

Research on Spatial Distribution Characteristics and Mechanism of 4A Level and Above Tourism Scenic Spots in Henan Province

Jun-yuan ZHAO

Xinyang College school of business, Xin Yang, He Nan 464000, China

Abstract. In this thesis, take Over 4A-Grade Tourist Attractions as the object of study, have been studied spatial distribution of over 4A-Grade Tourist Attractions of using Adjacent point index, the index of concentration, Gene coefficient, Imbalance index, point out spatial distribution of over 4A-Grade appear Global differentiation and high concentration, but there was a little difference in Scenic density, and Present Uniform distribution in spatial. Influence factor of restricting Spatial distribution has been discussed from three Aspects of Level of Rural Regional Economy, Tourist traffic, status of Occurrence about tourism resources. Introduction

1. Introduction

The tourism scenic spot, as an important part of the destination system in the tourism system, is one of the important sources of regional tourism supply, and the material basis and precondition for the development of tourism in a region. The 4A level and above scenic spots belong to the upper class level in China's scenic spots. The number of them owned by the region reflects the maturity and the level of regional tourism development to a certain extent. Therefore, the research on their spatial distribution and formation mechanism is of great significance for mastering the development of regional tourism space and the integration of regional tourism.

The spatial distribution and structure of tourism scenic spots is one of the focuses of tourism geography research, and domestic and foreign scholars have conducted in-depth research on it. In the related studies abroad, Pearce takes the Ile-de-France as the research object, and studies the spatial structure characteristics of its tourism areas[1], Papatheodorou takes the tourist resorts as the research objects, and discusses the consistency of its spatial distribution evolution and market structure evolution process[2], Zahra and others study the tourism space structure in New Zealand[3], and Masson and others expound the influence of traffic construction on the spatial structure of tourism[4]. In the related research in China, the research on the spatial distribution or structure of A level and above tourism scenic spots is mainly based on multi-space scale research method[5-10]. According to the research situation, the research method of the A level scenic spot is gradually mature, however, in the space scale of research, the research on the large and medium scale is relatively more, and the research on the small area is relatively scarce. Therefore, based on the latest survey data and taking the 4A level and above tourism scenic spots in Henan Province as the research objects, the spatial structure characteristics and formation mechanism of the tourism scenic spots are discussed in order to provide reference for the temporal development of regional tourism resources in Henan and the spatial structure of tourism scenic spots.



2. Data Sources and Research Methods

2.1 Data Sources and Processing

According to the tourism statistics of Henan Province, Henan Tourism Administration Network and the official website of local tourism bureaus, the relevant information of the 4A level and above tourism scenic spots in Henan Province is obtained. Henan Province began to implement the direct jurisdiction of county by province in 2015, however, in the statistics of scenic spots, the counties directly under the jurisdiction of province are also counted according to the prefecture-level cities they used to belong to.

As of May 2017, there were 147 4A level and above scenic spots in Henan Province, including 20 5A level scenic spots, namely Shaolin Temple, Longmen Grottoes, Yuntai Mountain, Qingtian River, Shennong Mountain, Yinxu, Taihang Grand Canyon, Red flag canal, Longtan Valley, Baiyun Mountain, the Laojun Mountain, the Jiguangong Tourist Area, Funiu Mountain, Laojie Mountain, China Dinosaur Park, YaoShan, Spring Temple Buddha, Cha Ya mountain, Qingming River Park, Mountain Mangdang, and 127 4A level scenic spots. In the statistics of the number of 5A level scenic spots, the declared scenic spots were basically separated in ticket sales, operation and management, so they were also separated in the statistics of the number, which led to a certain difference between the statistics and the number of 5A level scenic spots announced by the National Tourism Administration. The number of 4A level and above scenic spots in various cities of Henan is shown in Table 1.

Table 1. The number of 4A and above scenic spots in various cities of Henan Province

Sequence number	City	5A	4A	Total	Sequence number	City	5A	4A	Total
01	Zhengzhou	1	12	1/12	10	Hebi	0	4	0/4
02	Luoyang	5	18	5/8	11	Luohe	0	5	0/5
03	Kaifeng	1	7	1/7	12	Shangqiu	1	2	1/2
04	Xinyang	0	9	0/9	13	Anyang	3	5	3/5
05	Jiaozuo	3	3	3/3	14	Puyang	0	2	0/2
06	Xuchang	0	6	0/6	15	Zhumadian	1	4	1/4
07	Nanyang	3	17	3/17	16	Jiyuan	0	5	0/5
08	Xinxiang	0	10	0/10	17	Sanmenxia	0	10	0/10
09	Pingdingshan	2	5	2/5	18	Zhoukou	0	3	0/3
Total		20/127							

2.2 Research Methods

2.2.1 Nearest Neighbor Index

The nearest neighbor index is a geographical index to express the proximity degree of point objects in the geographical space[11], and a research method of determining the point layout situation, especially the description of the geographical spatial structure of the point objects, which is of great practical significance. Therefore, this method can be used to determine the spatial distribution types of 4A level and above tourism scenic spots in Henan Province. Its expression formula is as follows:

$$R = r_i / r_E = \frac{1}{n} \sum_{i=1}^n r_i(S_i) / \left[\frac{1}{2\sqrt{\frac{n}{A}}} \right]$$

In this formula: R represents the nearest neighbor index; r_E represents the theoretical nearest neighbor distance when the point elements are randomly distributed; n represents the number of points; $r_i(S_i)$ represents the actual distance from the point in the study area to its nearest neighbor point. In this study, the actual nearest distance of the two scenic spots ticket offices in the area shown by Amap

APP is used as the reference. A represents the area of the research area. When $R=1$, the point elements can be regarded as random distribution. When $R>1$, the point elements are regarded as uniform distribution. When $R < 1$, the point elements tend to be the aggregated distribution.

2.2.2 Geographic Concentration Index

The geographic concentration index is an index which is used to measure the degree of concentration of research objects in space or time. This index can be used to measure the spatial distribution of 4A and above tourism scenic spots of various cities in Henan Province. The calculation formula is as follows:

$$G = 100 * \sqrt{\sum_{i=1}^n (x_i / m)^2}$$

In the formula, G represents the geographic concentration index; x_i is the number of 4A and above scenic spots in i-th prefecture-level city; m is the total number of 4A level and above scenic spots. The higher the G value than 100, the more concentrated the distribution.

2.2.3 Gini Coefficient

The Gini coefficient is one of the most important methods to describe the spatial distribution law of the discrete regions. This method can not only describe the distribution of the spatial elements, but also make a lateral comparison of the distribution of the two spatial elements, so as to find out the spatial distribution law. The formula can be expressed as follows:

$$G=H/H_m, \text{ among which, } H_m=L_n N, H = - \sum_{i=1}^n P_i \ln P_i, C=1-G$$

P_i represents the proportion of 4A level and above tourism scenic spots of the area of the i-th research object in the total number of scenic spots in the province. N is the actual number of tourism scenic spots in the region, and C is the uniformity of distribution. The value of Gini coefficient G is between 0 and 1. The larger the value, the higher the concentration degree of the research object in the spatial distribution.

2.2.4 Imbalance Index

The imbalance index is an important index that reflects the balance degree of the research objects in different regions. The calculation formula is as follows:

$$S = \frac{\sum_{i=1}^n Y_i - 50(n+1)}{100n - 50(n+1)}$$

In the formula: n represents the number of regions, Y_i is the i-th cumulative percentage after the ranking from large to small of the proportion of a research object of each area in the total area. The imbalance index value S is between 0 and 1. The smaller the S value is, the more homogeneous the research objects are in the area. The larger the value is, the more concentrated the research objects are in the area.

3. The Spatial Distribution Characteristics of the 4A Level and Above Scenic Spots in Henan

3.1 The Spatial Structure Types of the 4A Level and Above Scenic Spots in Henan

The distribution of point elements in space generally includes 3 types: agglomeration, randomness and uniformity. Usually, they can be observed through maps, however, in real situations, these types may appear at the same time and cross together, so it is not easy to distinguish them. We calculate the index of the 4A level and above scenic spots in Henan Province through the nearest neighbor index in the research method. The results are shown in Table 2.

From Table 2, it can be seen that the spatial structure of scenic spots in 18 cities of Henan Province

shows a pattern of overall differentiation. The city of uniform type mainly includes Zhengzhou, Jiaozuo, Hebi, Luohe and Jiyuan, the city of random type only includes Anyang, and the other 12 cities all show agglomeration characteristics. However, through the nearest distance coefficient, it can be seen that the nearest distance coefficient of Jiaozuo, Kaifeng, Xuchang and Xinxiang draws close to 1, and its structure mode gradually changes to the uniform type.

Table 2. The nearest neighbor index and spatial structure types of 4A level and above scenic spots in Henan Province.

Region	Area/km ²	Number of scenic spots	Theoretical average distance/km	Actual nearest neighbour distance/km	Nearest neighbor distance coefficient	The types of spatial structure: agglomeration, randomness and uniformity
Zhengzhou	7446	13	11.97	4.6	1.13	uniformity
Luoyang	15200	23	17.10	4.7	0.79	agglomeration
Kaifeng	6266	8	13.99	0.5	0.96	agglomeration
Xinyang	18000	9	22.36	3.1	0.60	agglomeration
Jiaozuo	4071	6	13.02	29.1	1.04	uniformity
Xuchang	4996	6	14.43	1.6	0.94	agglomeration
Nanyang	26509	20	18.20	0.8	0.74	agglomeration
Xinxiang	8249	10	14.36	1.2	0.94	agglomeration
Pingdingshan	7882	7	16.78	15.8	0.80	agglomeration
Hebi	2182	4	11.68	13.4	1.16	uniformity
Luohe	2617	5	11.44	15.8	1.18	uniformity
Shangqiu	10704	3	29.87	63.5	0.45	agglomeration
Anyang	5599	8	13.23	3.8	1.00	randomness
Puyang	4188	2	22.88	8.0	0.59	agglomeration
Zhumadian	15000	5	27.39	22.3	0.49	agglomeration
Jiyuan	7446	13	11.97	4.6	1.13	uniformity
Sanmenxia	15200	23	17.10	4.7	0.79	agglomeration
Zhoukou	6266	8	13.99	0.5	0.96	agglomeration

3.2 Spatial Distribution Equilibrium of 4A Level and Above Scenic Spots in Henan Province

3.2.1 The Geographic Concentration Index of the Distribution of 4A level and above scenic spots in Henan Province

According to the formula of geographic concentration index, $m=147$, $n=18$, the number of scenic spots corresponding to different cities is extracted from Table 1 and Table 2, so as to calculate the geographic concentration index $G=25.28$ of 4A level and above scenic spots in Henan Province. Assuming that 147 4A level and above scenic spots in Henan Province are evenly distributed in 18 cities, the geographic concentration index G_1 value of the spatial distribution of the 4A level and above scenic spots in Henan is 23.57, however, $G > G_1$, indicating that the distribution of 4A level and above scenic spots in Henan is more concentrated. Among them, the 5A level scenic spots are mainly distributed in Luoyang, Zhengzhou, Jiaozuo, Kaifeng, Anyang and Nanyang, and they have little difference in quantity. The 4A level scenic spots are mainly distributed in Luoyang, Zhengzhou, Nanyang and Sanmenxia, and there is a large gap between them in terms of quantity.

3.2.2 Distribution Uniformity of 4A Level and Above Scenic Spots in Henan

According to the spatial differences of Henan's natural geographical conditions, historical evolution, economic and social development level and regional tourism development, Henan Province is roughly divided into five major spatial and geographical units of Eastern Henan, Western Henan, South Henan, North Henan and Central Henan. The Eastern Henan area mainly includes 3 cities of Kaifeng, Shangqiu and Zhoukou, the Western Henan area mainly includes 4 cities of Jiaozuo, Jiyuan, Sanmenxia and Luoyang, the South Henan area mainly includes 3 cities of Xinyang, Nanyang and Zhumadian, the North Henan area mainly includes Xinxiang, Puyang, Hebi and Anyang, and the

Central Henan area mainly includes 4 cities of Pingdingshan, Luohe, Xuchang and Zhengzhou. The statistics show that there are significant regional differences in 4A level and above scenic spots in Henan, obviously showing “three more, two less” situation. Among them, there are more 4A level and above scenic spots in Western Henan, South Henan and Central Henan areas, however, there are fewer 4A level and above scenic spots in North Henan and Eastern Henan, and the spatial distribution of the scenic spots is obviously uneven. In 2016, the distribution uniformity of 4A level and above scenic spots in 5 regions of Henan Province is shown in Table 3.

Table 3. The distribution uniformity of the 4A level and above scenic spots in 5 regions in Henan

Region	Number of scenic spots at all levels		Total number	Proportion (100%)	uniform distribution (100%)	Actual accumulation(100%)	Uniform accumulation(100%)
	5A	4A					
East Henan	2	12	14	9.52	20	9.52	20
West Henan	8	36	44	29.93	20	34.45	40
South Henan	4	30	34	23.13	20	62.58	30
North Henan	3	21	24	16.33	20	79.91	80
Middle of Henan	3	28	31	21.09	20	100	100
Total	20	127	147	100	100		

The 4A level and above scenic spots in Henan take the natural scenery and historical culture as the main body. The distribution of mountainous areas in Henan is most concentrated in western Henan and southern Henan, gradually from Taihang Mountain to the Funiu Mountain and the Dabie Mountain of southern Henan. The distribution of historical culture in Henan is basically the “T-shaped”, with the intersection of Longhai line and Beijing-Guangzhou line—the commercial city Zhengzhou as the center. The east and west respectively radiate the seven dynasties “Kaifeng” and nine dynasties “Luoyang”, and the north links the ancient capital of the Shang Dynasty “Anyang”. In general, the 4A level and above scenic spots in Henan Province are rarely distributed in the eastern Henan, which has a great relationship with the plain terrain of the eastern Henan, the historical culture of scenic spots, and the very low possibility of the new scenic spots excavation.

The Gini coefficient is used to analyze the distribution of the 4A level and above scenic spots of Henan in the five major geographical regions of Henan Province, so as to judge the uniformity of the distribution of the 4A level and above tourism scenic spots in various regions in Henan. In this study, there are 5 geographical regions, therefore, $N=5$. It can be obtained from the formula combined with the Gini coefficient: $Gini=0.9867$, $C=0.0133$. Therefore, it can be seen that the distribution of the tourist attractions above 4A level in Henan province in the five major geographical regions of Henan province is highly concentrated, and the uniformity of spatial distribution is extremely low. Therefore, it can be seen that the distribution of the 4A level and above tourism scenic spots of Henan in the five major geographical regions of Henan is highly concentrated, and the uniformity of spatial distribution is extremely low.

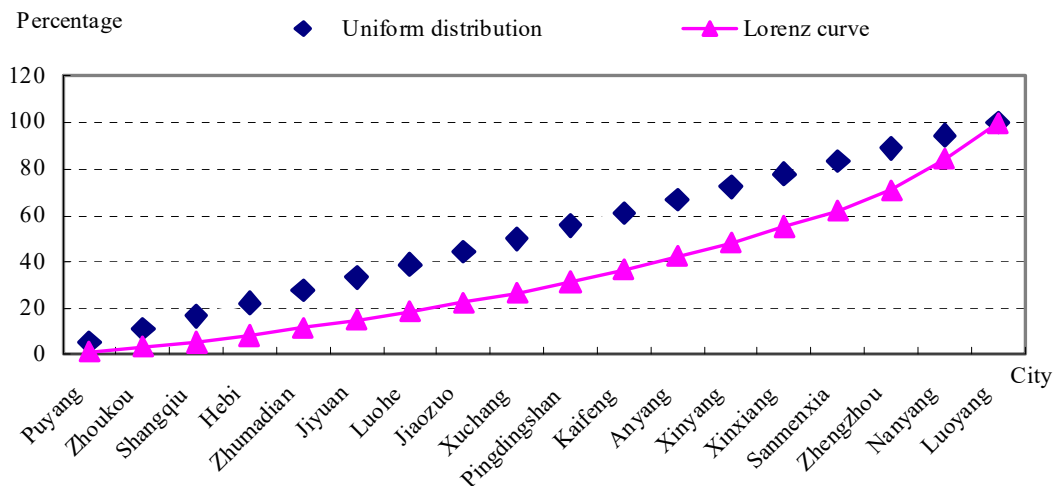


Figure 1. The Lorenz curve of the spatial distribution of 4A and level scenic spots in Henan

The imbalance index is used to study the distribution equilibrium of the 4A level and above tourism scenic spots of Henan in various cities, and $S=0.453$ is obtained. This also reflects the uneven distribution of 4A level and above scenic spots in Henan Province from another side. Using the number and imbalance index of the 4A level and above scenic spots in various cities in Henan Province, the Lorenz curve of the distribution of 4A level and above scenic spots in Henan Province is drawn. The results are shown in Fig.1.

Through this curve, we can see that there is an imbalance in the spatial distribution of the 4A level and above scenic spots in Henan Province, and there is a certain distance between the Lorenz curve and the average line. Most of the 4A level and above scenic spots are mainly distributed in 6 cities of Luoyang, Nanyang, Zhengzhou, Sanmenxia, Xinxiang and Xinyang, and the 4A level and above scenic spots in these 6 cities account for more than 60% of the total.

Combined with the area of different cities, we use the concept of scenic spot distribution to analyze. The distribution density of scenic spots is calculated by the ratio of the number of scenic spots to the region area. In this study, we use the number of 4A level and above scenic spots in the land area of 1000 square kilometers to represent the distribution density of scenic spots in different cities. On this basis, the grade of distribution density of scenic spots is divided into 5 levels of low grade ($0\sim0.5$), lower grade ($0.5\sim1.0$), medium grade ($1.0\sim1.5$), higher grade ($1.5\sim2.0$), and high grade (>2.0). The density and grade of 4A level and above scenic spots in 18 cities of Henan Province are shown in Table 4.

Table 4. The density and grade of the 4A level and above scenic spots in Henan (low grade, lower grade, medium grade, higher grade and high grade)

Sequence number	City	Scenic spot density	Grade	Sequence number	City	Scenic spot density	Grade
1	Zhoukou	0.2509	Low grade	10	Xinxiang	1.2123	Medium grade
2	Shangqiu	0.2803		11	Kaifeng	1.2767	
3	Zhumadian	0.3333		12	Anyang	1.4288	
4	Puyang	0.4776	Lower grade	13	Jiaozuo	1.4738	Higher grade
5	Xinyang	0.5000		14	Luoyang	1.5132	
6	Nanyang	0.7545		15	Zhengzhou	1.7459	
7	Pingdingshan	0.8881	Medium grade	16	Hebi	1.8332	High grade
8	Sanmenxia	0.9527		17	Luohe	1.9106	
9	Xuchang	1.2010		18	Jiyuan	4.1911	

It can be seen from this table that the grade distribution of density of 4A level and above scenic

spots in Henan Province is relatively uniform. There are 4 cities in the low grade, 4 cities in the lower grade, 5 cities in the medium grade, 4 cities in the higher grade, and one city in the high grade. The relative uniform distribution of the grade shows that although the number of 4A level and above scenic spots is quite different, the density is also different, and there is little difference in the number of cities in different grades. As a whole, the distribution of 4A level and above tourism scenic spots in cities is quite different. The 6 cities of Xuchang, Luoyang, Zhengzhou, Hebi, Louhe and Jiyuan are densely distributed, while the 4 cities of Puyang, Zhumadian, Shangqiu and Zhoukou show a relatively scattered distribution in space and develop the spatial pattern in isolation. This situation has a very negative impact on the integrated development of tourism industry and the formation of tourism industrial clusters. And this situation is basically consistent with the distribution of tourism resources in Henan Province and the strategy of regional tourism development, thus forming the basic space pattern of the distribution of the 4A level and above scenic spots in Henan Province.

4. The Formation Mechanism of the Spatial Distribution of 4A level and Above Scenic Spots in Henan Province

4.1 Level of Regional Economic Development

The level of regional economic development is an important factor in the investment and development of a scenic area, which has an important influence on the development of the tourism traffic, the improvement of the tourism infrastructure and the degree of the tourism civilization of the region, and in the grade assessment of scenic spots, the material indicators of the scenic spots are relatively more. There is a strong link between the promotion of these indicators and the regional economy, and meanwhile, the level of regional economic development is also an important decisive factor to measure regional tourism demand. From Table 5, we can see that the number of 4A level and above scenic spots of various cities in Henan is closely related to regional GDP per capita.

Table 5. The comparison table of 4A level and above scenic spots of various cities in Henan and regional GDP per capita

City	Number of scenic spots	GDP per capita(Yuan/person)	City	Number of scenic spots	GDP per capita(Yuan/person)	City	Number of scenic spots	GDP per capita(Yuan/person)
Zhengzhou	13	83542	Nanyang	20	31122	Anyang	8	39761
Luoyang	23	56101	Xinxiang	10	37419	Puyang	2	39993
Kaifeng	8	38479	Pingdingshan	7	36727	Zhumadian	5	28293
Xinyang	9	31785	Hebi	4	47908	Jiyuan	5	73112
Jiaozuo	6	58931	Luohe	5	41267	Sanmenxia	10	60029
Xuchang	6	54194	Shangqiu	3	27138	Zhoukou	3	25655

4.2 Regional Tourism Traffic Conditions

Tourism transportation infrastructure is a necessary condition for developing tourism resources and building tourist areas, is one of the prerequisites for the development of tourism industry, and also an important symbol to measure the developed degree of regional tourism industry. The tourism accessibility determines the timeliness of tourism and has an important impact on the behavior of tourism decision-makers.

The tourism traffic conditions can be measured through the shortest traffic mileage of scenic spots and highway exits. On the basis of the latest data of the Amap, we test the distance between the ticket hall of the scenic spot and the nearest highway exit to measure the convenience of the regional tourism traffic. The distribution of 147 4A level and above scenic spots in Henan from the nearest highway exit is shown in Table 6.

Table 6. The distance between the 147 4A level and above scenic spots in Henan and the nearest highway exit

Distance from the nearest highway exit (KM)	Number of scenic spots	Specific scenic spots
<10	23	Zhongyue Temple, Songyang Academy, Zhongyuan Ford, Longmen Grottoes, Luoyang Chinese Lavender Manor, China National Flower Park, Tianchi Mountain, Lingshan Scenic Area, Hubei-Henan-Anhui Soviet Area Capital Museum, Taoist Temple of Good Response, China JunCi Cultural Park, Wuhou Temple, Shedian Ancient Town, Neixiang County Government, Guanshan National Geopark, Spring Temple Buddha, Ancient Lingshan, Xushen Cultural Park, Suixian North Lake tourism scenic spot, Huanshui Bay, Green Manor scenic spot, Hangu Pass Historical Culture tourism scenic spot, Yangshao Culture Museum.
10-20	30	Shaolin Temple scenic spot, Zhengzhou Century Happy Park, Yellow Emperor's Hometown, Zhengzhou Green Expo Garden, Kang Baiwan Manor, Fengle Grange, Zhengzhou Sanquan Lake scenic spot, the Longevity Hill, Guanlin Temple, Qingming River Park, Lord Bao Memorial Temple, Iron Tower Park, Chinese John Park, Daxiangguo Temple, Kaifeng Prefecture, the Song Dynasty Of Kungfu City, Dragon Pavilion, Thrush valley ecological tourist area, Fragrant Hill Temple, Yunmeng Mountain, Dapi Mountain, Shalihe scenic spot, Huaiyuan scenic spot, Yuefei Temple, Lane City, Qi City heritage area, Guo State Museum, Swan Lake National Wetland Park, Yellow River Park, Laozi Hometown scenic spot, Taiqing Palace.
20-30	30	The Yellow River Scenic Area of Zhengzhou, Xingyang Cypress Ferry Flying Yellow tourism scenic spot, Zhongmu Fante Happy World, Laojun Mountain, Yangzi Ditch, Chongdu Ferry, Mount Jigong scenic spot, Yuntai Mountain, Yuan Rong Wu Ai Temple, Cao Prime Minister Mansion, Wuduo Mountain scenic spot, Fangcheng Seventy-Two Pools, Siebengebirge Mountains, Huanyuan scenic spot, Jinghua Garden, Bigan Temple, BaoQuan Tourist Resort, Huilong Tianjie Mountain, Luwang Tomb, YaoShan scenic spot, Sansuyuan scenic spot, Xiaoshangqiao, Shangqiu ancient cultural tourism area, Anyang Yinxu, Taihang Grand Canyon, Laole Mountain, Wangwu Mountain, Gan Shan National Forest Park, Yanzishan, Taihao Tomb scenic spot.
30-40	29	The Jiguangong Tourist Area, Sui and Tang Dynasties City Ruins Botanical Garden, QianTangZhiZhai Museum, Xiaolangdi (Mengjin), Nam Van Lake scenic spot, Jingangtai National Geological Park, Xihe scenic spot, General Shiyong Xu Hometown scenic spot, Shennongshan, Jiaozuo Cinema City Dinosaur Site, The Stork River Rafting Scenic Area, Zhenping International Jade City, Xixia Longtan Ditch, Bailigou scenic spot, Jiulian Mountain, Jiaoding Mountain, Wuyan Mountain Tourism Area, Nanjie Village, Mount Mangdang Tourist Area, Red Flag Canal, Mashu Manor, Nanhai Buddhist Temple,

		the Yellow River Three Gorges, Wulongkou, Yinhe Valley, Grand Canyon of Western-Henan, Dragon Bay Scenic Area, the Yellow River Danxia.
>40	35	Longtan Valley, Baiyun Mountain, Dinosaur Valley Drift, Xitaishan, Meidai Mountain, Castle Holding Ancient Village, Funiu Mountain Ski Resort, Muzhaling scenic spot, Luoyang Shenlingzhai, Long Yu Bay Scenic Area, White Horse Temple, Huangbai Mountain National Forest Park, Xijiuhua Mountain Scenic Area, Qingtian River, Yanling National Flower and Wood Expo Garden, Dahongzhai scenic spot, Yanling Huadu Hotspring Town scenic spot, Jinyu Vanilla Manor scenic spot, Xixia FuNiu Mountain, Laojie Mountain, Baitianman, Baitianman Canyon Drift, Xichuan Xiangyan Temple, Laojun Cave, Neixiang Yunwu Mountain, Huazhou Academy, Meditation Valley, the Wanxian Moutain, Erlang Mountain, Dengtaijia, Anyang Wanquanhu scenic spot, Cha Ya Mountain Toursim Scenic Spot, Tongshan toursim scenic spot, Zhugou Revolutionary Memorial Hall, Yellow River Xiaolangdi(Jiyuan).

From the perspective of the whole province, in 2017, there were 23 scenic spots whose accessibility was below 10 km, accounting for 15.65% of the total number of scenic spots, there were 30 scenic spots whose accessibility was 10-20km, accounting for 20.41% of the total number, there were 29 scenic spots whose accessibility was 30-40km, accounting for 19.72% of the total number, and the number of scenic spots above 40km was the largest, reaching 35, accounting for 23.81% of the total number of scenic spots. In the horizontal distribution, we can find that the scenic spots whose accessibility is below 10 km are mainly concentrated in the cities of Zhengzhou, Luoyang, Jiaozuo, Pingdingshan and Kaifeng, while the distribution of the other cities is not optimistic, and the development of tourism industry in city area over 40km kilometers is lagging behind. Thus it can be seen that the regional tourism traffic plays a decisive role in the development of regional economy, and meanwhile, its convenience degree has a very important influence on the evolution of the spatial structure of regional tourism scenic spots.

4.3 The Occurrence Status of Regional Tourism Resources

The tourism resource is the prerequisite and material basis for the development of tourism destinations, and is also one of the important factors that influence the success of tourism development. There is a positive correlation between the quality of tourism resources and the quality level of scenic spots to some extent. The tourism resources with high quality in Henan are mainly concentrated in mountainous areas and ancient capital cities, among which the Taihang Mountain, Mount Song, Funiu Mountain, Tongbai Mountain and Dabie Mountain, as well as Zhengzhou, Kaifeng, Luoyang, Anyang and other ancient capital cities are the main distribution areas of the 4A level and above scenic spots. With the advantages of superior tourism resources, good regional economic development and convenient tourism traffic, these areas have formed the strong competitiveness of regional tourism and become the main agglomeration areas of the 4A level and above scenic spots.

5. Conclusions

Through the research on the space and mechanism of 4A level and above scenic spots in Henan Province, the following conclusions are drawn:

(1) The spatial structure of scenic spots in 18 cities of Henan Province shows a pattern of overall differentiation. There are fewer cities with homogeneous distribution, and only one city with random distribution, and the rest are condensed cities.

(2) According to the calculation of the geographic concentration index, the spatial distribution of 4A level and above scenic spots in Henan is more concentrated, among which the 5A level scenic spots are mainly distributed in Nanyang, Zhengzhou, Anyang, Jiaozuo and Luoyang, while the 4A

level scenic spots are mainly distributed in Luoyang, Zhengzhou, Nanyang and Sanmenxia.

(3) The Gini coefficient of the 4A level and above scenic spots in Henan province is $Gini=0.9867$, which shows that the distribution of the 4A level and above scenic spots in Henan Province is highly concentrated in the five major geographical regions of Henan, and the uniformity of the spatial distribution is extremely low.

(4) The imbalance index of the 4A level and above tourism scenic spots in Henan Province is $S=0.453$, and the spatial distribution of the 4A level and above tourism scenic spots in Henan Province is unbalanced. Most of the 4A level and above tourism scenic spots are mainly distributed in 6 prefecture-level cities of Luoyang, Nanyang, Zhengzhou, Sanmenxia, Xinxiang and Xinyang, which account for more than 60% of the total.

(5) Through the research based on the concept of the scenic spot density, we find that the grade of the density of 4A level and above tourism scenic spots in Henan Province is relatively evenly distributed. There are 4 cities in the low grade, 4 cities in the lower grade, 5 cities in the medium grade, 4 cities in the higher grade, and one city in the high grade. The relative uniform distribution of this grade reflects that although there is a great difference in the number of 4A level and above scenic spots, it is also reflected in the density. The number of cities with different grades is not very different.

(6) The distribution of the 4A level and above scenic spots in Henan province is subject to the level of regional economic development, regional tourism traffic conditions and the occurrence status of regional tourism resources. These factors play a decisive role in the spatial distribution of the 4A level and above scenic spots in Henan Province.

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