.

Table 4. Presents a detailed analysis of the AHP hierarchy for the secondary criteria level.

Item of nodes	Diversity of entertainment items	Diversity of site facilities	Environmental landscape diversity	Vector of features	Weight value (%)
Diversity of entertainment items	1	3	1	1.442	41.606
Diversity of site facilities	0.333	1	0.25	0.437	12.601
Environmental landscape diversity	1	4	1	1.587	45.793
Item of nodes	Service attitude enthusiasm degree	The level of service efficiency	The degree of service quality	Vector of features	Weight value (%)
Service attitude enthusiasm degree	1	2	1	1.26	38.737
The level of service efficiency	0.5	1	0.333	0.55	16.92
The degree of service quality	1	3	1	1.442	44.343
Item of nodes	The level of ticket price	Intensity of preferential policies	Reasonable price	Vector of features	Weight value (%)
The level of ticket price	1	1	0.333	0.693	20.984
Intensity of preferential policies	1	1	0.5	0.794	24.021
Reasonable price	3	2	1	1.817	54.995
Item of nodes	Noise pollution level	Level of floor cleanliness	The ease of moving streamlines	Vector of features	Weight value (%)
Noise pollution level	1	3	2	1.817	54.995
Level of floor cleanliness	0.333	1	1	0.693	20.984
The ease of moving streamlines	0.5	1	1	0.794	24.021

Table 5. Summarizes the decision matrix for the alternatives at the scheme level.

Item of nodes	Xi 'an Olympic sports center	Xi 'an Urban sports park	Xi 'an stadium	CR	Consistency test
Diversity of entertainment items	0.659	0.185	0.156	0.028	Pass
Diversity of site facilities	0.648	0.122	0.23	0.004	Pass
Environmental landscape diversity	0.659	0.156	0.185	0.028	Pass
Service attitude enthusiasm degree	0.687	0.186	0.127	0.09	Pass
The level of service efficiency	0.659	0.156	0.185	0.028	Pass
The degree of service quality	0.659	0.156	0.185	0.028	Pass
The level of ticket price	0.55	0.21	0.24	0.017	Pass
Intensity of preferential policies	0.169	0.443	0.387	0.017	Pass
Reasonable price	0.55	0.21	0.24	0.017	Pass
Noise pollution level	0.634	0.174	0.192	0.009	Pass
Level of floor cleanliness	0.648	0.122	0.23	0.004	Pass
The ease of moving streamlines	0.659	0.156	0.185	0.028	Pass

5. Discussion

The impact of diversity, service quality, pricing strategy, and environmental quality of leisure and sports recreation resources on tourists' psychological value is the main focus of this study. In leisure and sports recreation activities, tourists' recreational needs and experiences are crucial, hence the diversity and service quality of leisure and sports recreation resources have a significant impact on tourists' psychological value (Winter et al., 2019).

Firstly, the diversity of leisure and sports recreation resources can meet the needs of different tourists, thus enhancing their psychological satisfaction and recreational experience. For instance, providing diversified sports facilities and activities can attract tourists of different ages, genders, interests, and hobbies. Additionally, providing different types of venues and activity locations, such as indoor and outdoor sports venues, water and land sports facilities, can also meet tourists' different needs and preferences, thereby enhancing their psychological value (Jawad et al., 2022). Secondly, service quality is a critical factor that affects tourists' psychological value. High-quality service can improve tourists' satisfaction and loyalty, thereby strengthening their recognition and trust in leisure and sports recreation resources (Agyeiwaah et al., 2019). Tourists' satisfaction with service quality can be evaluated and improved through surveys of tourist satisfaction. In the process of improving service quality, it is recommended that managers of leisure and sports recreation resources should focus on improving service attitude, efficiency, and quality. Thirdly, pricing strategy is also one of the important factors that affect tourists' psychological value. When formulating pricing strategies, it is necessary to consider the consumption ability and demands of different tourist groups, as well as the scarcity and competitiveness of resources (Toubes et al., 2021). The reasonableness and transparency of pricing strategies can increase tourists' trust and loyalty, thereby

enhancing their psychological value. Finally, environmental quality is also one of the important factors that affect tourists' psychological value. The environmental quality of leisure and sports recreation resources includes not only the natural environment and hardware facilities but also the software environment such as service attitude and hygiene. Improving environmental quality can improve tourists' satisfaction and loyalty, thereby enhancing their recognition and trust in leisure and sports recreation resources. Therefore, the comprehensive improvement of the diversity, service quality, pricing strategy, and environmental quality of leisure and sports recreation resources can promote tourists' psychological satisfaction and loyalty, enhance their recognition and trust in leisure and sports recreation resources, and thus increase their psychological value. The combined effects of these factors can have a positive impact on tourists' recreational experiences and behavior, and enhance the market competitiveness and economic benefits of leisure and sports recreation resources.

It is worth noting that different tourist groups may have different factors influencing the psychological value of leisure sports and recreation resources. For example, the elderly may place more emphasis on environmental and service quality, while young people may be more concerned with diversity and innovation. Therefore, when formulating management strategies for leisure sports and recreation resources, the characteristics and needs of different tourist groups should be fully considered to improve the market competitiveness and economic benefits of such resources (Khan et al., 2021).

6. Conclusion

This study is based on a research framework for evaluating the value of leisure sports and recreation resources from the perspective of tourist psychology. Using the AHP hierarchy analysis method, the first-level criteria layer, including diversity of recreational resources, service quality, price strategy, and environmental quality, and the second-level criteria layer underneath were analyzed with the aim of "tourist revisit intention." Additionally, three proposals were compared, namely, the Xi'an Olympic Sports Center, Xi'an Stadium, and Xi'an City Sports Park. The results indicate that the Xi'an Olympic Sports Center scored the highest in terms of tourist revisit intention, with a score of 4.517, demonstrating high feasibility and reliability.

The impact of this study is mainly manifested in several aspects: firstly, this study provides a new perspective and method for evaluating leisure sports and recreation resources, which can serve as a reference for scholars and practitioners in related fields. Secondly, the findings can provide decision-making basis for government agencies and related enterprises, promoting the utilization rate and attractiveness of recreational resources, and facilitating the development of the leisure sports industry. Thirdly, this study can promote the optimization and upgrading of recreational resources, enhance tourists' experience and satisfaction, and have a positive impact on society.

Future prospects include further refining the value evaluation system for leisure sports and recreation resources, exploring more scientific and effective evaluation methods, enhancing the quality and level of leisure sports and recreation resources, and promoting the sustainable development of the leisure sports industry. Additionally, it is necessary to strengthen interdisciplinary research with other fields, such as culture, economy, and society, to explore the relationship and interaction between leisure sports and recreation resources and society, economy, culture, etc., and deepen the understanding and research of leisure sports and recreation resources, making greater contributions to the development and progress of related fields.

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