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An Empirical Analysis of Aggregation Level on Gansu's Modern Service Industry

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Abstract

Based on the evaluation of the existing calculation methods of aggregation level, this paper analyzes the modern service industry of 14 cities in Gansu in 2008 by concentration coefficient empirically. The results show that the concentration coefficients are quite different in the 14 cities and the development of modern service industry aggregation is different. Through the analysis, we attempt to provide certain policy suggestions for the development of modern service in Gansu province.

Keywords: modern service industry; concentration coefficient; aggregation; Gansu

1. Introduction

Since Marshall \textsuperscript{[1]} innovatively has put forward the industry cluster, economists and economic geographers studied and explored on the theory of industrial clustering from different perspectives. Most of them focus on the manufacturing sector, emerging of a large number of results. However, empirical studies have found that, compared with the industry, service is more obvious on characteristics of spatial agglomeration \textsuperscript{[2]}. Ileris \textsuperscript{[3]} and Hong Yinxing \textsuperscript{[4]} pointed out that because time and space can’t be separated in the production and consumption segments, services depend on the capacity of the local market more than the industry. So the development of service industry is more concentrated in space, and has impact on the regional economy as well. Services can be divided into two categories: traditional

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service and modern services\cite{5}. Most of the existing studies focus on whole services. If not distinct those two categories, we can’t see the different impacts on economic development. In this article, we use concentration coefficient to empirically analyze the aggregation level of Gansu’s 14 cities modern service industry in 2008.

2. The **Content of Modern Service Industry**

In September 1997, the "modern service industry" was first emerged in the party’s fifth major report. Party Congress report clearly stated "speed up the development of modern service industry, improve the proportion of the tertiary industry in the national economy." But there are no clear statistical coverage and a unified definition on the concept of the modern service industry. We refer the Li Chaoxian’s definition of modern service industry. The modern service industry is highly developed in the stage of industrialization produced, playing an important role in economic development. Modern service industry is intelligence intensive, high value-added output and strong radiant and so on. There is no clear definition of the composition on the modern service industry on international and domestic authorities. Taking into account the accuracy, availability and consistency of statistical standards, the data of this article are from “Gansu Province Statistical Yearbook 2009”. The calculation method is the tertiary industry data minus transportation, postal and warehousing, wholesale and retail, and hotel and restaurant industry data.

3. The **Calculation Method of the Industry Concentration Degree**

Industry cluster means the same type or different types of industry or related support institutions concentrated in a certain geographical area. Currently, there are many methods to evaluate the level of industrial agglomeration. For example, location quotient, regional industry concentration, the Herfindahl index, Gini coefficient space, geographic concentration index, concentration coefficient, etc. There are briefs descriptions of each index below.

3.1 **Location Quotient**

Location quotient, known as professional rate, is first proposed by Haggett\cite{6} and applied to location analysis. LQ is a compared magnitude for a given industry's share of the region and the entire economy. Practically, we can choose the number of employees, added-value, output, etc. to calculate. A higher LQ means that the industry has a comparative advantage in scale. LQ index reflects the specialization degree for regional industrial relative to the overall economy. In general, if the LQ is more than 1, then the industry has a clear comparative advantage at this area.

3.2 **Concentration Ratio**

Concentration Ratio is the cumulative share for the former arrangement of the industry accounting for the total output. To some extent, CR can reflect the concentration of industries.

3.3 **Herfindahl Index**

Herfindahl index (H index) is an important indicator, which is based on the total number of firms in the industry and size distribution of the relevant market be the market share of all enterprises in the square. H index gives each company a market share – $S_i$. 
3.4 Spatial Gini Coefficient

Spatial Gini coefficient is the employment proportion for a region to the total area of an industry, and the employment proportion for all industries. Generally speaking, if the spatial Gini coefficient is bigger than 0.2, the area has been the formation of industrial agglomeration.

3.5 Geographic Concentration Index

Geographic Concentration index has put forward by Ellison and Glaeser. They found the disadvantages of Spatial Gini coefficient and tried to distinguish the monopoly enterprise with the industrial cluster effect concentration. Geographic Concentration index considers not only the size distribution of enterprises, but also the number of enterprises, which make it easier on the spatial distribution of economic activity for international comparison. In addition, the index considers the potential spillover effects caused by the existence of the other companies or natural resources [7].

3.6 Concentration coefficient

In a certain degree, concentration coefficient can be expressed the position of a region in the whole country by relative per capital indices. The formula is:

$$CC_{ij} = \frac{\sum_{j=1}^{n} e_{ij}}{\left(\sum_{j=1}^{n} e_{ij}\right) / \sum_{j=1}^{n} p_j}$$

$CC_{ij}$ represents the concentration coefficient of industry $i$ at region $j$; $e_{ij}$ represents the industrial output value of industry $i$ at region $j$; $p_j$ represents the population of industry $i$ at region $j$; $n$ is the total number of the area. If $CC_{ij} > 1$, industry $i$ at region $j$ is concentrated.

LQ fails to account for the links between the industries. Concentration Coefficient did not cover the entire market share; therefore, it cannot accurately reflect the degree of industry concentration. Although the Herfindahl index takes into account the differences of company size in the same industry, but neglects the close degree between industries. Spatial Gini Coefficient only considers the degree of concentration between the different regions, without considering the enterprises in the same industry. At this time, the number of enterprises within the region and the scale of enterprise are difficult to get, geographic concentration index can’t be calculated by a certain extent. The concentration coefficient uses per capita output, so the inclusion is more convincing. Besides, the method is simple and easy to operate. That’s the reason I choose this method.

4. The Modern Service Industry Agglomeration Level In Gansu Province

Service industry of Gansu Province shows a stable growth in the last 20 years. The added-value of tertiary industry was 8.041 billion yuan in 1990 while in 2008 the value was 124.168 billion yuan. The average annual growth is 12.08%. The proportion of the tertiary industry in GDP rises from 33.12% in 1990 to 39.12% in 2008. The structure of employment in three industries of Gansu Province in 1990 was 69.6:14.4:16.0 while in 2008 the value was 52.9:14.3:32.8. After the overall analysis of Gansu Province, it is necessary to introduce an important part of the service industry -- the modern service industry. The result is shown in Table 1.
### Table 1: Modern Service Industry Concentration Coefficient of Gansu Province in 2008

<table>
<thead>
<tr>
<th>Region</th>
<th>modern service industry</th>
<th>Information Transmission, Computer Services and Software</th>
<th>Financial Inter-mediation</th>
<th>Real Estate</th>
<th>Scientific Research, Technical Service and Geologic Prospecting</th>
<th>Management of water conservancy, Environment and public facilities</th>
<th>Education</th>
<th>Health, Social Security and Social Welfare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lanzhou</td>
<td>2.85</td>
<td>2.335</td>
<td>3.329</td>
<td>2.366</td>
<td>5.28</td>
<td>1.83</td>
<td>3.138</td>
<td>1.914</td>
</tr>
<tr>
<td>Jiayuguan</td>
<td>2.178</td>
<td>5.083</td>
<td>3.554</td>
<td>1.948</td>
<td>0.646</td>
<td>1.322</td>
<td>1.256</td>
<td>1.299</td>
</tr>
<tr>
<td>Jinchang</td>
<td>1.641</td>
<td>0.916</td>
<td>3.817</td>
<td>1.44</td>
<td>0.292</td>
<td>0.982</td>
<td>1.278</td>
<td>1.52</td>
</tr>
<tr>
<td>Baiyin</td>
<td>0.914</td>
<td>2.336</td>
<td>1.029</td>
<td>0.83</td>
<td>0.522</td>
<td>1.824</td>
<td>0.478</td>
<td>1.716</td>
</tr>
<tr>
<td>Tianshui</td>
<td>0.598</td>
<td>0.606</td>
<td>0.316</td>
<td>1.012</td>
<td>0.458</td>
<td>0.21</td>
<td>0.626</td>
<td>0.837</td>
</tr>
<tr>
<td>Wuwei</td>
<td>0.871</td>
<td>1.053</td>
<td>0.274</td>
<td>1.467</td>
<td>0.273</td>
<td>3.086</td>
<td>0.725</td>
<td>1.392</td>
</tr>
<tr>
<td>Zhangye</td>
<td>1.05</td>
<td>0.954</td>
<td>0.793</td>
<td>1.077</td>
<td>0.617</td>
<td>1.642</td>
<td>0.977</td>
<td>0.875</td>
</tr>
<tr>
<td>Pingliang</td>
<td>0.672</td>
<td>0.609</td>
<td>0.813</td>
<td>0.744</td>
<td>0.597</td>
<td>0.296</td>
<td>0.533</td>
<td>0.62</td>
</tr>
<tr>
<td>Jiuquan</td>
<td>1.741</td>
<td>1.809</td>
<td>2.043</td>
<td>1.382</td>
<td>1.744</td>
<td>3.785</td>
<td>1.223</td>
<td>2.565</td>
</tr>
<tr>
<td>Qingyang</td>
<td>0.582</td>
<td>0.634</td>
<td>0.472</td>
<td>0.554</td>
<td>0.112</td>
<td>0.263</td>
<td>0.825</td>
<td>0.442</td>
</tr>
<tr>
<td>Dingxi</td>
<td>0.417</td>
<td>0.3</td>
<td>0.236</td>
<td>0.56</td>
<td>0.103</td>
<td>0.05</td>
<td>0.438</td>
<td>0.348</td>
</tr>
<tr>
<td>Longnan</td>
<td>0.536</td>
<td>0.335</td>
<td>0.523</td>
<td>0.361</td>
<td>0.233</td>
<td>0.388</td>
<td>0.681</td>
<td>0.676</td>
</tr>
<tr>
<td>Linxia</td>
<td>0.535</td>
<td>0.443</td>
<td>0.323</td>
<td>0.526</td>
<td>0.162</td>
<td>0.491</td>
<td>0.607</td>
<td>0.487</td>
</tr>
<tr>
<td>Gannan</td>
<td>0.847</td>
<td>0.382</td>
<td>0.809</td>
<td>0.307</td>
<td>0.214</td>
<td>0.435</td>
<td>0.979</td>
<td>0.712</td>
</tr>
</tbody>
</table>

1. In 2008, the concentration coefficient of Lanzhou, Jiayuguan, Jiuquan, Jinchang and Zhangye is bigger than 1, with significant concentration characteristics of modern service. The concentration coefficient of Baiyin, Wuwei and Gannan is between 0.8 and 1, with obvious potential concentration characteristics of modern service. The concentration coefficient of Pingliang, Tianshui, Qingyang, Longnan, Linxia and Dingxi are quite low, with badly need to accelerate the pace of service concentration. The concentration coefficient of Lanzhou, the highest level of modern service, is 0.672 higher than Jiayuguan, and 2.433 higher than Dingxi. That indicates that cities in Gansu Province have great differences on the concentration coefficient. Concentration results of modern service differed in different cities.

2. Only Lanzhou and Jiuquan have a concentration coefficient bigger than 1 in the 14 cities of Gansu Province, while Pingliang, Qingyang, Dingxi, Longnan, Linxia and Gannan have a concentration coefficient smaller than 1. Besides, the concentration coefficient of most trade is less than 0.8. This fully shows that the modern service concentrated differently in Gansu Province. Agglomeration economy is not balance developed in the 14 cities.

3. Comparison of the maximum value of the concentration coefficient and the minimum value, we can see information transmission, computer services, software is 4.7829, financial intermediation is 3.5808, real estate is 2.0591, scientific research, technical services, geological prospecting is 5.1771, management of water conservancy, environment and public facilities is 3.7347, education is 2.7003, health, social security and social welfare is 2.2176. There is a close contract between the social nature of trade and the concentration coefficient. The trades to protect the social justice have a smaller agglomeration difference, such as health, social security and social welfare, education. The trades of higher commercial degree have
a larger agglomeration differences, such as scientific research, technical services, geological prospecting, information transmission, computer services, and software.

4. From the perspective of information transmission, computer services and software industry, Jiayuguan, Baiyin, Lanzhou, Jiuquan and Wuwei have an obvious agglomeration characteristic. Zhangye and Jinchang are possible to form agglomeration. From the perspective of financial industry, Jinchang, Jiayuguan, Lanzhou, Jiuquan and Baiyin have an obvious agglomeration characteristic. Pingliang and Gannan are likely to form agglomeration. From the perspective of real estate, Lanzhou, Jiayuguan, Wuwei, Jinchang, Jiuquan, and Zhangye have an obvious agglomeration characteristic. Tianshui is more likely to form agglomeration. From the perspective of research, technical service and geological prospecting, only Lanzhou and Jiuquan are of obvious characteristics, while others are not obvious in the agglomeration effects. From the perspective of water, environment and public facilities management industry, Jiuquan, Wuwei, Lanzhou, Baiyin, Zhangye and Jiayuguan have a clear agglomeration characteristics. Jinchang is of great potential to form agglomeration. From the perspective of education industry, Lanzhou, Jinchang, Jiayuguan and Jiuquan have a significant agglomeration characteristic. There is a strong agglomeration potential in Zhangye and Qingyang. From the perspective of health, social security and social welfare industry, Jiuquan, Lanzhou, Baiyin, Jinchang, Wuwei and Jiayuguan have a obvious agglomeration characteristics. Zhangye and Tianshui are more likely to form agglomeration.

5. Some explanations

5.1 Deficiency

In this paper, I analyze the modern service aggregation level of 14 cities in Gansu Province. The conclusion is fitful to the actual situation of Gansu Province. This does not mean the aggregation level of Lanzhou, Jiayuguan, Jiuquan, Jinchang and Zhangye are very high. It can only say that compared to other cities in Gansu Province, the above five cities are more concentrated of the modern service industries. Due to lack of horizontal comparison with other cities, especially urban developed areas, we do not see the gap with other cities. Therefore, the conclusion applies to comparative study of cities in Gansu province.

We just consider the aggregation level of modern service industry, without considering primary industry and secondary industry. It should be noted that different cities focus on different industries with different development strategies. The aggregation level of modern service industries only unilaterally responses to the level of economic development. Cities with low aggregation level of modern service industries may have a high GDP.

Referring to "Gansu Statistical Yearbook 2009", the modern service industry is divided into different trades, but this method did not cover all the trades. Some important modern service trades, for example tourism, intermediary services, etc. are not considered into the analysis of the resulting.

5.2 Policies and Proposals

1. Playing the role of government to promote the development of modern service industries

Modern service industry is an important symbol of the civilization, an important driving force of economic growth. Modern service has become an important industry and new economic growth point. Accelerating the development of modern service industry helps to promote the services, even the whole economic structure adjustment. It also helps to promote industrial upgrading, the improvement of industrial competitiveness and economic development.
There are only 5 cities of 14 with significant features of modern service. Nearly 65% of the city is not obvious, having considerable development space. Now, thanks to western development at economic and social aspects in Gansu province, local governments should seize the opportunity to choose a specific market and competitive industries, make appropriate policies, for example the introduction of talents, tax relief, credit system, etc. to develop the modern service industry and to promote the formation of agglomeration economies earlier.

2. Playing the central city role in promoting the formation of industrial agglomeration
Lanzhou is the political, economic and cultural center, the provincial government concentration. There are many the relatively intensive state-owned large and medium enterprises, research institutes, colleges and universities, with obvious advantages in information, human resources, technology, capital and other aspects. The modern service aggregation level is significantly higher than other cities. Baiyin is adjacent to Lanzhou, in Lanzhou one-hour economic circle, with excellent location and transportation conditions. Relatively concentrated production factors, complete industrial system, outstanding radiation ability, special geographical location and economic ties decided that the two cities can develop their potentials, promote the formation of industrial agglomeration, and stimulate the province's economic and social development through improving the transportation network and urban economic circle, optimizing the industrial layout.

3. Playing the overall advantage to promote economic development
Jiayuguan, Jiuquan, Jinchang and Zhangye have higher modern service aggregation level. We can play the overall regional advantage and consolidate resources to promote regional economic integration. Qingyang and Pingliang are important energy and chemical bases. Based on the well-known universities and research institutes, playing the advantages of rich resources can vigorously develop the circular economy. Now, we must fully understand the supporting role of the modern service industry and continuously improve the modern service industry in the national economy.

References