Comprehensive Evaluation of Development of Tertiary Industry in Hebei Province Based on Factor Analysis

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Abstract

The purpose of this article is intended for the development of tertiary industry in all regions of Hebei Province to provide a reference to a certain extent by factor analysis the relevant data on 11 cities in Hebei Province. This article selects seven indicators related tertiary industry in Hebei Province. For the above indicators for factor analysis inferred three more specific meaning common factors. Finally, factor scores Sort. Then we can get comprehensive level of Tertiary Industry in Hebei Province 11 cities Sort. The result showed that the Tertiary Development Industry Strength of the 11 cities in Hebei province obvious imbalance. According to the economic level of each city and ranking. We can know that the level of economic is closely related to the tertiary industry development, positively correlated with the location where the city.

Keywords

Tertiary, Industry Factor analysis, Comprehensive Evaluation.

1. Introduction

First proposed the "third industry" concept is New Zealand economist. He believes that the three industries is gradual emergence with the social and economic progress.

The level of development of tertiary industry has become an important measure of the level of economic strength and regional economic development. Therefore, the comprehensive development of the tertiary industry in Hebei Province that were analyzed and evaluated is conducive to correct understanding the level of development and current situation of tertiary industry in Hebei Province. And they can effectively promote the various regions of the tertiary industry and provide the basis for economic development.

GDP totaled 2.94212 trillion yuan in Hebei Province. Increase of 6.5 than last year. Among the first industry growth is RMB 344.75 billion, growth of 3.7. The tertiary industry growth is 1.09535 trillion yuan, growth of 9.2. The third industry growth accounted for the proportion of GDP in Hebei province is 37.2.

Domestic scholars Wang Chaoyi will GDP, per capita income level, the number of tertiary industry employment and other variables as factors that influence the development of the tertiary industry. And by means of eviews for analysis. It showed that the speed of China's economy and development of tertiary industry are closely linked. And he made recommendations. Promoting the development of the service sector[1].

2. Construction of Comprehensive Evaluation System

2.1 Factor method described

The basic idea

The basic idea of factor analysis is that study variables the internal structure of the correlation matrix. And finding a few random variables to control all the variables .To describe the relationship between several variables. But here, these few random variables are unobserved.   Often they are referred to factors. Then according to the size of correlation between variables are grouped. Makes the

correlation between variables within the same group is higher. But variable correlation between different groups is low.

It is simply using a few factors to describe the link between many of the indicators or factors. Several variables of the close correlation will be classified in the same class. Each kind of variable becomes a factor. Less several factors reflect materials most of the information. That for high-dimensional variable dimension reduction.

Factor analysis basic steps

The first step: Standardization of raw data to eliminate the influence of the dimension.

The second step: Establish correlation coefficient matrix R.

The third step: Seeking R characteristic value and eigenvectors, characteristic value contribution and cumulative contribution rate.

The fourth step: Establish factor loading matrix.

The fifth step: Implement variance maximum rotation for factor loading matrix, and obtaining the rotation matrix.

The sixth step: Establishment of a comprehensive evaluation model.

2.2 Establish indicator system and select data

Establish indicator system

There are many actors[2] that affect the development of the tertiary industry. If you want to evaluate to the tertiary industry in Hebei province. First we need select indicators that affect the development of the tertiary industry. Select a series of main indicators in many indicators. We must follow the principles of true and science. This article intends to select the following indicators reflect the level of development of tertiary industry in Hebei Province:

X1: Per capita GDP (Yuan);

X2: The added value of the third industry per capita (one hundred million yuan);

X3: Tertiary industry added value (million);

X4: Tertiary industry added value growth rate (%);

X5: The proportion of the added value of the third industry to GDP;

X6: The tertiary industry labor accounts for the proportion of the total labor force(%);

X7: The level of urbanization.

Select data

The data used in this paper selected in Hebei Statistical Yearbook[3]. After finishing obtain data of the respective. Specific data see Appendix 1. Also to explain, as used herein, the data are standardized data.

2.3 Factor analysis process

This paper uses statistical software to obtain standardized data, see Appendix 2. Standardized data table shows the level of per capita GDP ranked first in Tangshan. Per capita added value of the tertiary industry ranked first in Shijiazhuang. However, Tertiary industry added value ranked first in Qinhuangdao. Each index ranked is very different.

Correlation coefficient matrix

Establish standardized data correlation coefficient matrix. Available correlation coefficient matrix see Table 1:

The above table shows that among most indicators there is a high correlation. Therefore, factor analysis is necessary. Below using KMO and Bartlett test table verification[4]. The results show: KMO value is 0.770> 0.5, suitable for factor analysis. Bartlett spherical test Sig. value is 0.000,refused the hypothesis. It shows that each indicator is not independent[5].

Table 1 correlation coefficient matrix

	X1	X2	X3	X4	X5	X6	X7
X1	1	0.633	0.857	0.396	0.124	0.658	0.855
X2	-	1	0.552	0.297	0.122	0.273	0.467
X3	-	-	1	0.205	0.604	0.799	0.886
X4	-	-	-	1	-0.345	-0.143	0.035
X5	-	-	-	-	1	0.548	0.416
X6	-	-	-	-	-	1	0.878
X7	-	-	-	-	-	-	1

R characteristic value and eigenvectors, characteristic value contribution and cumulative contribution rate

In this paper, we need to know R characteristic value and eigenvectors, characteristic value contribution and cumulative contribution rate .They can be calculated using Statistics Software. The results are shown in Table 2:

Table 2 R characteristic value, Variance contribution rate and cumulative contribution rate

	Initial characteristic values			Extracting square and load		
	total	Variance %	Cumulative%	total	Variance %	Cumulative%
1	4.056	57.941	57.941	4.056	57.941	57.941
2	1.632	23.311	81.252	1.632	23.311	81.252
3	0.611	8.728	89.980	0.611	8.728	89.980
4	0.522	7.463	97.444			
5	0.125	1.782	99.225			
6	0.050	0.720	99.946			
7	0.004	0.054	100.000			

As we can be seen from Table 2, since the characteristic values' cumulative contribution rate of the first three have reached 89.980%. So take the first three characteristic values establish factor loading matrix.

Factor loading matrix and rotation matrix

Calculation factor loading matrix [5], we can obtain the results as the table 3 shown:

Table 3 Factor loading matrix

	Componet		
	1	2	3
X1	0.892	0.366	-0.159
X2	0.618	0.429	0.573
X3	0.974	-0.018	0.044
X4	0.153	0.863	-0.054
X5	0.519	-0.672	0.365
X6	0.860	-0.335	-0.269
X7	0.946	-0.073	-0.216

Implement variance maximum rotation for factor loading matrix, and obtaining the rotation matrix. Shown in the following table:

Table 4 the rotation matrix

	Componet		
	1	2	3
X1	0.893	0.355	0.178
X2	0.460	0.176	0.807

X3	0.940	-0.079	0.249
X4	0.134	0.821	0.281
X5	0.445	-0.781	0.217
X6	0.909	-0.264	-0.170
X7	0.973	-0.041	-0.013

Factor composite scores and comprehensive sorting

Utilization orthogonal rotation, we can get component score coefficient matrix. It is concluded that the linear combination of the various indexes of principal components[6].

$$F_1 = 0.266X_1 - 0.070X_2 + 0.218X_3 + 0.040X_4 + 0.003X_5 + 0.312X_6 + 0.308X_7$$

$$F_2 = 0.289X_1 - 0.082X_2 - 0.046X_3 + 0.525X_4 - 0.597X_5 - 0.052X_6 + 0.068X_7$$

$$F_3 = -0.112X_1 + 0.980X_2 + 0.114X_3 + 0.109X_4 + 0.432X_5 - 0.425X_6 - 0.287X_7$$

After the above factor analysis, comprehensively sort of various cities. Sorting the results shown in Table 5:

Table 5 Scores, ranking table of 11 cities in Hebei

	F1Score	F2Score	F3Score	Composite Score	Sorting
Shijiazhuang	0.97787	-0.13374	1.75916	0.86776	1
Tangshan	1.33352	1.13554	0.04181	0.83696	2
Baoding	-1.03803	0.06457	1.89669	0.30774	3
Lang fang	0.67338	1.14244	-1.1478	0.22267	4
Qinhuangdao	1.71496	-1.15827	-0.24879	0.10263	5
Cangzhou	-0.79017	0.33079	0.44587	-0.00450	6
Xingtai	-0.86098	1.02808	-0.50735	-0.11342	7
Handan	-0.08118	-0.26736	-0.17022	-0.17292	8
Hengshui	-0.61841	0.54773	-0.76179	-0.27749	9
Chengde	-0.95505	-0.67914	-0.59688	-0.74369	10
Zhangjiakou	-0.35589	-2.01064	-0.7107	-1.02574	11

According to factor composite scores can be seen: Shijiazhuang, Tangshan, Baoding the three cities ranked the top three in Hebei. Their third industry developments are best. And they have a higher degree of industrial modernization. And Hengshui, Chengde, and Zhangjiakou are the three cities belong to the lower level of the tertiary industry development in Hebei.

3. Conclusions and Recommendations

3.1 Conclusions Analysis

Reference standard of tertiary industry development level difference is factor analysis factor composite scores in 11 cities of Hebei Province. The smaller the gap between the composite score, the closer the level of development of tertiary industry. On the contrary, the more serious the cities of the third industry development level. The level of development of tertiary industry rankings for the: Shijiazhuang, Tangshan, Baoding, Lang fang, Qinhuangdao, Cangzhou, Xingtai, Handan, Hengshui, Chengde, and Zhangjiakou.

As we can see from the top, Shijiazhuang and Tangshan City are developed level. Their economic factor takes up absolute advantage. That is inseparable from their economic base, location and many other factors. Tangshan has a higher talent quality. Unique advantages in resources and so on. Therefore, it is required that Shijiazhuang, Tangshan City, the level of tertiary industry development ranks the forefront. Baoding and Lang fang City have a good geographical advantages. They are on the verge of Tianjin and Shijiazhuang. Better able to undertake the talents transfer of the two cities. So their level of tertiary industry development is relatively good. However, Chengde and

Zhangjiakou City in the economic strength factor there is a big gap with other cities. This is the main determining factor leading to its level of development of the tertiary industry is lower.

3.2 Recommendations accordingly

Right remedy，Promote synchronized development of tertiary industry in Hebei Province

This article analysis the factors that affect the tertiary industry of all regions in Hebei Province. Put forward the following suggestions for the development of all regions of the tertiary industry:

(1).Improve the degree of wealthy of residents;

(2).Increase all regions of personnel reserve;

(3).Improve the investment environment to attract foreign investment;

Increasing household income level

The income level will determine the living standards. Living standards can offer consumer demand for the development of the tertiary industry. To raise the income level of residents in Hebei Province, there need the government continues to reform the income distribution system.. Improving the Social Security System, and encouraged to residents own absorption. Finally, providing a broader space for the development of the tertiary industry in Hebei Province.

Pushing the pace of urbanization

Development of tertiary industry relies on the city. Only by constantly improving urbanization facilities, improving traffic and enhancing the carrying capacity of the city. We can provide a good platform for the development of tertiary industry. Therefore, Hebei Province, want to improve the level of tertiary industry. The premise must raise the level of urbanization.

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