The Research on Agglomeration Degree of Tourism Industry Cluster in Liaoning Province——Based on Improved Location Quotient Method

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Abstract: Tourism industry cluster is the product of the development of tourism industry to a certain extent. It refers to a form of industrial organization formed by the geographical agglomeration of tourism core attractions, tourism enterprises and related enterprises and departments in a certain geographical space and the establishment of close ties. The emergence of tourism industry cluster is of great significance to improve the status of tourism industry and promote the development of local economy. Industrial agglomeration is the most important characteristic of industrial clusters. Based on the data of Liaoning Province from 2010 to 2019, this paper uses improved location quotient method to measure and analyze the agglomeration degree of tourism industry clusters, so as to provide reference for the development of tourism industrial clusters in Liaoning Province.

Keywords- tourism industry cluster; agglomeration degree; location quotient method

1. INTRODUCTION

The phenomenon of industrial cluster is the product of the development of market economy to a certain stage. It is of great significance to enhance the competitiveness of the region. The tourism industry in many areas of our co-untry has appeared a certain cluster trend. For example, the Yangtze River Delta, the Pearl River Delta, Beijing, Tianjin and North China, relying on the location advan-tages and economic development strength of Shanghai, Guangzhou, Beijing and other central cities, realize the integration and sharing of tourism resources, give play to the driving effect of big tourism, and become the leader of China's tourism economic output. This shows that the cluster trend of tourism industry is irresistible. Industrial agglomeration is the most typical feature of tourism industry cluster. The industrial agg-lomeration refers to the geographic agglomeration of industrial sectors in a certain geographical space and the establishment of close ties, so as to make the industry more specialized.

At present, there are many researches on tourism industry cluster at home and abroad. Different scholars have adopted different methods and models to study the industrial agglomeration of

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tourism industry cluster. Ellison and Glaeser (1999) believe that tourism is one of the industries that realize agglomeration by virtue of natural advantages, and he proposed the latest agglom-eration measurement index [1]. Chun and Kalnins (2001) evaluated and analyzed the degree of tourism industry agglomeration from the perspective of the overall level of tourism industry and tourism enterprises, and proved that the development of tourism industry agglomeration can improve the performance level of tourism enterprises [2]. Anat tchetchik (2011) studied the agglomeration effect of rural accommodation industry, and found that under the existing policy, the number of accommodation industry has exceeded the optimal state, which will hinder the further development of tourism [3]. Cheng Luping (2015) takes the number of employment as the measurement index, and selects the data of six industries to calculate the agglomeration degree of tourism industry in Hubei Province [4]. Zhao Liming and Xing Yanan (2011) through the calculation of EG index, analyzed the agglomeration degree of China's tourism industry from 2000 to 2008 from the regional and departmental levels [5]. Liu Chuanxi et al. (2015) used kernel density analy-sis to analyze the agglomeration of rural tourism industry in Hangzhou [6]. Liu Yinghui (2020) explores the agglo-meration degree of regional rural tourism industry, which has important reference value for the proposal of policies, strategies and models related to rural tourism [7]. Ni Xiangli (2018) takes 16 cities in Yunnan Province as the research object, calculates the location quotient of the total tourism income of each city, and finds that the tourism industry in Yunnan Province presents a trend of agglomeration development [8]. Liang Honggang (2015) constructed the index system affecting the tourism industry agglomeration degree, analyzed the main factors influencing the tourism industry agglomeration degree of the Yangtze River Delta [9]. The above research process and results have certain reference value for the research of this paper.

Liaoning Province is rich in tourism resources, and the scale of tourism industry has been expanding in recent years. In 2019, Liaoning Province received 642 million tourists, with a total tourism revenue of 621.634 billion yuan, a year-on-year growth of 13.6% compared with the total tourism revenue in 2018, accounting for a quarter of the GDP of that year. The development potential of tourism can not be underestimated. This paper takes Liaoning Province as an example to study.

2. CONSTRUCTION OF RESEARCH METHODS AND INDEX SYSTEM

2.1 Location quotient method

"Location quotient" was first proposed by P. Haggett and applied to location analysis. The so-called "quotient" is ratio [10]. "Location quotient", also known as specia-lization rate, is used to measure the spatial distribution of elements in a certain region, to reflect the specialization degree of an industry or sector, or the status or role of a sector or industry in a higher-level geographical region, as well as its concentration. By calculating location quotient (LQ), the agglomeration degree of a certain industry in a certain region can be judged. The higher LQ indicates the high level of spec-ialized production in the area. The better the agglo-meration effect is, and the more obvious the industrial advantage is. The calculation formula of location quotient is as follows:

$$LQ_{ij} = \frac{\frac{q_{ij}}{q_j}}{\frac{q_i}{q}}$$

LQ_{ij} : The calculated location quotient of i industry in j region.

q_{ij} : The value of a certain index of i industry in j region.

q_j : The total value of a certain index of all industries in j region.

q_i : The value of a certain index of i industry in the high-level region.

q : The total value of a certain index of all industries in the high-level region.

"Location quotient method" is a common method to measure the degree of agglomeration. It has the chara-cteristics of comprehensiveness and professionalism in measuring the degree of agglomeration. It is simple and intuitive, and the required data are easier to obtain. However, the traditional "location quotient method" often measures the single index of output value, which is difficult to comprehensively measure the degree of industrial agglomeration. In this paper, the traditional "location quotient method" is improved, and multiple indicators are selected to measure, which can more comprehensively reflect the industrial agglomeration in tourism industry cluster.

2.2 Measurement index of agglomeration degree

Food, housing, transportation, tourism, entertainment and shopping are the six elements of tourism activities. Therefore, to measure the agglomeration degree of tourism industry cluster, we should not only consider the relevant indicators of tourism industry, but also consider the catering industry, accommodation industry, trans-portation industry and other industries. Based on the relevant theories of tourism industry cluster and the characteristics of tourism industry, and referring to the relevant literature of Chinese and foreign scholars, this paper establishes an index system for measuring the agglomeration degree of tourism industry cluster, as shown in the following table:

TABLE 1 THE EVALUATION INDEX SYSTEM OF AGGLOMERATION DEGREE OF TOURISM INDUSTRY CLUSTER

First level indicators	Second level indicators
Location quotient of tourism	Total tourism revenue
	Total number of tourists
	Number of tourism enterprises
Location quotient of closely related industries to tourism	Number of employees in accommodation and catering industry
	Number of employees in transportation industry
	Number of employees in entertainment industry

3. EMPIRICAL RESEARCH BASED ON LIAONING PROVINCE

3.1 Calculation results of agglomeration degree

Industrial cluster is a dynamic evolution process. This section will analyze the industrial agglomeration of tourism industrial cluster in Liaoning Province from the perspective of time. According to the evaluation index system of agglomeration degree of tourism industrial cluster established above, based on the data of Liaoning Province from 2010 to 2019 in recent 10 years, using excel2019 software, according to the location quotient method, calculate the "location quotient index", so as to reflect the agglomeration degree of tourism industry cluster in Liaoning Province.

Data sources: Statistical Yearbook of Liaoning Province, statistical yearbook of China, statistical bulle-tin of national economic and social development of Liaoning Province (2010-2020)

Firstly, according to the location quotient formula, the entropy value of each index of tourism industry in Liaoning Province in recent 10 years is calculated. The specific calculation results are shown in the table below:

TABLE 2 LOCATION QUOTIENT OF TOURISM

Total tourism revenue:

Unite: 100 million yuan

Year	Liaoning Province		Whole country		LQ_1
	Total tourism revenue	Output value of tertiary industry	Total tourism revenue	Output value of tertiary industry	
2010	2681	5246	15574	182062	5.98
2011	3337	6183	22472	216124	5.19
2012	3950	7092	25975	244856	5.25
2013	4660	8031	29652	277984	5.44
2014	5296	8985	37198	310654	4.92
2015	3730	9812	41622	349745	3.19
2016	4236	10686	47232	390828	3.28
2017	4737	11462	53726	438356	3.37
2018	5369	12441	59584	489701	3.55
2019	6216	13200	65828	534233	3.82

Total number of tourist:

Unite: 10000 person

Year	Liaoning Province		Whole country		LQ_2
	Tourist	Passen-ger volume	Tourist	Passen-ger volume	
2010	28640	102241	223676	3269508	4.09
2011	32974	99328	277642	3526319	4.22
2012	36755	104113	308940	3804035	4.35
2013	40930	92629	339108	2122992	2.77
2014	46186	95364	373950	2032218	2.63
2015	39975	75039	412382	1943271	2.51
2016	45111	75077	457344	1900194	2.50
2017	50597	74042	514048	1848620	2.46
2018	56499	73083	568020	1793820	2.44
2019	64170	71977	615131	1760436	2.55

Number of tourism enterprise:

Unite: piece

Year	Liaoning Province		Whole country		LQ_3
	Tourism enterpr-ise	Tertiary industry enterpr-ise	Tourism enterpr-ise	Tertiary industry enterpr-ise	
2010	1863	242397	40819	5943341	1.12
2011	1948	255177	42776	6514160	1.16
2012	1897	315733	43793	7225983	0.99
2013	2006	308077	45951	8110957	1.15
2014	2080	360057	46812	9683872	1.20
2015	2183	399774	48902	11178994	1.25
2016	2253	435068	49448	12974678	1.36
2017	2568	480409	50089	15606969	1.67
2018	2614	440281	58195	16685481	1.70
2019	2452	450692	61475	18574135	1.64

The number of tourism enterprises is summarized by the number of travel agencies, star grade hotels and A-grade scenic spots.

TABLE 3 LOCATION QUOTIENT OF CLOSELY RELATED INDUSTRIES TO TOURISM

Employees in accommodation industry:

Unite: 10000 person

Year	Liaoning Province		Whole country		LQ_4
	Accomm-odation and catering industry	The tertiary industry	Accomm-odation and catering industry	The tertiary industry	
2010	11.31	972	431.12	26332	0.71
2011	10.66	1020	443.46	27282	0.64
2012	11.21	1078	445.46	27690	0.65
2013	10.32	1111	456.19	29636	0.60
2014	9.35	1164	432.40	31364	0.58
2015	8.40	1085	413.24	32839	0.61
2016	7.18	1023	407.44	33757	0.58
2017	6.80	1010	405.31	34872	0.58
2018	6.52	1015	412.26	35938	0.56
2019	6.93	1007	433.76	36721	0.58

Employees in transportation industry:

Unite: 10000 person

Year	Liaoning Province		Whole country		LQ_5
	Transpor-tation industry	The tertiary industry	Transpor-tation industry	The tertiary industry	
2010	23.90	972	650.62	26332	0.99
2011	20.79	1020	648.04	27282	0.86
2012	23.40	1078	675.97	27690	0.89
2013	27.96	1111	678.56	29636	1.10
2014	31.43	1164	677.40	31364	1.25
2015	31.69	1085	678.29	32839	1.41
2016	30.33	1023	658.03	33757	1.52
2017	30.81	1010	539.45	34872	1.97
2018	26.60	1015	424.71	35938	2.22
2019	26.13	1007	409.00	36721	2.33

Employees in entertainment industry:

Unite: 10000 person

Year	Liaoning Province		Whole country		LQ_6
	Entertain-ment industry	The tertiary industry	Entertain-ment industry	The tertiary industry	
2010	5.10	972	131.40	26332	1.05
2011	5.20	1020	135.00	27282	1.03
2012	5.10	1078	137.70	27690	0.95
2013	5.50	1111	147.00	29636	1.00
2014	5.40	1164	145.50	31364	1.00
2015	5.10	1085	149.10	32839	1.03
2016	5.00	1023	150.80	33757	1.09
2017	4.70	1010	152.20	34872	1.07
2018	4.10	1015	146.60	35938	0.99
2019	4.50	1007	151.20	36721	1.08

Secondly, according to the location quotient value of each index, the same weight is taken for the six indexes, and the final location quotient index is calculated by using the following formula:

$$K_Q = \frac{1}{n}\sum_{i=1}^{n} LQ_i$$

The calculation results are shown in the table below:

TABLE 4 LOCATION QUOTIENT INDEX

Year	K_Q	Year	K_Q
2010	2.32	2015	1.67
2011	2.18	2016	1.72
2012	2.18	2017	1.85
2013	2.01	2018	1.91
2014	1.93	2019	2.00

3.2 Analysis

Firstly, from the calculation results of location quotient index, when $K_Q < 1$, it shows that the level of industrial agglomeration in the region is low, and the degree of specialization of the industry is at a disadvantage; when $K_Q = 1$, it shows that the level of industrial agglomerat-ion in

the region is general, and the degree of speciali-zation of the industry is at an average level; when $K_Q > 1$, it shows that the level of industrial agglomeration in the region is high, the degree of specialization of the industry is higher than the average level, and it has strong competitiveness. The location quotient index of tourism industry in Liaoning Province has been higher than 1.5 in recent 10 years, which shows that the tourism industry in Liaoning Province has obvious agglome-ration phenomenon, and the agglomeration level is high, and the tourism industry has a strong level of specialization.

Secondly, from the change trend of 2010-2019, the agglomeration level of tourism industry in Liaoning Province has obvious development and change trend, showing a downward trend in 2010-2015, and gradually rising since 2015.

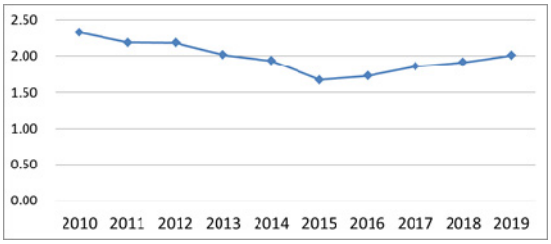

Figure 1 The change trend of tourism industry agglomeration from 2010 to 2019

In addition, According to the calculation results of each index, the calculation results of each index of tourism industry are higher than 1, and significantly higher than the accommodation and catering industry, transportation industry and entertainment industry which are closely related to tourism industry. The result shows that in the whole tourism industry cluster, tourism industry has a higher degree of agglomeration than other industries in the cluster.

4. CONCLUSION AND SUGGESTION

In this paper, by establishing the measurement index system about the tourism industry cluster agglomeration degree, and improving the traditional location quotient method, the agglomeration degree of tourism industry cluster in Liaoning Province is calculated. The results show that the agglomeration degree of tourism industry cluster in Liaoning Province is high, and the phenome-non of industry cluster is obvious. The analysis process of this paper is simple and feasible, and the research results are in line with the reality, scientific and reasonable, which can directly show the level of indust-rial agglomeration of tourism industry cluster in Liaoning Province, and enrich the research on Liaoning tourism industry cluster.

In order to further promote the development of tourism industry cluster in Liaoning Province, according to the research results, the following suggestions are put forward: (1) By improving the tourism infrastructure, further improving the tourism consumption environment and professional service level, and promoting the agglomeration of tourism market. (2) Through merger and reorganization, capital holding and other ways to set up large-scale tourism enterprise groups, accelerate the agglomeration of tourism enterprises [11]. (3) By giving play

to the government's guiding role, enhancing the link between tourism and related industries, and streng-then the supporting role of related industries, especially closely related industries.

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