Cluster Analysis of Regional Tourism Resource Exploitation in Shaanxi

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Abstract. A tourism resource exploitation evaluation system is constructed based on the compilation of data and information related to tourism resources in Shaanxi; cluster analysis is used to form superior and inferior regions in tourism resource distribution in Shaanxi, further to form core and peripheral regions in regional tourism development. It is suggested that a strategy which optimizes the core region, drives the peripheral regions and realizes advantage complementation and win-win cooperation between the core and peripheral regions should be implemented in tourism development, so as to achieve coordinated tourism development throughout Shaanxi.

Introduction

Shaanxi province is located in the middle reaches of the Yellow River in the hinterland of China. With a long and narrow territory, it is high in the south and north, and low in the middle. Beishan (the Northern Mountains) and Qinling (the Qin Mountain Range) stand as two boundaries dividing the province into three natural areas from north to south: the Loess Plateau in Northern Shaanxi, the Guanzhong Plain, and the Qinba Mountains, which also separate the province into three different climatic zones with distinctive regional natural scenery and humane culture. These also contribute to the rich and diversified tourism resources in Shaanxi, providing superior resource advantages for tourism development of Shaanxi. According to relevant survey data, there are 9972 tourism resource objects across the province. These objects can be divided into two types, including 654 objects of natural type (6.6%) and 9318 objects of cultural type (93.4%), and six grades, including 154 objects of Grade V, 409 objects of Grade IV, 1165 objects of Grade III, 1378 objects of Grade II, 2373 objects of Grade I, and 4493 objects without grade [1]. The rich tourism resources provide an advantageous condition for tourism development of Shaanxi. However, the regional differences among its tourism resources and the unbalanced geographical distribution of high-quality tourism resources lead to regional gaps in tourism development. In this paper, cluster analysis is used to further clarify the regional differences in tourism resources across Shaanxi, thus to provide a theoretical basis for the differential development of regional tourist products and for the formulation of tourism cooperation and development strategy in Shaanxi.

Statistics of Regional Tourism Resource Distribution and Status Quo of Tourism Development in Shaanxi

Regional Distribution of Main Types of Tourism Resource Objects in Shaanxi. The regional differences in geographical environment constitute a basic condition for the formation of tourism resources. In accordance with the *Classification, Investigation and Evaluation of Tourism Resources* (GB/T 18972-2003), the statistical data on tourism resources of each prefecture-level city (zone) in Shaanxi have been complied in combination with relevant survey data (Table 1). As can be seen, the tourism resources in Shaanxi are mainly dominated by two types: sites & relics, and buildings & facilities, which respectively account for 33.82% and 42.20% of the total number of resource objects. Meanwhile, distinct regional differences can be seen in tourism resources across Shaanxi: Baoji, Hanzhong, Ankang and Shangluo are rich in geographical landscape and water resources; Guanzhong is outstanding in sites & relics, buildings & facilities, and cultural activities; cities in Northern Shaanxi have distinctive sites & relics and red tourism resources.

Table 1 Statistical data on different types of tourism resource objects in each prefecture-level city (zone) of Shaanxi

City (zone)	Objects	Geographical landscape		Water landscape		Biological landscape		Astronomical & climatic landscape		Sites & relics		Buildings & facilities		Tourist commodities		Cultural activities	
	Number (object)	Number (object)	PCT (%)	Number (object)	PCT (%)	Number (object)	PCT (%)	Number (object)	PCT (%)	Number (object)	PCT (%)	Number (object)	PCT (%)	Number (object)	PCT (%)	Number (object)	PCT (%)
Ankang	964	68	7.05	20	2.07	23	2.39	1	0.10	183	18.98	541	56.12	54	5.60	74	7.68
Baoji	1240	98	7.90	24	1.94	47	3.79	2	0.16	503	40.56	389	31.37	79	6.37	98	7.90
Hanzhong	640	58	9.06	14	2.19	23	3.59	1	0.16	124	19.38	282	44.06	72	11.25	66	10.31
Shangluo	556	20	3.6	7	1.26	7	1.26	0	0.00	258	46.40	243	43.71	15	2.70	6	1.08
Tongchuan	277	9	3.25	4	1.44	5	1.81	1	0.36	82	29.60	125	45.13	22	7.94	29	10.47
Weinan	1025	26	2.54	13	1.27	4	0.39	0	0.00	466	45.46	370	36.10	52	5.07	94	9.17
Xi'an	2148	42	1.96	19	0.88	6	0.28	0	0.00	390	18.16	960	44.46	96	4.47	635	29.56
Xianyang	902	9	1.00	9	1.00	16	1.77	0	0.00	358	39.69	453	50.22	22	2.44	35	3.88
Yan'an	1129	35	3.10	11	0.97	7	0.62	0	0.00	628	55.62	325	28.79	58	5.14	65	5.76
Yangling	86	0	0.00	0	0.00	1	1.16	0	0.00	15	17.44	62	72.09	6	6.98	2	2.33
Yulin	1055	15	1.49	8	0.80	1	0.10	0	0.00	366	36.42	458	45.57	57	5.67	100	9.95
Total	9972	380	3.81	129	1.29	140	1.40	5	0.05	3373	33.82	4208	42.20	533	5.34	1204	12.07

Note: Date source: Ma Yaofeng et al. *Evaluation Research on Tourism Resources in Shaanxi,* Science Press, 2007.

Quality of Tourism Resources. In accordance with the *Classification, Investigation and Evaluation of Tourism Resources* (GB/T 18972-2003), tourism resources are classified into five grades: Grade V includes "special tourism resources"; Grade IV and III are "eminent tourism resources"; Grade II and lower are "common tourism resources". Table 2 shows the statistical quality data of tourism resources in each prefecture-level city (zone) of Shaanxi.

Table 2 Statistical data on different grades of tourism resources in each prefecture-level city (zone) of Shaanxi

City (zone)	Number of objects	Grade V (object)	Grade IV (object)	Grade III (object)	< Grade II (object)
Ankang	964	8	24	43	884
Baoji	1240	21	35	143	1041
Hanzhong	640	3	27	98	512
Shangluo	556	6	4	55	491
Tongchuan	277	5	8	32	232
Weinan	1025	9	28	120	868
Xi'an	2148	70	183	323	1572
Xianyang	902	12	29	113	748
Yan'an	1129	16	31	121	961
Yangling	86	0	11	13	62
Yulin	1005	4	29	104	868

Status Quo of Tourism Development in Each Prefecture-level City (Zone) of Shaanxi. According to the statistical bulletins of Shaanxi and each prefecture-level city (zone) on the development of tourism economy in 2014, Shaanxi's tourism is developing in a diversified manner from the traditional sightseeing tourism to that combining sightseeing and recreation, and the ways of travel are also evolving from group travel organized by travel agencies to self-drive travel. These trends bring new opportunities for tourism development in inferior regions in tourism resources. A double-digit growth in tourism has been kept in each prefecture-level city (zone) of Shaanxi (Table 3).

Table 3 Statistical data on the gross tourism revenue in each prefecture-level city (zone) of Shaanxi in 2014

Tourism revenue	Ankang	Baoji	Hanzhong	Shangluo	Tongchuan	Weinan	Xi'an	Xianyang	Yan'an	Yangling	Yulin
Gross revenue (RMB 100 million)	119.91	310.80	131.35	153.29	53.60	252.00	950.00	230.00	171.75	8.56	95.25
Year-on-year growth (%)	16.75	31.10	23.90	13.19	22.00	18.90	17.10	15.00	13.10	31.70	27.0

Note: The above data are compiled from the statistical bulletin of each prefecture-level city (zone) on economic development in 2014

Cluster Analysis of Regional Tourism Resource Exploitation in Shaanxi

Data Collection and Compilation. Data used in this research mainly include three types: (1) the number of tourism resource objects in each prefecture-level city (zone); (2) the number of eminent and higher-grade (above Grade III) tourism resource objects in each prefecture-level city (zone); (3) tourism revenue, year-on-year growth and other data in each prefecture-level city (zone). Data for analysis are complied in Table 4. Normalization is unnecessary since these data have no difference in the order of magnitude.

Table 4 Basic data for cluster analysis of regional tourism resource exploitation in each prefecture-level city (zone) of Shaanxi

City (zone)	Number of tourism resource objects	Number of eminent and higher-grade tourism resource objects	Gross tourism revenue in 2014 (RMB 100 million)
Ankang	964	75	119.91
Baoji	1240	199	310.80
Hanzhong	640	128	131.35
Shangluo	556	65	153.29
Tongchuan	277	45	53.60
Weinan	1025	157	252.00
Xi'an	2148	576	950.00
Xianyang	902	154	230.00
Yan'an	1129	168	171.75
Yangling	86	24	8.56
Yulin	1055	137	95.25

Analytical Method and Procedure. In this paper, cluster analysis is used to evaluate the indicators of tourism resource distribution in Shaanxi. Cluster analysis is a statistical method which aims to classify a sample of subjects (or objects) on the basis of a set of measured variables into a number of different groups such that similar subjects are placed in the same group. By cluster analysis, tourism resources in Shaanxi can be classified automatically according to the degree of similarity in nature. Subjects in the same group have similar characteristics, while the characteristics of subjects in one group are significantly different from the other group. Such research will provide policy and measure support for the differential development of regional tourism products and interregional tourism cooperation. Based on hierarchical cluster analysis with SPSS, this paper uses squared Euclidean distance to calculate the regional differences in tourism resources of 11 cities (zone). The Ward's method, also referred to as the incremental sum of squares, is used as the clustering method.

Results of Cluster Analysis and Discussion

Hierarchical Clustering Diagram and Classification. Table 5 lists the cluster members after data clustering with SPSS; Fig. 1 shows a dendrogram.

Table 5 Cluster membership

Case	3 Clusters
1: Ankang	1
2: Baoji	1
3: Hanzhong	2
4: Shangluo	2
5: Tongchua	2
6: Weinan	1
7: Xi'an	3
8: Xianyang	1
9: Yan'an	1
10: Yanglin	2
11: Yulin	1

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                 Dendrogram Using Average Linkage (Between Groups)
                        Rescaled Distance Cluster Combine

     C A S E          0         5        10       15       20        25
  Label          Num  +--------+--------+--------+--------+--------+
  Hanzhong        3
  Shangluo        4
  Tongchua        5
  Yanglin        10
  Yan'an          9
  Yulin          11
  Weinan          6
  Xianyang        8
  Ankang          1
  Baoji           2
  Xi'an           7
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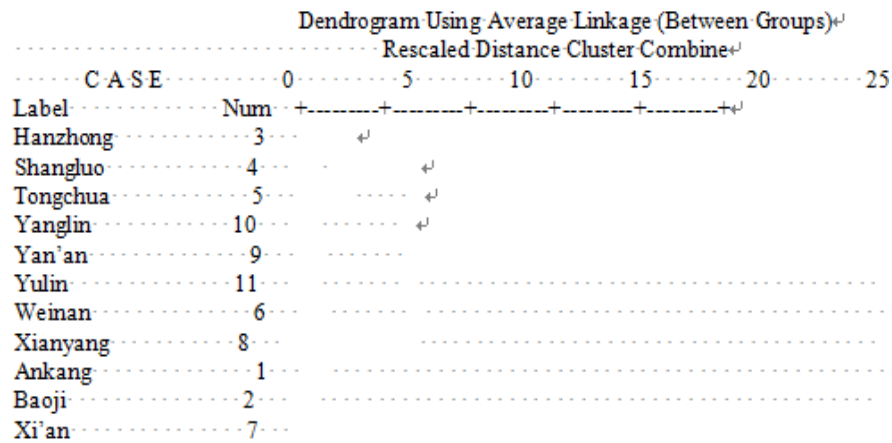
Fig.1 Dendrogram of clustering analysis

According to Table 5 and Fig. 1, the regional tourism resource exploitation in the prefecture-level cities (zone) of Shaanxi can be divided into three classes. Class I includes Xi'an, which is a superior region in tourism resources; Xi'an is significantly superior to other cities no matter in the number of tourism resource objects, the number of eminent and higher-grade tourism resource objects, or tourism revenue. Class II covers Baoji, Ankang, Xianyang, Weinan and Yulin; the number of tourism resource objects in this class is large, but the number of eminent and higher-grade tourism resource objects accounts for a relatively low percentage in the total number, and the gross tourism revenue is relatively low. Class III covers Hanzhong, Shangluo, Tongchuan and Yangling, with a relatively small number of tourism resource objects, the lowest number of eminent and higher-grade tourism resource objects, and a relatively low amount of gross tourism revenue.

Formation of Superior and Inferior Regions in Tourism Resources of Shaanxi. Tourism resources, serving as a base for the development of tourism industry, are unevenly distributed in space due to such factors as natural and geological environments, and cultural and historical activities. As a result, superior and inferior regions in tourism resources are formed. In the distribution of tourism resources in Shaanxi, Xi'an, as a renowned historical and cultural city and the capital city of the province, is a superior region with rich, concentrated and high-quality tourism resources. In the tourism resource population of this city, buildings & facilities take up the highest proportion, followed by cultural activities. Baoji, Ankang, Xianyang, Weinan and Yulin have a large number of tourism resource objects, but the number of eminent and higher-grade tourism resource objects accounts for a relatively low percentage in the total number. Hanzhong, Shangluo, Tongchuan and Yangling have a relatively small number of tourism resource objects and also a small number of eminent and higher-grade tourism resource objects. These cities (zone) are all inferior regions in tourism resources, and the types of their tourism resources are also significantly different. The formation of superior and inferior regions in tourism resources of Shaanxi requires us to take a strategy combining "point", "axis" and "plane" in regional tourism development. Xi'an should be taken as the "point" to develop high-taste tourist products; in other cities (zone), the local characteristics of tourism resources should be taken advantage of to implement characteristic development, for example, eco-tourism in Southern Shaanxi, red tourism in Northern Shaanxi, and rural tourism in rural-urban fringe zones.

Formation of Core and Peripheral Regions in Tourism Development of Shaanxi. Friedman, an American economist, came up with the "core-periphery" theory in his book *Regional Development Policy*. Analyses based on the "core-periphery" theory show that every country (or region) has both core and peripheral tourism regions. Usually, core tourism regions are some tourism hot spots boasting advantages in tourism resources and locations [2]. According to statistical and cluster analysis of relevant data, Xi'an is the core region in tourism resource distribution and tourism development of Shaanxi, and other cities (zone) all belong to peripheral regions. The exploitation of tourism resources in Shaanxi should gradually move to the peripheral regions from Xi'an which is the traditional focus of development. A strategy which optimizes the core region, drives the peripheral regions and realizes advantage complementation and win-win cooperation between the core and

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peripheral regions should be implemented in tourism development, so as to achieve coordinated tourism development throughout Shaanxi

Conclusion

Tourism resources, as a material basis and precondition for the development of tourism industry, exhibit convergence and similarity in spatial distribution within a small range, thus forming a tourism resource population; however, these resources show unevenness and dissimilarity in distribution within a large range. Through cluster analysis of regional tourism resource exploitation in Shaanxi, it has been concluded that the distribution of tourism resources in Shaanxi forms superior (Xi'an) and inferior (other cities (zone)) regions in tourism resources, further forming core and peripheral tourism regions. Therefore, a strategy which optimizes the core region, drives the peripheral regions and realizes advantage complementation and win-win cooperation between the core and peripheral regions should be implemented in tourism development, so as to achieve coordinated tourism development throughout Shaanxi.

Acknowledgements

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