

QUANTITATIVE EVALUATION AND REGIONALIZATION OF TOURISM RESOURCES IN GUANGXI

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ABSTRACT: Since the 1970s foreign and Chinese scholars have researched into quantitative evaluation of tourism resources by mathematical method early or late and made great progress. Guangxi is in the south of China and rich in tourism resources with picturesque scenery. In this paper, Guangxi's tourism resources are quantitatively evaluated by method of analytic hierarchy process. Firstly a modular tree of quantitative evaluation for tourism resources of Guangxi is set up and weighted values of evaluative factors are defined by method of consulting experts. On the basis of a great amount of data from investigation, synthetic evaluation indexes and their order of tourism resources of 22 cities and counties in Guangxi are calculated. Then, the tourism resources of Guangxi are divided into 6 regions and their development orientations are described by a combination of quantitative analysis and qualitative analysis. The study would be helpful to the exploitation of tourism resource of Guangxi.

KEY WORDS: tourism resource, quantitative evaluation, analytic hierarchy process, regionalization, Guangxi

I. INTRODUCTION

The evaluation of tourism resources can provide the theoretic basis for rational exploitation of tourism resources and it is prerequisite of tourism plan (Lu, 1988). Since the 1970s the great change of the study on evaluation of tourism resources has taken place in foreign countries. The scholars of Canada, USA, France etc. set up evaluation systems of tourism resources successively. They resolved and quantified various kinds of factors which influenced the tourism resources, and dealt with data by mathematical method to make the study of tourism resources be quantitative, thus improving the precision and practicality of evaluation greatly. In the later 1980s Chinese scholars Bao Jigang (1988), Chen Chuankang et al. (1989), Yang Hankui (1987), Chu Yifang (1991), et al. firstly by mathematic method evaluated quantitatively the tourism resources of Beijing, Guizhou, Hunan, etc. and made great progress. Guangxi is in the

south of China and rich in tourism resources with green hills and clear waters. In this paper, mathematic method is used to evaluate quantitatively tourism resources of Guangxi, and on the basis of this the tourism resources is regionalized for reference of relative organizations and readers.

II. QUANTITATIVE EVALUATION OF TOURISM RESOURCES

1. Establishment of the Modular Tree of Quantitative Evaluation for Tourism Resources of Guangxi

In this paper, analytic hierarchy process is used to analyse and evaluate comprehensively tourism resources of Guangxi. To use analytic hierarchy process to analyse and study tourism resources, firstly the factors which influence the exploitation of tourism resources should be defined. Our predecessors did a lot of work about factors which influence the exploitation of tourism resources. So we analyse comprehensively the nature and importance of each influential factors due to the combination of geographical environment of Guangxi and degree of tourist exploitation by now. On the basis of this the evaluation index system of tourism resources of Guangxi is established, that is, to divide various main factors into different levels, then to illustrate the stair structures of levels and the subordinate relationship of factors in the form of diagram, and to set up the modular tree of quantitative evaluation for tourism resources of Guangxi (Fig.). There are four levels in the modular tree: the first level is the level of general objective, that is level O; the second level is the level of comprehensive factors, that is level C; the third level is the level of evaluative norms, that is level F; the fourth level is the level of evaluative reference content, that is level S.

2. Definition of Weighted Values of Evaluative Factors

In order to define weighted values of evaluative factors, we distribute consulting sheets to Guangxi's and national experts and scholars. In consulting sheets one judges by the degree of importance which is divided into 9 classes and fills in list. 1, 3, 5, 7, 9 or their reciprocals are used as quantitative standards to judge the relative importance of various factors at the same level for some factors at higher level, and raise one's own opinions. We altogether distributed 82 pieces of consulting sheets and received back 68 pieces, and the returning rate was 82.9%. In such 68 pieces of consulting sheets we all gained 2652 effective firsthand data. Comprehensively sorting out such data, we calculated the maximum eigen root of determination matrix λ_{\max} and corresponding regular vector W and got permutation weighted values of relative importance of the factors at the same level for some factors at higher level. In order to make the permutation results have satisfactorily uniform, we put them to a test of random uniform rate $CR = \frac{CI}{RI}$,

among which $CI = \frac{\lambda_{\max} - n}{n - 1}$, and RI is a known average random uniform, when $CR < 0.1$, it tallies with the facts, otherwise it does not. After we got permutation weighted value of each factor at some level for its higher level, we used weighted values of the factor itself for its higher level to weight comprehensively and got the general permutation. Also we used to test the

$$CR = \frac{\sum_{j=1}^m a_j CI_j}{\sum_{j=1}^m a_j RI_j}$$

general permutation. When $CR < 0.1$, the general permutation tallies with the facts, otherwise it does not. In the process of dealing with such data, CR is all smaller than 0.1, which indicates that the experts and scholars invited to answer the consulting sheets have high professional level and their answers tally with the facts. According to data above and reference to the relative achievements at home, we made the table of evaluative norms of weighted values for tourism resources of Guangxi (Table 1). In Table 1 weighted values of various

Table 1 Weighted value of evaluative norms for tourism resources of Guangxi

Comprehensive factors	Weighted value	Evaluative norms	Weighted value	Reference content	Weighted value		
Value of tourism resource	0.75	Value of sightseeing	0.3858	Aesthetic perception	0.1670		
				Peculiarity	0.1799		
				Degree of scattering	0.0389		
		Value of culture	0.1783	0.0997	Historical culture	0.0813	
					Religious culture	0.0401	
					National custom	0.0569	
		Value of science	0.0997	0.0862	Scientific investigation	0.0665	
					Scientific popularization	0.0332	
		Value of environment	0.0862	0.0673	Environmental capacity	0.0431	
					Environmental quality	0.0431	
Condition of tourist exploitation	0.25	Condition of lodging	0.0444	Board service	0.0173		
				Location, transportation and communication	0.0842	Expense	0.0369
						Convenience	0.0256
		Safety	0.0217				
		Guide service	0.0184	Quality of staff	0.0184		

factors of each level fairly corresponds with the actual situation of Guangxi. From the order of permutation, at the level of comprehensive factors, the value of tourism resource takes the first place of weighted values and the second one is the condition of tourist exploitation. These reflect that by now in Guangxi the value of tourism resource and the great attraction to visitors

will determine a place to develop tourism or not. Generally, Guagnxi is a resource-kind tourist place. Natural scenery of hills and water is the mainstay of tourism resources of Guagnxi, so at the level of evaluation reference content, aesthetic perception and peculiarity take the main place and the degree of scattering takes the second. Because Guagnxi has a relative early developing history and many kinds of minority nationalities, the historical culture and national custom are more important than religious culture. Guangxi is in the south of China and far from the main domestic visitors' residence (highly developed and densely populated regions) and the main entry ports of foreign visitors, so the location, transportation and communication take key place in the conditions of tourist exploitation, and the expense and convenience take the main place in the location, transportation and communication.

3. Definition of Synthetic Evaluation Indexes of Tourism Resources of Major Cities and Counties in Guagnxi

The modular tree of quantitative evaluation for tourism resources of Guangxi and weighted values of various factors are established on the basis of geographical environment of Guangxi, existing social economic conditions, development level of tourism and judgement of value (the opinion of experts). According to the modular tree and weighted values of various factors, we tried to quantitatively evaluate 22 cities and counties in Guangxi where tourism resources are fairly dense and influential. To make the mark popular, we designed the indistinct standards of evaluation indexes for tourism resources of Guangxi and investigation form and investigated at some major scenery points in Guangxi. The major object of investigation is visitor and the focal points are Guilin, Liuzhou, Nanning, Beihai, Guiping, etc. and we mailed investigation forms to some experts of tourism and geography. We altogether received back 508 pieces of effective investigation form, nearly 180 000 data (some investigation forms were not completely filled, and blank items were left). We used computer to arrange them synthetically (Table 2) and to multiplied the marks by weighted value of various factors to get the final results (Table 3).

Among the 22 cities and counties investigated in Guangxi, Guilin has the highest synthetic evaluation index (8.6), the second is Guiping (7.0), and Beihai and Liuzhou are both the third place (6.6). Another five cities and counties which have a synthetic evaluation index above 6.0 are Xin'an (6.5), Rongxian (6.5), Ningming (6.4), Nanning (6.0) and Pingxiang (6.0). Other 11 cities and counties, including Wuzhou (5.8), Beiliu (5.8), Rongshui (5.8) etc., have a synthetic evaluation index between 5.0 and 5.9. Qinzhou (4.9) and Yizhou (4.3) are the lowest in synthetic evaluation index. The Lijiang River in Guilin, the Xishan Mountain in Guiping and Huashan Rock Painting in Ningming are state scenery districts and Yintan Beach in Beihai is state holiday district. They all have the front places in synthetic evaluation indexes. The cities and counties which have state historical sites (such as Lingqu Canal in Xing'an, Zhenwuge Pavilion in Rongxian, etc.) and provincial scenery districts (such as Qingxu Hill in Nanning, Goulou Cave in Beiliu, etc.) are also at front. These indicate that

this investigation accords with the reality of tourism resources of Guangxi.

III. REGIONALIZATION OF TOURISM RESOURCES OF GUANGXI

1. The Difference of Regional Distribution and the Principles of Regionalization of Tourism Resources in Guangxi

The length of Guangxi from east to west is 780 km, while its width from north to south is 620 km and its area is 236 000 km², taking the 9th place among the provinces (or autonomous regions) of China. The major landform in Guangxi is hills and mountains. The Tropic of Cancer is across its central part and its south part faces the vast sea. So the natural landscape of Guangxi is complex and various. The east part of Guangxi (along and on the east of the Hunan – Guangxi railway) has a early developing history and a lot of historical sites, and its social economic and transportation conditions are good, while the west part of Guangxi and some outlying mountainous areas are exploited relatively later and have colourful customs of minority nationalities, their social economic and transportation conditions are fairly behind the east part. To correctly understand the difference of regional distribution and the unbalance of exploitation of tourism resources in Guangxi, it is necessary to divide Guangxi's tourism resources into several regions as a reference foundation for relative organizations to exploit tourism resources. In this paper Guangxi's tourism resources are regionalized according to four principles as follows. The first, in each region tourism resources have certain enrichment, whose distribution and combination form a certain network and have some local characteristic, referencing synthetic evaluation indexes of 22 cities and counties in this investigation. The second, each region has fairly good social economic and transportation conditions. The third, tourist regions which are well exploited, have formed or are their own forming tourist centers, radiating and promoting the development of regional tourism. The fourth, the completeness of administrative divisions is considered in order to provide convenience for relative organizations.

2. The Division of Tourist Regions of Guangxi

According to the principles above, we tried to divide tourism resources of Guangxi into 6 tourist regions: Northeast Guangxi, Central Guangxi, South Guangxi, Coastal region, Southeast Guangxi and West Guangxi. Now we briefly describe the characteristics of each region as follows.

2.1 *Northeast Guangxi tourist region*

This region is situated in the northeast part of Guangxi, including Guilin City and Guilin Prefecture, and very abundant in tourism resources. Guilin City (including Yangshuo county) is the tourist centre of this region and the state scenery district. It is always famous for green hills, clear waters, magic caves and charming rocks in the world. In this investigation the sym-

thetic evaluation index of Guilin (8.6) takes the first place of Guangxi. Around Guilin there is Xing'an (synthetic index 6.5) which is known for Lingqu Canal dug in the Qin Dynasty, Longsheng (synthetic index 5.3) which has colorful customs of minority nationalities, etc. and "Big Guilin" tourist network has a preliminary form. By now the level of tourist exploitation of this region is in the front of Guangxi and Guilin has always been a hot tourist point of China more than ten years. From now on this region should be planned and constructed as an international tourist region at the highest level, bringing the characteristics of scenery of hills and waters into prominence and exploiting energetically new projects. It would develop multifunctionally with sightseeing as main function combined with conferences, holiday convalesce, visiting national customs and scientific exploration.

2.2 *Central Guangxi tourist region*

The region is located in the central part of Guangxi, including Liuzhou City and Liuzhou Prefecture. Liuzhou City is the tourist centre of this region, its synthetic index (6.6) takes the third place in Guangxi. The Liujiang River surrounds the city, wonderful hills inverting their reflection in water and caves are deep and magic. Around Liuzhou there are three national minority autonomous counties: Rongshui (synthetic index 5.8), Sanjinang (synthetic index 5.5) and Jinxiu (synthetic index 5.5) and Zhuang, Miao, Dong, Yao nationalities have a strong local colour of national customs. From now on this region should focus on developing the characteristic of local colour of national customs, fully using the advantage of Liuzhou as a hub railway communication and attracting the coming and going passengers to take part in tourism.

2.3 *South Guangxi tourist region*

This region is located in the south part of Guangxi, including Nanning City and Nanning Prefecture. Nanning (synthetic index 6.0) is both the capital of Guangxi and the tourist centre of this region. With shades of green trees Nanning is a beautiful subtropical city. On the cliff of the Huashan Mountain along the Mingjiang River in Nanning (synthetic index 6.4), there are huge rock paintings made by the ancestors of Zhuang nationalities presenting a marvelous spectacle. Some wild monkey groups play with visitors in the Longhu Mountain in Long'an (synthetic index 5.1) and Pingxiang (synthetic index 6.0) is a city on the border between China and Vietnam, in which Youyi Pass stands. From now on this region should focus on the developing the characteristics of subtropical styles and features, local colour of nationalities and border-trade visit, fully using the advantage of Nanning as the capital of Guangxi through which people comes and goes frequently to attract visitors.

2.4 *Coastal tourist region*

This region includes three prefecture-level cities: Beihai, Qinzhou and Fangchenggang facing Beibu Gulf. Beihai City is the tourist centre of this region and its synthetic index is 6.6 (having the same place with Liuzhou). The synthetic indexes of Qinzhou and Fangchenggang are 4.9 and 5.0 respectively. The Yintan Beach in Beihai is a sandy beach extending 10 km and has a nickname "South Beidaihe". Fangchenggang is a modern port city, in its suburb Dongxi Town faces Mongcai Town in Vietnam across a river and the border trade is brisk.

Qinzhou has famous attraction: Longmen 72 water routes. From now on this region should emphasize its oceanic characteristics, being a new and developing tourist region with great hope.

2.5 Southeast Guangxi tourist region

It lies in the southeast part of Guangxi, including Guiping City, Wuzhou City, Yulin City, Guigang City and Hezhou Prefecture. Guiping and Wuzhou are the tourist centres of the region. Guiping takes the second place in this investigation with synthetic index 7.0. The Xishan Mountain in Guiping is famous for luxuriant forest, fantastic rock, sweet spring water and fragrant tea. In Jintiancun village in Guiping there is also historical site of Taiping Heavenly Kingdom, which is known over the whole country. In Wuzhou (synthetic index 5.8) along the Xijiang River there are Beishan Hill, Baiheshan Hill, etc. as attractions. Famous classic building Zhenwuge Pavilion is in Rongxian (synthetic index 6.5) and well-known historical cave Gouloudong is in Beiliu (synthetic index 5.8). Guigang (synthetic index 5.4) has scenery such as Nanshan Temple, Donghu Lake, etc. and Luchuan (synthetic index 5.2) has Luchuan Hot Spring and Xielu Shanzhang Garden as scenery. In Southeast Guangxi tourism resources are abundant, but they are scattered. It is necessary to connect them into a tourist network and promote them to the outside. Fully using the advantage of its location that is close to Guangdong, Hong Kong and Macao, this region will have new development in tourism.

2.6 West Guangxi tourist region

It is located in the west part of Guangxi, including Hechi Prefecture and Bose Prefecture. This region has plentiful tourism resources to be developed. Bose (synthetic index 5.5) and Yizhou (synthetic index 4.3) in this investigation take later places. The natural scenery of this region is magnificent and rough. This region also has strong local colour of minority nationalities. From now on transportation condition of this region should be firstly resolved. In the process of development the original natural style and features and unsophisticated folk customs should be kept. Tourist facilities need not be too large nor be western style, and the scale should not be too big.

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