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A recreation satisfaction measurement of National Lakeside Wetland Park in Hefei based on structural equation model

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ABSTRACT

In recent years, with the development of wetland environmental protection, different countries around the world are recognizing the recreational value of wetland ecosystems. However, current researches on the perceptions of tourism stakeholders lack structural perceptions of recreation satisfaction. Consequently, a structural equation model is applied to identify the recreation satisfaction of National Hefei Lakeside Wetland Park. To realize the unnoticeable factors of the recreation satisfaction, seven latent variables are established, including perceived material quality, perceived social quality, perceived management quality, recreation expectation, perceived value, tourist satisfaction and accessibility. The results show that perceived quality, accessibility and recreation expectation are the critical factors that may affect recreation satisfaction. Furthermore, adding recreational facilities and public transportation can greatly advance the level of satisfaction. This research supports sustainable development and coordination of different tourists at wetland parks.

Keywords: Wetland parks; Recreation satisfaction index; Structural equation model

1. Introduction

With the rapid development of urban construction, wetland degradation and loss are increasingly common [1]. Wetland degradation is a global problem that negatively impacts biodiversity and human well-being [2]. As core components of the urban green space system, wetland forest parks carry important functions such as improving the ecological environment, beautifying the environment, inheriting local culture, protecting resources and popularizing education. In the face of China's rapid development of the wetland forest parks, governments and relevant departments are challenged with designing parks to meet the needs of the people as well as serve as a core city sustainable ecosystem. The construction of the wetland parks in China has just begun and is still in the exploratory stage, its recreational value and quality not only reflect the attractiveness of the parks for residents, but also reflect whether the parks can achieve sustainable, healthy development. At present, there are still many problems with the regulation of the wetland parks. On the one hand, due to the lack of development experience, the government and relevant departments handle problems superficially and cannot recognize the profound influence behind the recreation quality of the parks. Empirical analysis on the development planning of the wetland parks is relatively insufficient. On the other hand, although studying the forest wetland park is popular, there still lack support from complete theoretical models. More specifically, researchers often do not consider the perplexing relationship between each factor and each observation index, resulting in poor conclusions that do not benefit park construction nor reflect the wetland parks recreation satisfaction truly. Tourists' positive cognitive and emotional experience can improve the economic evaluation of nature reserves and increases the likelihood of the tourists to pay a return visit [3]. Against this background, it is urgent to

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build a theoretical model which can further study and fully consider the impact of the park recreation satisfaction.

Recreation satisfaction can be used to describe individuals' emotion by participating in recreational activities [4]. At present, many foreign countries are actively studying and using the satisfaction degree model, the most representative of which is the American Customer Satisfaction Index and the European Customer Satisfaction Index. Foreign scholars have gained many insights through recreation satisfaction research. For instance, Kim et al. [5] used the satisfaction factor analysis method to test the Suseong leisure park trails facilities visitor satisfaction: their results showed that the facility usage, pedestrian accessibility, surrounding landscape, facility satisfaction and quiet level have significant positive influence, and that convenience was the largest influence factor. Salleh et al. [6] used the average analysis which includes importance average and perception average to evaluate tourists satisfaction of the service quality of Tioman Island Ocean Park, and discussed when the perceived average less than expected average and why the tourist satisfaction was low. Arabatzis and Grigoroudis [7] analyzed Dadia–Lefkimi–Souflion National Park's visitors' satisfaction, perception and differences by using the multiobjective satisfaction analysis system and concluded that natural features, service levels and rest facilities are enough to impact satisfaction. According to Saneum Natural Recreation Forest's tourist satisfaction evaluation, Weon [8] revealed the recreation of vision, ramp, trails and nature education facilities are needed to add attention. Eom [9] used the same measurement tools to investigate the change in Daegu city's park green space in 1986, 2001 and 2010, and classified the factors that affect individual satisfaction such as facilities, objective conditions and green space plan. Syme et al. [10] found that controlling of perception environment is an important factor after the survey of Australian urban wetland, which can decide wetland views, and also pointed out the perceived environment statistical relationship of the park visitors.

In contrast, recreation assessment in China is in its early stages, for instance, Li [11] applied descriptive statistical methods to investigate and analyze Beijing Suburb Park residents' satisfaction and suggested improvements that the park could make to serve the residents better. This method is fast and convenient, but the results are not profound enough to explore deeper. Ma and Na [12] evaluated the recreation value of Zhalong Wetland through a questionnaire survey that was based on contingent valuation method. Although this method is diverse and easy to calculate, it is sensitive to differences in the subjects' responses, which may cause errors in the valuation of wetland. Su et al. [13] used factor analysis and multivariate linear regression analysis to discuss the behavior of tourists at leisure agriculture science locations. This method has the advantages of weighing a variety of factors and the simple form is easy to fit and calculate, but this method limits the effect and must be linear. Yu et al. [14] made an empirical analysis of the forest visitors' recreation satisfaction based on importance-performance analysis. This method can objectively evaluate the importance and performance of the factors which affect the satisfaction degree. Guo [15] conducted association analysis of residents' satisfaction with Lanzhou City Park, and an active relationship among accessibility, perceived value, perceived quality and residents' satisfaction was discovered. Zhang [16] researched Forest Park tourist experience of Recreation Opportunity Spectrum theory, the results can be employed to the allocation and management of resources in the southern suburbs park.

In terms of the recreation satisfaction research, scholars in both China and abroad focus mainly on explicit variables, such as whether the park facilities are complete, the transportation is convenient, the scenery is beautiful, service is satisfactory while ignoring the main body of the recreation value, namely, the hidden variables, such as recreation expectation and loyalty. Structural equation model (SEM) shows its superiority in this respect. SEM is a multivariate statistical method that has been increasingly applied to social science to analyze the complicated relationship between latent variables and observed variables. It can handle multiple factors at the same time, allows bigger more flexible measurement model to estimate the whole model fitting degree [17]. One of the greatest advantages of SEM is its ability to detect multicollinearity problem.

This study provides further analysis on the basis of data onto Hefei Lakeside Wetland Forest Park, which is located at the southeast of Hefei city, near the Nanfei river estuary. To help decision-making during strategic planning of wetland parks, this paper takes Hefei Lakeside Wetland Park as a typical case, makes an empirical analysis based on the SEM, and conducts a comprehensive study of factors correlated to tourist recreation satisfaction. The rest of this paper is organized as follows: Section 2 describes the study area, methods and data, Section 3 describes the structure of the model, Section 4 examines the validity and reliability of SEM. Section 5 describes the results of SEM simulation. Finally, Sections 6 and 7 propose potential policy implications.

2. Materials and methods

2.1. Study area

Hefei Lakeside Wetland Forest Park is located at north of the Jiazi River, south of the Huanhu Road North, west of the Chao Lake Road South and east of the Nanfei River (latitude range: 31°42′45″–31°45′24″N; longitude range: 117°22′32″–117°23′29″E; Fig. 1). It is the only million mu city water net forest in Anhui province and one of the 22 4A tourist attractions in Anhui province. The forest resources and water resources are rich, covering an area of 799 and 263 ha, respectively, with a total land area of 1,072 ha. The park is the product of China' first initiative of reverting farmland back to forestry. It belongs to subtropical monsoon climate zone, the annual average temperature of 15.7°. It is composed of a city forest, wetland forest and culture forest which serve multiple functions such as conserving water, cleaning air, regulating climate and resisting wind and noise. It has been nicknamed the "lung" and "kidney" of Hefei to reflect its role of keeping the city clean and livable.

Hefei Lakeside Wetland Forest Park construction is expected to help Hefei reach its "Great Lakes City, Innovative Highland" strategic goal. However, in recent years, due to excessive discharge and over-exploitation, Chao Lake's water quality has suffered severe pollution. Wetland can regulate the quality of water, and thus attention has turned to lakeside wetland construction. Recreation satisfaction is an important yardstick of construction quality. Lakeside Wetland Park

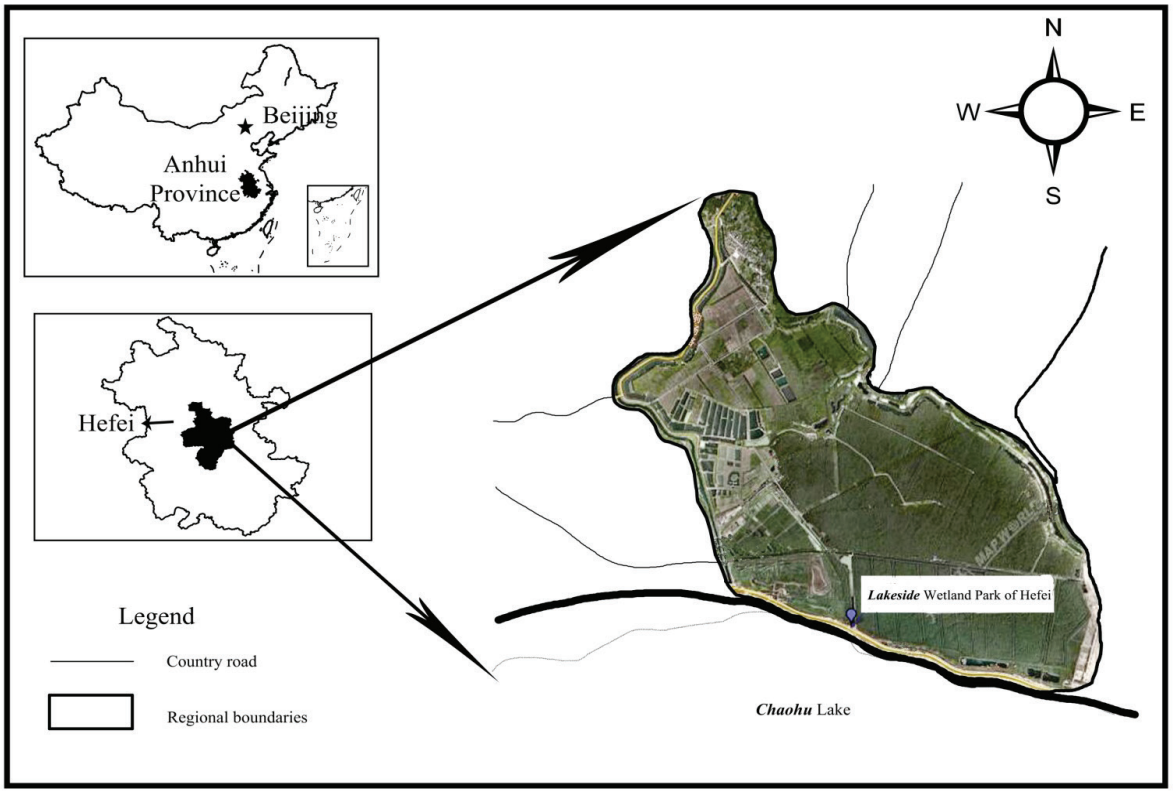

Fig. 1. The geographic location of lakeside Wetland Park [18].

plays an important role in purifying water quality, conserving water supplies, improving air quality and regulating urban microclimate, is the "lung" and "kidney" of Hefei. Hefei boosts its development with big efforts in the guidance of the state Central Rise Policy, to 2020, its GDP will reach 11,400 billion Yuan. The construction of Lakeside Wetland Park projects which aims to protect the ecological environment and promote the emerging industries are expected to bring in Hefei and Chao Lake ecological, social and economic benefits. Moreover, it will promote the build of Economic Circles of Anhui Provincial Capitals and the development of the region of Wanjiang city.

2.2. Questionnaire design

The questionnaire includes seven aspects: perceived material quality, perceived social quality, perceived management quality, recreation expectation, perceived value, tourist satisfaction and accessibility. It involves a total of 19 measurements indexes (Table 1). The questionnaire is divided into two parts. The first part collects demographic data, including gender, age and education level. The second part considers the various index factors and is conducted with the Likert scale, a five point scale in which 1 represents "dissatisfied" and 5 represents "very satisfied".

2.3. Data acquisition

Data were collected via random sampling. It allows the investigator to analyze the emotion, motivation, insights, activities and experiences of the visitors who respond to the same set of questions in the study area [19]. The field survey times were selected weekends with good weather and were conducted from early November to mid-November 2016. The survey site was chosen in the Hefei Lakeside Wetland Park. The respondents were tourists inside the park. A sample size greater than or equal to 200 was considered to be sufficient for analysis in SEM [20]. 300 questionnaires were issued, of which 248 were valid, for a validity rate of 82.7%.

2.4. Structural equation model

A theoretical hypothesis model describing the relationship between indicators and latent variables. We need to sort out which variables may influence and the relationship between these variables, later prediction based on the theoretical model [21].

The SEM consists of a measurement equation and a structural equation, as shown in Eqs. (1) and (2):

$$x = \Lambda_x \xi + \delta \tag{1}$$

$$y = \Lambda_y \eta + \varepsilon \tag{2}$$

where x is the vector of exogenous index; y is the vector of endogenous index; ξ is the vector of exogenous latent variables; η is the vector of endogenous latent variables; Λ_x is the

Table 1
Questionnaire design

Observed variable	Question
Landscape quality	How do you feel about the landscape quality?
Park scale	How do you feel about the park scale?
Fundamental service facilities	How do you feel about the fundamental service facilities such as the bathrooms and the night lights?
Recreational facilities	How do you feel about the recreational facilities such as the rest chairs, pavilions and squares?
Identification system	How do you feel about the identification system such as the signs and maps?
Entertainment project	How do you feel about the entertainment project?
Wetland regional culture	How do you feel about the wetland culture the park can show?
Sanitation cleaning	How do you feel about the sanitation cleaning?
Park security	How do you feel about the park security?
Employee service	How do you feel about the employee service?
General expectation	How do you feel about the general expectation the park can meet you?
Physical fitness expectation	How do you feel about the physical fitness expectation the park can meet you?
Ecological education expectation	How do you feel about the ecological education expectation the park can meet you?
Recreation motivation expectation	How do you feel about the expectations of making friends, dating and playing with family the park can meet you?
Entertainment consumption	How do you feel about the entertainment consumption the park offered?
Perceived cost of travel	How do you feel about the time spent on the way to the park?
Compare with expectation	Compared with your expectation before visit, how do you feel about the park?
Overall satisfaction	In general, how do you feel about the park?
Public transportation	How do you feel about the convenience of public transport to the park?
Exit and entrance	How do you feel about the exit and entrance?

factor loading matrix of exogenous variables on exogenous latent variables, that is, describes the relationship between exogenous index and exogenous variables; and Λ_y is the factor loading matrix of endogenous variables on endogenous latent variables, that is, describes the relationship between endogenous index and endogenous variables.

Eq. (3) describes the relationship between latent variables:

$$\eta = B\eta + \Gamma\xi + \zeta \tag{3}$$

where B describes the relationship between endogenous latent variables; Γ describes exogenous latent variables' effects on endogenous latent variables; and ζ is the residual term of the structural equation.

Index indicates variables that can be observed, while latent variables are abstract concepts that require data measured from multiple observation variables. For example, in the park recreation satisfaction model, perceived quality is indirectly inferred by the visitors' satisfaction with the quality of landscape, the park scale, infrastructure and other observations. Most observation objects that we need to explore are hard to characterize directly through first-hand survey data. Therefore, we first study the relationship between observation variables and latent variables of the model (measuring model) and then study the relationship between the latent variables of the model (structural model).

2.5. Statistical method

Data processing based on SEM. Cribbie [22] believes that the SEM refers to a statistical analysis method which uses the covariance matrix to analysis the relationship between variables, it is a multivariable measurement model considering the causal relationship between factors and factors' internal structure. Yejing holds that the SEM is a multivariate analysis technique with excellent properties, which is good at dealing with the complicated relationship [23]. It can be seen that the traditional statistical analysis methods cannot properly deal with latent variables, while SEM can deal with it and its indexes. Amos is a powerful statistical analysis tool. SEM built by using it can be more accurate than by the standard multivariate statistical analysis. Research procedures can be seen in Fig. 2.

3. Theoretical framework

We define tourist satisfaction as being influenced by the following indices:

- Perceived material quality
- Perceived social quality
- Perceived management quality
- Recreation expectation
- Perceived value
- Tourist satisfaction
- Accessibility

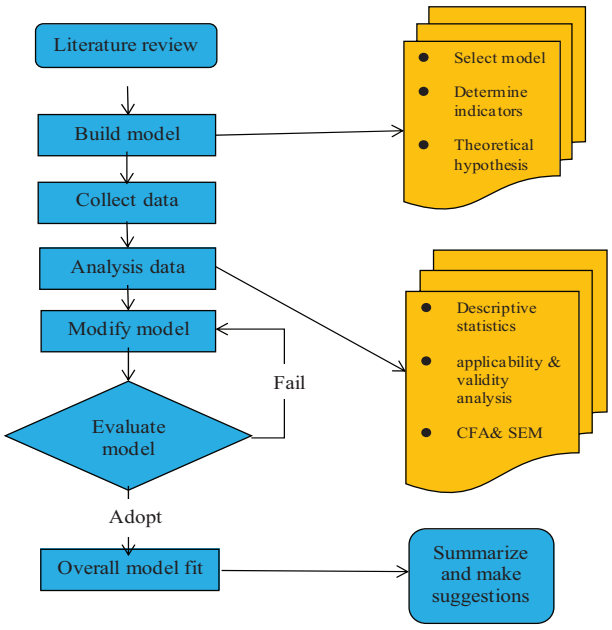

Fig. 2. Entire framework of model technology.

Tourist satisfaction is the core of our discussion, it may be affected by different indexes. "Tourist satisfaction" pertains to park scenery, valuable natural scenic spots, forestry, free space, peace, opportunities for activity and historic culture [24]. Scenic factors shown to influence the park utilization rate include equipment, security, sign enhancement and availability of walking and jogging trails [25]. Based on this, hypotheses H1 and H2 are established:

Hypothesis 1 (H1). Perceived material quality will have a significant positive impact on perceived value.

Hypothesis 2 (H2). Perceived material quality will have a significant positive impact on tourist satisfaction.

Amidst the development of modern society, motivations for visiting parks have shifted from the pure pursuit of landscape to partaking in the cultural and spiritual spaces that parks offer. Taking Germany Franken Hill Park as an example, four dimensions – environmental, economic, sociocultural and institutional – the sociocultural dimension was shown to be the strongest predictor of customer satisfaction [26]. Zhao [27] has used Nanjing Xuanwu Lake Park as an example, deems that the city parks residents recreation experience qualities including health facilities, space scale, service facilities, activities, cultural connotation, landscape, environment, facilities and activities. Based on this, hypotheses H3 and H4 are established:

Hypothesis 3 (H3). Perceived social quality will have a significant positive impact on perceived value.

Hypothesis 4 (H4). Perceived social quality will have a significant positive impact on tourist satisfaction.

The planning, management and implementation of park development are also key factors affecting the level of recreation. Efficient management and comfortable services can greatly enhance the park's perceived quality and level. This is shown in a study of Changsha City Park, which considers a variety of factors affecting the perception of recreation satisfaction can be divided into accessibility recreational attraction, recreational services and recreational function [28]. Based on this, hypotheses H5 and H6 are established:

Hypothesis 5 (H5). Perceived management quality will have a significant positive impact on perceived value.

Hypothesis 6 (H6). Perceived management quality will have a significant positive impact on tourist satisfaction.

Recreation expectation refers to an abstract expectation of service that a destination should provide before visitors depart. Higher expectations usually imply the lower perceived quality. The majority of studies on the evaluation of recreation satisfaction have focused on the relationship between expectation and perceived quality [24,26,27]. Based on this, hypotheses H7, H8 and H9 are established:

Hypothesis 7 (H7). Recreation expectation will have a significant negative impact on perceived material quality.

Hypothesis 8 (H8). Recreation expectation will have a significant negative impact on perceived social quality.

Hypothesis 9 (H9). Recreation expectation will have a significant negative impact on perceived management quality.

Perceive value means an overall evaluation of the whole feeling about the parks after weighing the perceived benefits and the costs of the acquisition of the service. Although it reflects a subjective cognition, it has a relatively great impact on tourist satisfaction. The residents' attachment to recreation grounds consists of appealing, familiarity and emotional satisfaction, management environment, uniqueness, infrastructure, destination image and trust [29]. Based on this, hypothesis H10 is established:

Hypothesis 10 (H10). Perceived value will have a significant positive impact on tourist satisfaction.

By taking Zhentou Mountain Forest Park as a case, considers that three indicators including air quality, recreation ornamental value and traffic condition are important factors that affecting the perception of tourists, among these, traffic condition has a relatively bigger effect [30]. Based on this, hypotheses H11 and H12 are established:

Hypothesis 11 (H11). Accessibility will have a significant positive impact on recreation expectation.

Hypothesis 12 (H12). Accessibility will have a significant positive impact on perceived value.

With a series of literature review and above analysis, this paper finally selects perceived material quality, perceived social quality, perceived management quality, recreation expectation, perceived value, tourist satisfaction and accessibility to constructs the preliminary SEM, then takes this way to measure the Wetland Forest Park recreation satisfaction. Based on the above theoretical assumptions, we can initially construct the Wetland Forest Park recreation satisfaction model hypothesis figure (Fig. 3).

Compared with the existing models, this model has been improved in the following places:

- It summarizes the advantages and disadvantages of the existing literature, eliminates the repeated meaning and repeated outcome variables, adds more influential variables, selects 20 observed variables, 7 potential variables which are representative and convincing, considers many aspects which may influence the park recreation satisfaction.
- There are many indices that may influence perceived quality, in order to facilitate the later detailed analysis

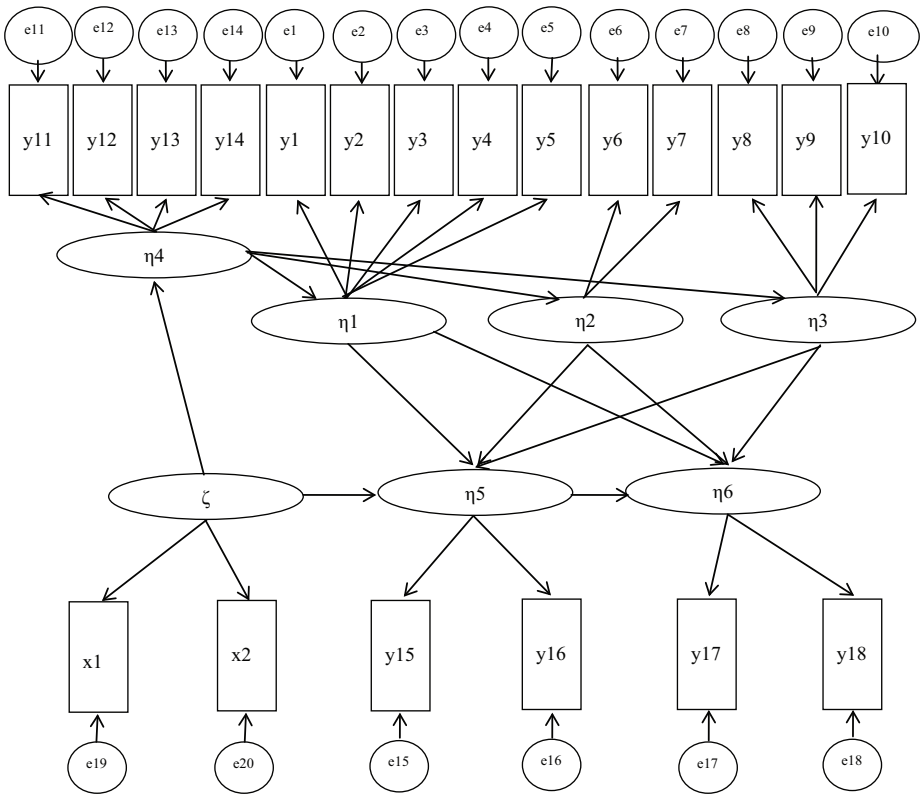

Fig. 3. Tentative model of wetland park recreation satisfaction [31]. η1 = perceived material quality; η2 = perceived social quality; η3 = perceived management quality; η4 = recreation expectation; η5 = perceived value; η6 = tourist satisfaction; ζ = accessibility; y1 = landscape quality; y2 = park scale; y3 = recreational facilities; y4 = fundamental service facilities; y5 = identification system; y6 = entertainment project; y7 = wetland regional culture; y8 = sanitation cleaning; y9 = park security; y10 = employee service; y11 = general expectation; y12 = physical fitness expectation; y13 = ecological education expectation; y14 = recreation motivation expectation; y15 = entertainment consumption; y16 = perceived cost of travel; y17 = compare with expectation; y18 = overall satisfaction; x1 = public transportation and x2 = exit and entrance.

and the understanding of the impact of material, society and management on tourist satisfaction and perceived value, respectively, perceived quality is divided into perceived material quality, perceived social quality and perceived management quality.

- According to the field investigation, the existing wetland parks mostly focus on the development of entertainment. Our model adds entertainment consumption index under perception values. Furthermore, the Wetland Park is in the preliminary stage of development. In order to attract tourists, entry into the park is free. Therefore, we do not consider the ticket consumption index.
- We use the wetland park as a typical case to study recreation quality, our model adds the ecological education expectation index to recreation expectation, adds the wetland regional culture index to perceived social quality.

4. Methodology

4.1. Sample distribution

We used SPSS software (16.0) to process the collected data. The basic information about the respondents is shown in Table 2. The gender ratio is balanced. Young people aged 18–25 comprise of 44% of respondents, young people below the age of 17 account for 17.7% of the total number. Because the wetland park is far away from the downtown areas and residential areas, it is inconvenient to the elderly, so the smaller proportion of older-aged respondents is expected.

4.2. Model applicability test

In order to realize whether the questionnaire design is reasonable and the data are valuable for further analysis, we first analyze the applicability and validity of the questionnaire and revise questionnaire designs accordingly.

Applicability analysis pertains to repeatability, that is, measurements demonstrate consistency when we use the same index or measuring tools. The applicability formula is as follows:

$$r_{xx} = \frac{S_r^2}{S_x^2} \tag{4}$$

where r_{xx} is the applicability coefficient; S_r is the true variance; and S_x is the total variance.

In actual measurement, the true value is unknown. Thus, the applicability coefficient is estimated according to the measured value. The applicability coefficient table

for the seven questionnaire variables is shown in Table 3. According to the applicability coefficient table, the Cronbach's alpha coefficient of each latent variable is between 0.674 and 0.818. The overall applicability coefficient is 0.944, which indicates that the applicability of this scale is good and is consistent with the questionnaire.

4.3. Model validity test

Validity analysis refers to the degree of analysis tools ability measure object attributes accurately and objectively, which represents the validity and correctness of the measurement.

Here the KMO value and Bartlett's tests for the questionnaire data. The results are shown in Table 4. p Value is $0.000 < 0.001$, which shows that the correlation coefficient matrix is not identity matrix and there is correlation between variables; the Kaiser–Meyer–Olkin (KMO) value is $0.954 > 0.9$, indicating that the structural validity of the questionnaire is good, and thus it is very suitable to test validity by factor analysis.

The more variables the model contains, the more samples it requires. However, the χ^2 value of model fit can easily reach the significant level to affect the evaluation [32], so we use factor analysis method of principal component analysis to simplify model structure and remove variables which are not well representative. According to the rotated factor loading matrix, it is needed to delete the observed variables of poor effect to simplify the model and make some amendments to the hypothesis model.

- The deletion of the observed variables: observation variable – recreational facilities show little difference between two principal factors, it cannot make a good explanation of factors. Theoretically speaking, people's perception of the recreational facilities can be included within the fundamental service facilities, so we removed the observed variable. Observation variable – loads of ecological education expectation on the main factor are less than 0.5. Upon theoretical analysis, perception of ecological education knowledge can be embodied in the perception of wetland culture, so we removed the observed variable.
- The position transfer of the observed variables: if we put the observed variables – (wetland regional culture and entertainment project) from the latent variable – (perceived social quality) to the latent variable – (perceived material quality), theoretical analysis found that although the wetland culture represents the cultural atmosphere that the park shows to the public, it needs park's facilities

Table 4
KMO value and Bartlett's test

KMO value		0.954
Bartlett's	Approximate χ^2	2.736E3
	DF	190
	Significance	0.000

Table 2
Basic information of respondents

Gender	Male			Female		
Population	123			125		
Percentage %	49.6			50.4		
Age	17 and below	18–25	26–35	36–45	46–55	56 and above
Population	44	109	26	39	22	8
Percentage (%)	17.7	44	10.5	15.7	8.9	3.2
Education	High/technical secondary school and below		Junior college	Undergraduate	Master and above	
Population	85		35	111	17	
Percentage %	34.3		14.1	44.8	6.9	

Table 3
Applicability coefficient

Latent variable	Observed variable	No. of cases	No. of items	Alpha coefficient
Perceived material quality	y1~y5	248	5	0.818
Perceived social quality	y6~y7	248	2	0.749
Perceived management quality	y8~y10	248	3	0.815
Recreation expectation	y11~y14	248	4	0.789
Perceived value	y15~y16	248	2	0.674
Tourist satisfaction	y17~y18	248	2	0.802
Accessibility	x1~x2	248	2	0.702
Total scale	y1~y18, x1~x2	248	25	0.944

as the carrier. Whether the facilities are complete affects the wetland culture's influence. Similarly, whether the entertainment projects are sufficient depends on the facilities in the park. If we put the observed variables – (fundamental service facilities and identification system) from the latent variable – (perceived material quality) to the latent variables – (perceived management quality). Analysis found that basic services and identification system cannot operate properly without personnel management, for example, cleanliness of toilet has correlation with cleaning staff, so the adjustment above is in line with the actual application.

In addition to the factor load, the reliability and the average variance extraction (AVE) are also the criteria for determining the convergent validity of the model [20]. The measurement of reliability can observe whether the latent construct measured by item has a high consistency. AVE can observe whether the latent variables good to explain the variation value of the index variable, so the measurement of the two items is necessary for inspection. The reliability of each factor construct is usually based on the consistency alpha coefficient in exploratory factor analysis, but the reliability of CFA model is based on construct reliability [32]. The construct validity of latent variables is called composite reliability (CR). The combination reliability and AVE can be calculated by the standardized indicator loading and the error variance. The formula is as follows:

$$CR = \frac{(\Sigma SIL)^2}{[(\Sigma SIL)^2 + \Sigma(EV)]} \quad (5)$$

$$AVE = \frac{(\Sigma SIL^2)}{[(\Sigma SIL^2) + \Sigma(EV)]} \quad (6)$$

where SIL is standardized indicator loading and EV is error variance.

The calculation results are shown in Table 5. It can be seen from the table that the reliability values of the six latent variables are between 0.66 and 0.83 and the CR index values of the latent variables are greater than 0.60, which means the model internal quality is great and the consistency between measured variables is large. Furthermore, their average variance has extracted all equal critical values which indicates that the convergent validity of the measurement model is good and can be used in empirical research.

4.4. Model fit test

Through the above principal component analysis, measurement variables of the model have certain adjustment. Then, the next step is to conduct parameter estimation and model testing based on the Amos software (17.0) to confirm whether the adjusted model satisfies the requirements of adaptation. First, the model is evaluated by the normality, and the normal evaluation table can be seen in Table 6. The absolute value of skew coefficient is less than 1 and the absolute value of kurtosis coefficient is not more than 2, therefore the data show normal distribution, and estimate the parameters statistics of the model with the maximum likelihood method is very suitable.

The significance of path coefficient of each parameter was tested by the maximum likelihood method, namely *t* test.

Table 5
Convergent validity measurement of the SEM

Latent variable	Observed variable	SIL	EV	CR	AVE
Perceived material quality	Landscape quality y1	0.73	0.53	0.80	0.50
	Park scale y2	0.58	0.33		
	Entertainment project y3	0.76	0.58		
	Wetland regional culture y4	0.75	0.57		
Perceived management quality	Fundamental service facilities y5	0.71	0.50	0.83	0.50
	Identification system y6	0.73	0.54		
	Sanitation cleaning y7	0.72	0.52		
	Park security y8	0.74	0.55		
	Employee service y9	0.77	0.59		
Recreation expectation	General expectation y10	0.73	0.53	0.75	0.50
	Physical fitness expectation y11	0.66	0.44		
	Recreation motivation expectation y12	0.67	0.45		
Perceived value	Entertainment consumption y13	0.67	0.45	0.66	0.50
	Perceived cost of travel y14	0.78	0.61		
Tourist satisfaction	Compare with expectation y15	0.86	0.73	0.67	0.50
	Overall satisfaction y16	0.79	0.62		
Accessibility	Public transportation x1	0.80	0.64	0.66	0.50
	Exit and entrance x2	0.68	0.47		

We get the path coefficient as shown in Table 7: expect standardized regression coefficient parameters such as "General expectation <-- η4", "Landscape quality <-- η1" are fixed parameter (value = 1), the *p* values of other paths are all less than 0.001, which means the path coefficients reach 0.05 significant level and the *t* test has been passed.

As shown in Table 8, the χ^2 value of the overall model fit is 233.634, the degrees of freedom (DF) of the model is 127, the significant probability level $p = 0.000$, the ratio of χ^2 degrees of freedom (CMIN/DF) is 1.84 the adaptive standard of being less than 3 was satisfied. Based on the above results, it can be seen that the fitness of the hypothetical model is good. Fit statistics are shown in Table 8: goodness of fit index (GFI), norm of fit index (NFI), incremental fit index (IFI) and Tucker–Lewis index (TLI) are all in line with the fit standard (more than 0.900), adjusted goodness of fit index (AGFI) and relative fit index (RFI) are not in accord with the matching standard (more than 0.900), root mean square error of approximation (RMSEA) is 0.058 (in accord with the fit standard: less than 0.80), critical N (CN) is 176 (not accord with the fit standard, which is more

Table 6
Assessment of normality

Variable	Skew	Kurtosis
Landscape quality	–0.373	–0.259
Park scale	–0.558	0.686
Fundamental service facilities	–0.336	–0.169
Identification system	–0.419	–0.275
Entertainment project	–0.265	–0.395
Wetland regional culture	–0.669	0.199
Sanitation cleaning	–0.598	0.375
Park security	–0.508	0.119
Employee service	–0.470	–0.062
General expectation	–0.433	0.030
Physical fitness expectation	–0.420	–0.297
Recreation motivation expectation	–0.774	0.721
Entertainment consumption	–0.360	–0.221
Perceived cost of travel	–0.514	0.181
Compare with expectation	–0.619	0.181
Overall satisfaction	–0.872	1.219
Public transportation	–0.499	–0.187
Exit and entrance	–0.524	0.105

Table 8
Fit statistics of the SEM

Fit statistics	Value
GFI	0.904
RMSEA	0.058
NFI	0.905
RFI	0.886
IFI	0.954
TLI	0.944
CN	176

Table 7
Test of *t* value

	Estimated	SE	CR	*p*
Landscape quality <-- η1	1.000			
Park scale <-- η1	0.779	0.090	8.694	***
Entertainment project <-- η1	1.344	0.116	11.581	***
Wetland regional culture <-- η1	1.322	0.116	11.581	***
Sanitation cleaning <-- η3	1.000			
Park security <-- η3	1.045	0.094	11.142	***
Employee service <-- η3	1.147	0.100	11.523	***
Identification system <-- η3	0.998	0.091	10.990	***
Fundamental service facilities <-- η3	0.960	0.091	10.600	***
General expectation <-- η4	1.000			
Physical fitness expectation <-- η4	0.981	0.097	10.105	***
Recreation motivation expectation <-- η4	0.949	0.092	10.266	***
Entertainment consumption <-- η5	1.000			
Perceived cost of travel <-- η5	1.050	0.102	10.285	***
Compare with expectation <-- η6	1.000			
Overall satisfaction <-- η6	0.845	0.060	14.009	***
Public transportation <-- ζ	1.000			
Exit and entrance <-- ζ	0.719	0.069	10.343	***

*** The significance of path coefficient of each parameter all reach 0.01 significant level and the *P* values of other paths are all less than 0.01.

than 200). In conclusion, the fit degree between the hypothesized model and the sample data needs to be further revised.

4.5. Model modification

According to the above fit statistics, it is necessary to further modify the path graph of the hypothetical model, generally through [33]: increasing the correlation between variables (covariance). The cited statistics can include *t* value (if the *t* value is less than 1.96, then it indicates that the corresponding path is not significant and need to be deleted) and modification indices (MI) value (on the basis of the larger MI value to establish a new path, if the χ^2 value is significantly reduced, it indicates that the correction is effective and correct). However, it should be noted that it is needed to analyze whether the amendment has practical significance or experience rule before correct indicators proposed by Amos [21].

In the views of significance test of path coefficient, according to the *t* value: the *t* value of the path coefficients such as "perceived value η5 <-- perceived material quality η1", "perceived value η5 <-- perceived management quality η3", "tourist satisfaction η6 <-- perceived value η5" and "tourist satisfaction η6 <-- perceived management quality η3" are all less than 1.96 which means their path coefficients are not significant ($p < 0.001$). All of these need to be removed, but deletion does not have theoretical significance here, and therefore they were retained.

Referring to the MI value, it is found that building a new path between "perceived management quality" and "perceived material quality" can help to decrease the χ^2 value and improve the fit statistics. Theoretically speaking, material infrastructure is the premise and necessary condition to carry out park management. Basic material construction is the key factor to improve the quality of management of the park. In addition, the correction is also considered to increase the covariance of the observed variable error terms from the same measurement model. It is important to note that the covariance needs to be corrected successively, otherwise easily lead to excessive correction [32]. Therefore, according to the covariance correction index, select the correction index within the largest MI value from the same measurement model, and then establish the relationship between e5 and e9, e8 and e9, e2 and e3, e7 and e8 one by one.

χ^2 value of the modified model is 196.816, DF = 121, CMIN/DF = 1.627, GFI = 0.919, RMSEA = 0.050, NFI = 0.920, RFI = 0.900, IFI = 0.968, TLI = 0.958, CN = 201, all statistics are closer to the standard. The overall fit of the revised model achieves good effect. Finally, the wetland parks recreation satisfaction SEM standardized path coefficient graph is shown in Fig. 4.

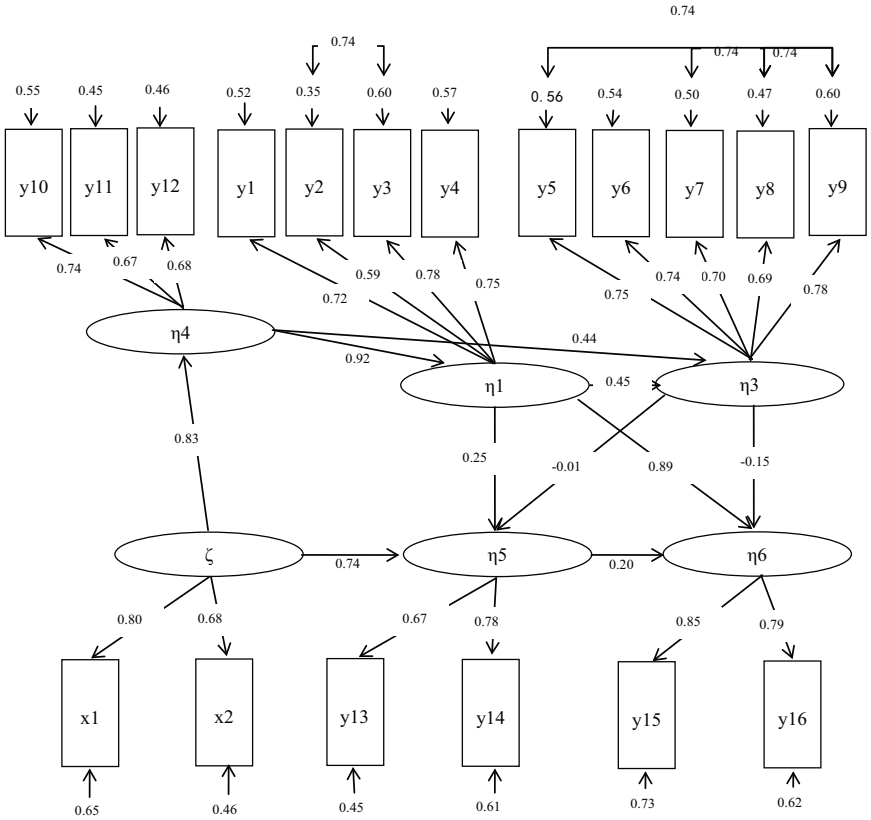

Fig. 4. Wetland park recreation satisfaction standardized path graph. η1 = perceived material quality; η3 = perceived management quality; η4 = recreation expectation; η5 = perceived value; η6 = tourist satisfaction; ζ = accessibility; y1 = landscape quality; y2 = park scale; y3 = entertainment project; y4 = wetland regional culture; y5 = fundamental service facilities; y6 = identification system; y7 = sanitation cleaning; y8 = park security; y9 = employee service; y10 = general expectation; y11 = physical fitness expectation; y12 = recreation motivation expectation; y13 = entertainment consumption; y14 = perceived cost of travel; y15 = compare with expectation; y16 = overall satisfaction; x1 = public transportation; and x2 = exit and entrance.

Table 9
Standardized results of structural equation modeling

Observed and latent variables	Factor loading	Latent and latent variable	Direct effect	Total effect
Landscape quality <-- η1	0.723	η3 <-- η1	0.446	0.446
Park scale <-- η1	0.595	η5 <-- η1	0.254	0.251
Entertainment project <-- η1	0.777	η6 <-- η1	0.888	0.872
Wetland regional culture <-- η1	0.754	η5 <-- η3	–0.007	–0.007
Sanitation cleaning <-- η3	0.705	η6 <-- η3	–0.146	–0.147
Park security <-- η3	0.687	η1 <-- η4	0.924	0.924
Employee service <-- η3	0.777	η3 <-- η4	0.440	0.852
Identification system <-- η3	0.735	η5 <-- η4	0.000	0.229
Fundamental service facilities <-- η3	0.751	η6 <-- η4	0.000	0.741
General expectation <-- η4	0.741	η1 <-- ζ	0.000	0.768
Physical fitness expectation <-- η4	0.673	η3 <-- ζ	0.000	0.708
Recreation motivation expectation <-- η4	0.680	η4 <-- ζ	0.832	0.832
Entertainment consumption <-- η5	0.673	η5 <-- ζ	0.744	0.934
Perceived cost of travel <-- η5	0.782	η6 <-- ζ	0.000	0.763
Compare with expectation <-- η6	0.853			
Overall satisfaction <-- η6	0.788			
Public transportation <-- ζ	0.805			
Exit and entrance <-- ζ	0.680			

5. Results

According to the output of Amos, the valid data are summarized as shown in Table 9 and the analysis of tourist satisfactions is as follows:

- The path coefficient – "perceived material quality η1" is the highest value affecting tourist satisfaction which reached the maximum (0.872) and the direct path coefficient had reached 0.888, indicating that perceived material quality directly acts on the satisfaction from the tourists and produces huge visual impact on the tourists' satisfaction. The path coefficient of "entertainment project y3" among observation variables has relatively high effect (0.777), which shows the entertainment project is a key factor affecting tourist satisfaction. The second highest path coefficient includes "wetland regional culture y4" and "landscape quality y1", which reached 0.754 and 0.723, respectively. They are also important factors to influence satisfaction.
- The path coefficient of the "accessibility ζ" is the second highest affecting "tourist satisfaction η6" (0.763). It is also a necessary factor that can affect tourists' satisfaction. Although it does not directly affect satisfaction but through "perceived material quality η1", "perceived management quality η3", "recreation expectation η4" and "perceived value η5" to affect the tourist satisfaction indirectly and even more greatly. By analyzing the variables of accessibility, it is found that "public transportation x1" has a relatively high path coefficient among indexes (0.805) which explains why "public transportation x1" has bigger effect on tourist satisfaction.
- Moreover, "recreational expectation η4" is also an important factor affecting the satisfaction from tourists, the total path coefficient reaches 0.741. It has also generated indirect influence on tourist satisfaction with other latent variables. Among the observed variables of the tourists' expectation, the path coefficient of the "general expectation y10" is the biggest (0.741), which means that the "general expectation y10" has greater impact on satisfaction.

6. Discussion

Based on the empirical study of the SEM, after the discussion and analysis of the obtained results, this paper gives the following recommendations to improve the satisfaction of the Hefei Lakeside Wetland Park:

- To balance landscape quality and cultural connotation development. Hefei Lakeside Wetland Park is popular with tourists for its natural scenery and forest resources. In the actual survey, we found that park is rich in forest resources and species, thus forest quality needs to be paid attention to. Too much green vegetation will cause the lack of light and fertilizer which may lead to canopy. The park should increase the gardener manpower and pay close attention to the growth status of every tree and bush in the park. In addition, the reason people visit the park is no longer merely because of aesthetic pursuit of scenery, they start to focus on the cultural connotation, so the wetland parks should hold more exhibitions to show the wetland cultural features and often carry out some cultural activities and educational knowledge contest to make visitors have a sense of gain.

- To speed up the construction of the park security and standardize the consumer price. Lakeside Wetland Park covers an area of 10.72 km^2, which is its advantage, but it also brings out some security problems. The park area is large, while the number of staff is limited. Besides increasing the security personnel, it is also required to continuously improve the park security service system, such as setting the alarm, planning an emergency escape channel and setting additional emergency inlet and outlet. In addition, high consumer prices are common in many tourist attractions. In order to enhance the satisfaction from tourists, the park should standardize consumer prices and take a more active part in rectifying the prices and hygiene of the stores around the park so as to give visitors the best tourist experience.
- To set additional entertainment facilities and perfect the identification system. The entertainment activities can not only attract tourists and add vitality to the development of the park, but it is also a necessary factor of the sustainable and healthy development of the park. In the actual survey, it is found that the tourists are mainly couples that take the elderly and children out to relax and the results from SEM also reflect that the satisfaction of spending quality time with family, making friends and dating, is an important factor affecting tourist satisfaction. However, the existing entertainment facilities in the park may seem more suitable for the young people. It requires more sports facilities to meet the needs of different age groups, such as fitness equipment, fishing areas and chess tables. It also needs to be noted that the park trails are complex and the identification system is limited while many older people claim they are illiterate. The park can refer to New York Central Park's street guidance system which turns the identification information into vivid and lively forms to meet the needs of the elderly population.
- To expand the service radiation and improve the accessibility. It can be seen from the sample distribution statistics that the elderly aged 56 and above accounted for only 3.2% and many elderly people said the park location is far from urban district and the trip is very inconvenient, so there should be Bus Rapid Transit system between residential areas and the park, also additional bus shifts should be added to attract more tourists and avoid the waste of natural scenery resources.
- Only by forming its own characteristics can there be healthy and sustainable development of the park. Even if it is classified as the same type of product, different attractions and purposes can meet the different tourist's demands [34]. There are a lot of City Parks in Hefei. Only when the park strengthens its characteristics about wetland cultural, convey the green, healthy and sustainable development concept to every resident and make it a trend for people to be close to nature, it can have the capacity to compete with others.

7. Conclusion

Combined with the previous scholars' discussion and conclusion of the influence of recreation satisfaction variables, it is revealed that there are many factors affecting the quality of recreation and the relationship among various factors is perplexing. Studying the relationship among various factors and finding out which latent variable plays the most important role requires the consideration of a variety of factors and indicators. This paper established Wetland Park Recreation Satisfaction Index Model by comparing advantages and shortcomings of different models and combining actual conditions. The result indicated that perceived material quality, accessibility and recreational expectation are critical for affecting tourist satisfaction with their higher total effects: 0.872, 0.763 and 0.741. They all have a positive impact on recreational satisfaction. Some of these indexes are directly related to satisfaction index, such as perceived material quality whose direct effect has reached 0.888. However, some are generating influence indirectly through other indicators such as accessibility whose direct is 0, while its total effect reached 0.763 through perceived material quality, perceived management quality, recreation expectation and perceived value. According to the path coefficients calculated by Amos software, visitor experiences need to be improved from multiple angles, such as optimizing traffic whose path coefficient is 0.805 and adding facilities whose path coefficient is 0.777, etc. Although this paper has integrated the statistics and survey data from literature and estimated the regional recreational satisfaction, which is important for local public policy making, it is still a preliminary study due to some limitations. For example, this paper has just taken seven latent variables into account which may cause the choice of indicators to be inaccurate and lacking depth. Besides, results based on calculation lack empirical analysis, so the precision of the model may be influenced. Our future study is to examine these in more detail.

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Authors contribution

Li Tan provided the idea and pointed the direction; he also reviewed the manuscript and modified it. Wang Xiaowen collected and organized data and wrote the manuscript.

Conflicts of interest

The author declares no conflicts of interest.

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