Evaluation of the Suitability of Urban Parks in Tangshan Hebei China

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Abstract: In recent years, the dramatic expansion of urban scale and the high intensity of transportation activities have brought about many social problems, and the contradiction between urbanization and the natural ecology and humanistic environment has been increasing, triggering land-use conflicts, which makes the original natural landscape areas altered and the balance of the ecosystem threatened. In this study, the South Lake Park in Tangshan, Hebei Province, is used as an example to evaluate the suitability of the park using the hierarchical analysis method (AHP). Several key influencing factors were considered in the study, including natural landscape, cultural features, infrastructure, environmental protection, accessibility and management quality. The results of the study show that South Lake Park has advantages in terms of natural landscape and cultural features, but there is room for improvement in terms of infrastructure maintenance, environmental protection measures and accessibility. The overall evaluation score of the park accessibility is 3.4, the landscape is 3.95, the overall score of uniqueness is 3.8, the infrastructure is 2.96, and the management service is 3.04. Based on the scores, three targeted optimization strategies are proposed for the appropriateness of the South Lake Park in Tangshan City. The first is to improve the organization and design of slow-moving traffic, the second is to improve the concept of landscape design, and the third is to propose the improvement of the park's management services, the timely maintenance of various facilities in the park, and the training of service personnel's attitudes. This study not only provides a scientific assessment method for the planning and construction of urban parks in Tangshan City, but also provides some lessons and references for other cities on similar issues. In the process of urbanization, scientific and reasonable urban park planning is of great significance in realizing the sustainable development of cities and improving the quality of life of residents.

Keywords: City Park, AHP, Suitability Assessment, Sustainable Development, Quality of Life of Residents

1. Introduction

By the end of 2021, there are more than 24,841 urban parks in China, comprising over 10 different types[1]. China's urbanization is accelerating, with more and more people flooding into cities, leading to more social, economic, and environmental challenges. Urbanization puts cities under pressure from a variety of sources, including land use, transportation, pollution, and resource management[2]. As part of the urban space, urban parks play an important role in alleviating urban problems and improving the quality of life of residents[3]. Urban parks can provide residents with places for recreation, sports, and

cultural activities, and can also be a construction management project that has attracted much attention in the process of urbanization[4]. Urban parks not only provide services for human beings, but also play the role of ecological protection and greening in the urban environment[5]. They protect natural resources, wildlife habitat, mitigate the urban heat island effect, and contribute to air and water quality. Some city parks are also tourist resorts, attracting visitors and promoting local economic development[6]. Take the Central Park in New York, the United States as an example, according to statistics, the number of visitors in 2019 amounted to 42 million, which brought billions of dollars of income to the economy of New York City, including the surrounding business and catering, and so on. Nanhu Park in Tangshan, Hebei Province, contains several aspects related to urban planning, natural environmental protection, social interaction, cultural activities, landscape design, and public art, which can be studied in a diversified way, so this study analyzes the park as a representative case, and the results can also provide help for the construction of other parks. As an urban park with a unique geographic location and rich ecological landscape, it is not only an important place for Tangshan city residents to have leisure and entertainment, but also undertakes the important mission of ecological protection and cultural heritage. It needs to meet various needs, such as leisure, sports, cultural activities, etc[7]. Scientific and reasonable planning can make the city park become the green star of the city, create a unique landscape for the city, and enhance the image and quality of the city. By considering the leisure, recreation and cultural needs of residents, planners can better meet the needs of society and improve the quality of life of citizens. Therefore, it is of great significance to evaluate and study the suitability of urban parks in Tangshan for the scientific and rational planning of urban green space, improving the quality of the urban ecological environment as well as promoting the sustainable development of the city.

In the process of urbanization, the planning and management of urban parks face numerous challenges, including problems of resource allocation, cultural protection, ecological sustainability, and facility maintenance[8]. To seek ways to improve these problems, a study on the suitability evaluation of urban parks is needed, which is also in line with the new concept of focusing on the construction of ecological civilization and the development of green cities in the process of urbanization in China.

First, a comprehensive understanding of the natural environment, cultural and historical value, management and maintenance of Tangshan South Lake Park. Second, the AHP model was applied to determine the weights between different evaluation factors to comprehensively evaluate the suitability of Tangshan South Lake Park. The scientific evaluation of the suitability of Tangshan South Lake Park can help promote the sustainable development of urban parks, improve the quality of life of urban residents, and also provide experience for the management and planning of urban parks in China. The suitability assessment helps to better plan urban parks and ensure that they are consistent with the overall development goals of the city, thus improving the sustainability of the city. Ensuring that urban parks meet the leisure and recreational needs of residents helps improve their quality of life and sense of well-being.

It also helps governments and urban planners to better manage and improve parks in order to enhance the quality of life of urban residents[9].

2. Literature Review

2.1 Hebei Tangshan South Lake Park Introduction

The Tangshan South Lake Park, also known as Tangshan South Lake City Central Ecological Park, is China's 4A-level scenic spot located in the southern part of Tangshan city center. It is only 1 kilometer away from the city center and is one of the four main functional areas of Tangshan, South Lake Eco-city core area. As shown in Figure 1, the park's overall planning area of 30 square kilometers is the integration

of the natural ecology, history and culture, and modern culture as one of the large-scale city's central ecological parks[10].

The park is adjacent to South Lake, hence the name South Lake Park. One of the main features of South Lake Park is its beautiful natural landscape. The park is surrounded by lakes with clear water and shady evergreen trees along the shore, providing a pleasant natural environment. There are extensive green spaces, gardens, and lakes that attract many visitors to enjoy the scenery, take a walk, and relax. South Lake Park is committed to ecological conservation[11]. Several natural wetland ecosystems have been preserved in the park, helping to maintain the ecological balance of the area. It also provides habitats for birds and wildlife.
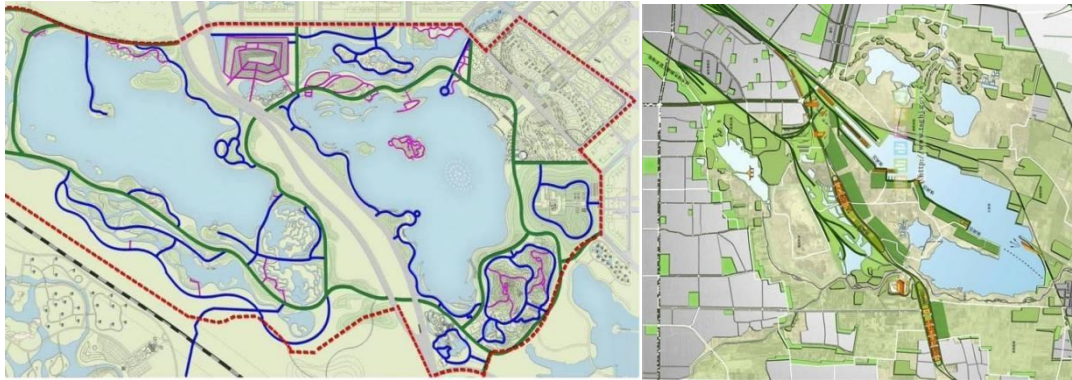
[Fig. 1] Location map of Nanhu Park, Tangshan, Hebei, China

[Table 1] Main Park Facility Areas

Representative region	Detailed introduction
Lakes and water features	South Lake Park features a lake and provides recreational space along the lake. These areas may include walking trails, seating, observation decks, and gardens for visitors to enjoy the beauty of the lake.
Gardens and Botanical Areas	Parks usually include well-designed gardens and planted areas that offer a variety of flowers and trees that create pleasant landscapes. These areas attract tourists and photographers.
Children's amusement facilities	City parks often provide children's play areas with slides, swings, climbing structures, and other children's recreational facilities to accommodate families.
Sports facility	Parks provide athletic facilities such as basketball courts, tennis courts, fitness equipment, and running trails to encourage physical activity among residents.
Cultural and arts facilities	South Lake Park may include venues for cultural activities such as amphitheaters, exhibition spaces, and music stages to host a variety of cultural and artistic events.
Dining and commercial facilities	The park features restaurants, cafes, and small stores for food and beverages, as well as shopping opportunities.
Pedestrian and bicycle paths	Parks often have dedicated walking and biking trails that provide visitors with safe places to recreate and exercise.
Sidewalks and bike lanes	The park is furnished with seating and rest areas for visitors to rest, enjoy the scenery or socialize and interact.
Ecoregion	For ecological preservation, some parks may retain natural wetlands and wildlife habitats to provide opportunities for nature observation.

Usually, urban parks are divided into different functional areas to meet various needs and activities. Through downline research, it was concluded that there are many areas divided in Tangshan South Lake Park as shown in [Table 1], Period the park has lakes and water features, gardens and botanical areas, children's recreation areas, sports areas, cultural and artistic activities, commercial areas, rest areas, and ecosystems.

Although the park's facilities are perfect, it also faces many problems. Urban centers are often home to traffic, industry, and commercial activities, making South Lake Park vulnerable to air pollution from vehicle exhaust, factory emissions, and commercial activities, and the large number of facilities in the park correspondingly requires more investment in management to maintain. Second, the land use planning of the park needs to be constantly challenged to adapt to the continuous development of the city. In response to these issues, at present, many Chinese scholars have conducted research and analysis of Tangshan South Lake Park. One of which is the scholar Jiang Jingwen[12] who has evaluated and analyzed the slow-moving traffic in South Lake Park. He has put forward the prospect of the construction of the slow-moving system of national city parks and has put forward three targeted optimization strategies for the slow-moving system of Tangshan South Lake Park according to the evaluation results. One is to improve the organization design of slow walking traffic, including adjusting its choice and form. The second is to improve the concept of slow-moving landscape design, including the creation of interactive landscapes, the installation of a variety of waterfront landscapes, the establishment of a self-circulation of the park's water body, biological ecological floating island technology to purify water quality, the rational collection of rainwater to replenish the park, the design and construction of biological habitats, and the increase of shade tree planting. The third is the improvement of slow-moving traffic road design and proposed transportation facilities, including the increase of the types of slow-moving traffic service facilities, the realization of the park lighting system, and the reasonable coverage, and the installation of ground line signs, and so on. At the same time, it summarizes and refines the design principle and construction standard walking system of urban ecological parks. Scholar Cao Lei[13]evaluates the safety of South Lake Park, in which the study shows that user satisfaction is from high to low in the order of image and maintenance, locality, surveillance, access control, activity support, and goal enhancement. Scholar Li Jiaqi[14]evaluated the landscape configuration of South Lake Park, focusing on the ecological landscape restoration and upgrading of coal mine wasteland, and made a comprehensive and detailed investigation of South Lake Wetland Park, exploring its successful experience from the perspective of wetland landscape plant configuration. The research of the above scholars on the South Lake Park in Tangshan, Hebei Province mainly focuses on the regionalized design of the park and lacks an overall evaluation of the park. Therefore, in order to evaluate the suitability of urban parks more scientifically and comprehensively, it is the innovation point of this study to provide effective suggestions for the construction and management of Nanhu Park.

2.2 Introduction to the Study of Hierarchical Analysis

Analytic Hierarchy Process (AHP) is a multi-criteria decision analysis method that is widely used in various fields, including management, engineering, environmental planning, urban planning, and so on. The method was proposed by American mathematician Thomas L. Saaty[15] in the 1970s, By hierarchizing and quantifying complex problems, it helps decision makers to understand problems more clearly.

The AHP is able to deal with complex problems that include both qualitative and quantitative factors, providing a structured approach to help decision-makers weigh different factors. Second, AHP can provide interpretable results that enable decision-makers to understand why certain choices are preferred. In addition, AHP has a wide range of applications in a variety of fields, including engineering management, environmental planning, and financial investment, which demonstrates its versatility and

generalizability[16].

However, there are some challenges and limitations of AHP. First, consistency testing can be a subjective process that relies on the experience and judgment of the decision-maker, which may lead to inconsistent results. Second, AHP requires a large number of two-by-two comparisons, which can become complex and time-consuming in large-scale problems. In addition, the weight sensitivity of the AHP method needs to be handled carefully, as different weight assignments may lead to different results.

The basic idea of AHP is to decompose a large problem into multiple levels and gradually refine it from the overall goal to specific guidelines and alternatives. In AHP, the researcher first establishes a hierarchical structure, including three levels:

1. Goal level: At this level, the overall goal or objective of the decision is determined.

2. Criteria Level: At this level, individual criteria or factors that influence the decision are listed. These criteria can be qualitatively evaluated or quantitatively assessed and they are used to evaluate the performance of the alternatives.

3. Alternatives Level: At this level, the available alternatives are listed. These alternatives can be different decision options and each alternative will be evaluated at the criterion level.

The AHP allows the researcher to take multiple factors into account, including geographic, ecological, social, and cultural aspects, in order to assess the suitability of the park. This approach helps develop more holistic decisions and ensures that parks are planned and managed to be more responsive to a variety of needs.The AHP is often used to build decision support systems that provide decision-makers with visual and quantitative assessment results. This enables decision-makers better understand the basis for decisions and make informed decisions. AHP has been widely used in park suitability evaluation in various countries and regions. Specific cases include the planning of urban parks, the management of nature reserves, and the evaluation of tourist destinations. Scholar Min J[17] used the AHP evaluation method to evaluate and analyze the forest parks. The evaluation system in this study can objectively reflect the value of the ecological vortex of the parks and the basic conditions for carrying out eco-tourism according to the key index factors affecting the quality of the scenic resources and provide scientific and reliable references for the key index factors of the scenic resource quality. Scholar ZhiMing Li[18] used AHP evaluation to establish a new evaluation index system for urban green space suitability from four aspects. The results show that the high suitability areas are mainly distributed in the northern mountainous areas, two important rivers, and the peripheral areas of the center city. By comparing the results of UGS suitability evaluation obtained by AHP, CV , and AHP-CV combined weighting method, it was found that the AHP-CV method was optimal. Scholar Chandio I[19] used an AHP-based research method to determine land suitability of the park. The scholars found that the AHP-based research method for the evaluation of park suitability is more scientific and objective, which is also the main research method in the related research.

3. Expert Evaluation of Park Suitability

3.1 Identification of Evaluation Indicator Factors

This study adopted the methods of field investigation and literature collection to collect data. The field survey investigates the basic situation of Tangshan South Lake Park, including the natural environment, humanistic environment, park design and management, etc., and the relevant environmental pictures are shown in Figure 2. Literature collection is mainly to collect information on Chinese policies and regulations, academic papers, professional books, and public data, so as to gain a deeper understanding of the evaluation and management methods of urban parks, thus providing the necessary data support for the construction of the suitability evaluation index system and empirical analysis of the South Lake Park, with specific factors as shown in [Table 2].
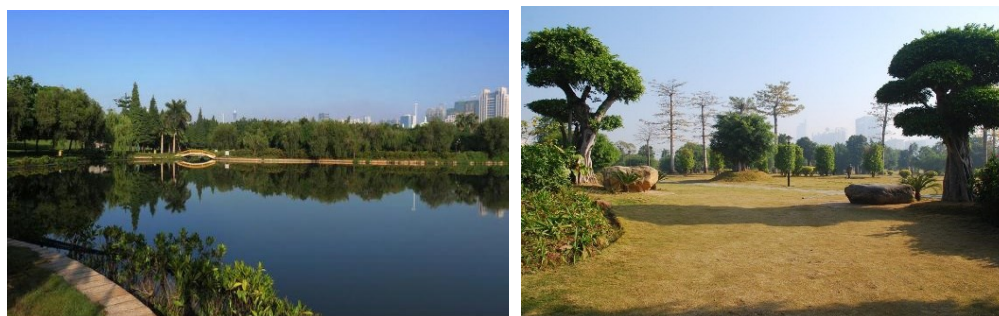
[Fig. 2] Some of the Park's Scenic Spots

3.2 Constructing a Suitability Evaluation System for Tangshan South Lake Park

The hierarchical analysis is applied to park suitability evaluation, considering five levels of park accessibility, landscape, uniqueness, infrastructure, and management services, respectively, and finally determining the composition of the evaluation model's target layer (A), criterion layer (B), and program layer (C)[20]. According to the determined evaluation factors and related indicators, the evaluation index system of urban park suitability is constructed, as shown in [Table 2].

[Table 2] Park Suitability Evaluation Index System

Target layer（A）	Criteria layer（B）	Indicator layer（C）	Meaning of Indicator Layer
ASuitability Assessment of South Lake Park in Tangshan, Hebei	B1 Park Accessibility	C1 Transportation Convenience	Accessibility varies depending on transportation choices
		C2 Spatial Visibility	Whether the main road space is open and smooth
		C3 Spatial Functional Layout	Is the spatial orientation and functional division reasonable
	B2 Park Scenic Beauty	C4 Green Landscape Quality	Is the variety and aesthetics of green landscape trees rich
		C5 Water Landscape Quality	Is the water clear, and is there pollution along the shoreline
		C6 Air Quality	Is the air fresh
		C7 Cultural Landscape Quality	Can it reflect the local social culture, and so on
	B3 Park Uniqueness	C8 Cultural connotation	Whether the park can reflect spiritual and intellectual content
		C9 Style features	Does it have regional landscape characteristics
		C10 Artistic emotion	Can it create attitudes and experiences that resonate with visitors
	B4 Park Infrastructure	C11 Recreational facilities	Whether it provides good resting places for pedestrians
		C12 Signage	Whether the warning signs and directional signs within the area are reasonable
		C13 Sanitary facilities	Whether the public sanitation facilities are sufficient and reasonable in their arrangement
		C14 Accessible facilities	Whether it ensures the safety and convenience of passage for the elderly, weak, sick, disabled, etc
		C15 lighting facilities	Whether it can provide the necessary lighting requirements at night and be aesthetically pleasing
	B5 Park Management Services	C16 Environmental hygiene	Whether the park is clean, sanitary, tidy, and aesthetically pleasing
		C17 Greenery maintenance	Whether the daily management and maintenance of green spaces, vegetation, and plants are timely
		C18 Facility maintenance	Whether the various facilities within the park are regularly maintained
		C19 Quality of public services	Whether the quality of service management personnel within the park is high
		C20 Safety condition	Whether there are any dangers within the park

3.3 Hierarchical analysis modeling

3.3.1 Creating a Decision Matrix

In order to evaluate the suitability criteria for South Lake Park, this study invited eight research experts in the field of park suitability for interviews. The research data was analyzed using the Analytic Hierarchy Process (AHP) to obtain scientifically derived evaluation results. The construction of the judgment matrix in this study is shown in the formula below, where a_{ij} represents the importance of Ai relative to Aj. If the former is more important, a_{ij} >1, and if the two are equally important, a_{ij}=1[21].

$$A = \begin{vmatrix} a_{12} & a_{12} & \cdots\cdots & \cdots\cdots & a_{1n} \\ a_{21} & a_{22} & \cdots\cdots & \cdots\cdots & a_{2n} \\ \cdots\cdots & \cdots\cdots & a_{ij} & \cdots\cdots & \cdots\cdots \\ a_{n1} & a_{n2} & \cdots\cdots & \cdots\cdots & a_{nn} \end{vmatrix}$$

3.3.2 Matrix Judgment

During the pairwise assessment process of various elements of South Lake Park, experts need to assign weight rankings to each element through scoring, where the meanings of each score are represented as shown in [Table 3].

[Table 3] Evaluation Indicators

Scale	Meaning of representation
1	When comparing two factors, they have equal importance
3	When comparing two factors, the first factor is slightly more important than the second factor
5	When comparing two factors, the first factor is significantly more important than the second factor
7	When comparing two factors, the first factor is strongly more important than the second factor
9	When comparing two factors, the first factor is extremely more important than the second factor
2 `4 `6 `8	The middle value for judging two adjacent factors is referred to as the "intermediate value
The reciprocal of the values mentioned above	When comparing two factors in reverse, it is the reciprocal of the original comparison value

3.3.3 Explanation of Weight Vector Calculation

1: Normalize the matrix using the following formula:

$$\overline{a_{ij}} = a_{ij} / \sum_{i=1}^{n} a_{ij} (i.j = 1, \ 2, \ \ldots.. n)$$

Where a_{ij} represents the data in the i-th row and j-th column of judgment matrix A, and a_{ij} represents the data in the i-th row and j-th column of the normalized matrix.

2: Sum the elements within the matrix：

$$\overline{w_i} = \sum_{j=1}^{n} \overline{a_{ij}} (i.j = 1, \ 2, \ \ldots.. n)$$

3: Implement normalization for $\overline{w_i}$ in the above formula

$$w_i = \overline{w_i} / \sum_{i=1}^{n} \overline{w_i} (i = 1, \ 2, \ \dots \dots n)$$

Where w_i represents the weight of the i-th criterion.

4: Compute the largest eigenvalue of the judgment matrix A

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

Where n is the order of the matrix, A is the judgment matrix, w_i is the weight of the ith indicator. λ_{max} is the maximum eigenvalue of the judgment matrix A[22].

For the consistency test for the vector obtained earlier, there are eigenvalues. The consistency test indicates that, if you can pass the test, the construction of the judgment matrix is reasonable in both the existence of the value of the interpretation. Assuming that CI stands for consistency index, the following is the arithmetic method:

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

Through the value of n, it is possible to obtain the value of RI, so as to obtain the consistency ratio, both when the CR < 0.1, then the test meets the requirements, as shown in [Table 4].

[Table 4] RI Indicator

N	1	2	3	4	5	6	7	8	9	10	11
RI	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51

3.3.4 Weights Solution

According to the indicator system, using the above formula, the importance of each indicator is scored by experts, and then the scoring results are discussed and summarized internally, and the two-by-two comparison at the guideline level results in the judgment matrix in [Table 5]. A comparison of the indicators at the indicator level resulted in [Table 6-10].

[Table 5] Normative Level Evaluation

	B1	B2	B3	B4	B5
B1	1	0.33	0.25	0.5	0.67
B2	3	1	0.75	1.49	2
B3	4	1.33	1	2	2.67
B4	2	0.67	0.5	1	1.33
B5	1.5	0.5	0.38	0.75	1

[Table 6] Evaluation of Park Accessibility

	C1	C2	C3
C1	1	0.33	0.5
C2	3	1	1.49
C3	2	0.67	1

[Table 7] Evaluation of Park Scenicity

	C4	C5	C6	C7
C4	1	0.67	1.67	1.25
C5	1.5	1	2.5	2
C6	0.6	0.4	1	0.75
C7	0.8	0.5	1.3	1

[Table 8] Evaluation of Park Uniqueness

	C8	C9	C10
C8	1	0.5	2
C9	2	1	4
C10	0.5	0.25	1

[Table 9] Evaluation of Park Infrastructure

	C11	C12	C13	C14	C15
C11	1	0.67	0.33	2	0.5
C12	1.5	1	0.17	3	0.76
C13	3	6	1	5.8	1.4
C14	0.5	0.33	0.17	1	0.25
C15	2	1.3	0.7	4	1

[Table 10] Evaluation of Park Management Services

	C16	C17	C18	C19	C20
C16	1	0.5	1.33	2	0.67
C17	2	1	2.6	4	1.33
C18	0.75	0.38	1	1.5	0.5
C19	0.5	0.25	0.7	1	0.33
C20	1.5	0.75	2	3	1

According to the judgment matrix combined with the relevant calculation formula to derive the weight proportion relationship of each behavioral element, among them, all of the above judgment matrices pass the consistency test, so the construction of judgment matrices is considered reasonable. The weight ratio relationship between the elements can be clearly seen in [Table 11]. It has five important factors, which in descending order are park accessibility > park landscape > park characteristics > park infrastructure > park management services, and the other sub-weight factors are also ranked as shown in the following table, and the top three items with the highest weight ratios in the evaluation at the expert level are the park's stylistic characteristics, the good quality of the water quality and landscape, and the high cultural content.

[Table 11] Weighting of Indicators for the Integrated Evaluation

Target layer	Criteria layer	Indicator layer	Total weight	Overall sorting
	B1 （0.087）	C1 （0.167）	0.015	17
		C2 （0.499）	0.043	10
		C3 （0.334）	0.029	12
	B2 （0.261）	C4 （0.256）	0.066	5
		C5 （0.389）	0.102	2
		C6 （0.153）	0.041	10
		C7 （0.201）	0.052	6
	B3 （0.348）	C8 （0.286）	0.099	3
		C9 （0.571）	0.199	1
		C10 （0.143）	0.049	7
	B4 （0.174）	C11 （0.118）	0.021	15
		C12 （0.151）	0.026	13

		C13 (0.435)	0.076	4
		C14 (0.059)	0.010	19
		C15 (0.238)	0.041	9
		C16 (0.174)	0.023	14
		C17 (0.347)	0.045	8
	B5 (0.131)	C18 (0.131)	0.017	16
		C19 (0.087)	0.011	18
		C20 (0.261)	0.034	11

4. User Reviews and Discussion Analysis

In the previous chapter, the park environmental experts studied the relationship between the proportion of each element in the park, so based on the proportion of the relationship between the research and analysis of the user's evaluation of the facilities in the park, the final evaluation score is more objective, reducing the scoring error due to the different users of the research. Taking the internal visitors of Tangshan Park in Hebei Province as the research object, this study randomly distributed paper questionnaires and network questionnaires in a combination of methods, using the Likert scale method, so that they can rate the suitability of urban parks in each indicator factor 1 to 5, corresponding to "very poor, poor, general, good, very good" respectively. The 150 questionnaires were collected, and the average value of the scores of each index factor in the questionnaires was counted using MS Excel, and the scores of each index factor and the overall comprehensive score of the suitability of South Lake Park were calculated by the formula as shown in [Table 12]. Then the result M was divided into 4 grades using difference method for landscape effect: excellent ($4 \leq M < 5$), good ($3 \leq M < 4$), medium ($2 \leq M < 3$), poor ($1 \leq M < 2$) 4 grades.

The formula for calculating the overall user score is as follows:

$$M = \sum_{k=i}^{n} C_i W_i$$

[Table 12] Composite Score Statistics

Indicator factors	Total weight	Average score (users)	Aggregate score	Score	Aggregate score
C1	0.015	2.5		0.038	
C2	0.043	4.2	3.4	0.180	
C3	0.029	3.5		0.102	
C4	0.066	3.8		0.251	
C5	0.102	4.5	3.95	0.459	
C6	0.041	4		0.164	
C7	0.052	3.5		0.182	
C8	0.099	4		0.396	3.43
C9	0.199	4.2	3.8	0.836	
C10	0.049	3.2		0.157	
C11	0.021	2.8		0.059	
C12	0.026	3		0.078	
C13	0.076	3.4	2.96	0.258	
C14	0.010	2		0.020	
C15	0.041	3.6		0.148	
C16	0.023	3.6	3.04	0.083	

C17	0.045	3.1		0.139	
C18	0.017	3		0.051	
C19	0.011	2		0.022	
C20	0.034	3.5		0.119	

The overall score for park accessibility was 3.4 out of 5, which is a "good" rating. The combination of the indicators shows that the means of access to the park and the spatial orientation of the park still need to be improved. Park accessibility allows urban residents have an easy access to outdoor recreation and entertainment facilities, providing opportunities for exercise, social interaction, and enjoyment of the natural environment. This contributes to a better quality of life, less stressful living conditions, and improved mental health. Park accessibility is influenced by transportation connections, and good roads and transportation systems can make it easier for people to get to parks, including the ease of walking, biking, and taking public transportation. Urban planning and land use policies are critical to the design of park accessibility. Planners need to ensure that parks and natural green spaces are adequately considered to meet the needs of a growing urban population.

The overall score of the park landscape is 3.95. Vegetation is the core element of the park landscape. A wide variety of trees, flowers, grasses, and shrubs add diversity to the landscape, provide seasonal variations in color and texture, and provide beautiful views and shade for visitors. A weaker aspect of the comparison is the physical richness of the park, so there is a need to increase the variety of greenery and to design the landscaping to be more aesthetically pleasing. Various landscape elements can be added to the park such as sculptures, statues, courtyards, lawns, stone paths, horticulture, structures, and bridges. These elements can add to the artistry of the park.

The overall score for the uniqueness of the park is 3.8, with a rating of "good", which can be attributed to the park's location, topography, climate, and ecosystem. There are many exquisite garden buildings in the park, such as pavilions, rockeries, and water pavilions. These buildings incorporate traditional Chinese garden styles. South Lake Park also incorporates rich cultural elements, including the history and culture of the city of Tangshan. There may be cultural displays, sculptures, or monuments in the park to help visitors better understand the local history and cultural traditions. In terms of future improvements, unique landscaping and planning programs could be developed within the park to ensure that the park's layout and landscaping differentiate it from other parks. Consider using unique pathways, bridges, outdoor seating, and horticultural elements to highlight the park. Design some unique courtyards to provide serene and unique spaces for visitors, introduce some characteristic plant species to enrich the ecosystem, and incorporate some sculptural artworks to reflect the history and cultural design of the park. South Lake Park also emphasizes ecological protection and strives to maintain the surrounding natural ecosystem. This feature makes the park not only a place for urban recreation, but also an important ecological conservation value.

The overall score for park infrastructure was 2.96, with a rating of "Medium". Among the five sub-indicators, hygiene management scored the highest, indicating that environmental protection in South Lake Park is relatively good, but there is still a need to strengthen and improve cleaning and maintenance work to ensure that the park is clean and orderly, which is an important aspect. The lowest score for accessibility indicates that accessibility is not good in South Lake Park. Accessible facilities could be created to ensure that people with disabilities and the elderly can also enjoy the park's facilities and activities. Construct and maintain quality trails and paths, including walking paths, bike paths, and wheelchair access, to facilitate mobility for residents and visitors. Construct outdoor stages, music areas, public art installations, outdoor libraries, etc., to provide diverse venues for recreational and cultural activities.

The overall score for the park management services aspect is 3.04, with the green care score being the highest, thus validating the excellent sanitation facilities in the park infrastructure aspect above.

Among the public service quality, scores are lower, and some public facilities, such as restrooms, rest areas, and trash cans, may be inadequate or poorly maintained. Adding appropriate infrastructure (toilets, walking paths, seating areas etc.) and improving the efficiency of facility maintenance will improve visitor comfort. Parks should be cleaned regularly, including trash removal, plant trimming, and road maintenance. Keeping parks clean and tidy provides a pleasant environment. Next, develop a long-term plan and budget to ensure continued investment in park maintenance and improvements. Ensure that sufficient resources are available for maintenance and upgrading of facilities and activities. Finally, establish a monitoring and evaluation mechanism to regularly review the effectiveness of park management services, collect user feedback, identify problems, and take improvement measures.

5. Conclusion

This study provides a comprehensive assessment of a number of key factors within the South Lake Park in Tangshan City, Hebei Province, evaluating the park's accessibility, landscape, uniqueness, infrastructure, and management services, resulting in five evaluation scores and a good overall evaluation score. During the evaluation and analysis process, it was found that South Lake Park, as an important green space and recreational destination in Tangshan City, has obvious advantages in terms of natural landscape, cultural features, and ecological environment, and that South Lake Park's lakes, bridges, vegetation, and cultural heritage provide diverse recreational choices for visitors. However, the assessment and analysis also identified some possible deficiencies in South Lake Park, such as infrastructure maintenance (lighting system, roads), environmental protection measures (waste management, water pollution), and accessibility (transportation connections, barrier-free facilities), which have much room for improvement. To address these issues, managers can establish a good transportation system, build and maintain high-quality walking paths, driveways, and accessible routes, and develop long-term plans and programs to clean the park on a regular basis. In addition, the management organization of South Lake Park can draw on the methodology of this study to continuously improve the sustainable management and planning of urban parks to meet the changing needs of visitors and the social environment. The elemental analysis of this study provides clear existing problems and improvement options for the management and planning of urban parks, which will have a positive impact on improving the quality of urban parks and the quality of life of urban residents. Creating more comfortable, healthy, and community-involved urban parks by integrating environmental, social, and economic factors will drive urban development in a more sustainable direction. This will not only improve the quality of life of urban residents, but will also help to reduce the pressure on natural resources and the ecological environment in the process of urbanization.

This study is randomly selected tourists to distribute paper questionnaires, in the process of distributing questionnaires, most tourists may not understand the park facilities and levels thoroughly enough, and considering the mobility of tourists, age levels are not divided into a series of problems such as lack of clarity, which will affect the completion of the questionnaire, resulting in the final rating results have certain errors. Therefore, future research should be carried out in a more scientific and effective way, based on different age levels to conduct detailed interviews and research, so as to obtain more accurate data.

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