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Study on the Impact of Logistics Development on Import and Export Trade in Western Provinces

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Abstract

The factor analysis method was used to measure the development level of logistics in 10 western provinces, and the total score was calculated. On this basis, the regression analysis method was used to calculate the influence direction and degree of logistics development on import and export trade. The results show that: Sichuan logistics level is the highest, with a score of 1.62; Xizang has the lowest logistics level, with a score of -1.13. There is a large gap in logistics level and the regional logistics development level is not balanced. In addition, the development level of logistics has a significant positive impact on the total import and export, the total import and export trade will be increased by 0.861 units for each unit increase in logistics development level.

Keywords

Western province; Logistics development level; Import and export trade; Factor analysis; Regression analysis.

1. INTRODUCTION

The western provinces and regions include Shanxi, Xinjiang, Qinghai, Ningxia, Gansu, Sichuan, Chongqing, Yunnan, Guizhou and Xizang. The western region covers a vast area and plays an important role in China's economic development. The logistics development of western provinces and regions is a significant symbol of the economic development level of western provinces and regions, and it plays a significant role in promoting regional economic growth and international trade. Therefore, the study on the comprehensive evaluation of logistics development level in western provinces and the strength and degree of the impact of logistics level on import and export trade has a significant promoting effect on the healthy and sustainable economic development of western provinces and regions.

2. EVALUATION OF LOGISTICS DEVELOPMENT LEVEL IN WESTERN PROVINCES

Factor analysis starts from studying the internal dependence of correlation matrix, grouping variables according to the correlation, and adopting dimensionality reduction method to extract a small number of irrelevant indicators from numerous indicators, so as to determine the main influencing indicators and re-study the meaning of these indicators. The specific mathematical model is as follows:

$$X_1 = a_{11} f_1 + a_{12} f_2 + \ldots + a_{1m} f_m + a_1 \delta_1$$

$$X_2 = a_{21} f_1 + a_{22} f_2 + \ldots + a_{2m} f_m + a_2 \delta_2$$

$$\ldots$$

$$X_p = a_{p1} f_1 + a_{p2} f_2 + \ldots + a_{pm} f_m + a_p \delta_p$$

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Abbreviated as: X=AF+δ, where: A is called the factor loading matrix. F is the common factor of X, and δ is the special factor.

2.1. Index Selection and Data Sources

According to the actual situation of the related literature and in this paper, combing the western provinces logistics development level of relevant indicators that line the total length (X1), volume (X2), freight turnover amount (X3), post and telecommunications business (X4), civilian car ownership (X5), mobile phone number (X6), Internet broadband access port (X7), logistics workers (by 8). The data in this paper are from China Statistical Yearbook.

2.2. Feasibility Analysis

Generally speaking, if KMO value is greater than 0.5, factor analysis can be performed. The results of this paper show that KMO value is 0.547, chi-square value is 126.761, and P value is 0.000, indicating that factor analysis can be performed.

Table 1. KMO and Bartlett's test

Kaiser-Meyer-Olkin measure of sampling adequacy.		.547
Bartlett's test of sphericity	Approx. chi-square	126.761
	df	28
	Sig.	.000

2.3. Common Factor Analysis

Common factor is the factor that reflects the common information among indicators extracted from the original indicator information. The specific characteristic roots and variance contribution rates are shown in Table 2 below.

Table 2. Characteristics of root and variance contribution to the table

Component	Initial eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.051	75.637	75.637	6.051	75.637	75.637	5.892	73.655	73.655
2	1.279	15.986	91.623	1.279	15.986	91.623	1.437	17.967	91.623
3	.488	6.097	97.720						
4	.118	1.479	99.199						
5	.041	.515	99.714						
6	.020	.255	99.969						
7	.002	.030	99.999						
8	.000	.001	100.000						
Extraction method: Principal component analysis									

The above table shows that the first two factors account for 91.623% of the cumulative variance, which indicates that these two factors provide sufficient information for the original data. Therefore, we can extract two main factors and take these five factors as the main components to evaluate the logistics development of western provinces and regions, and set them as F1 and F2.

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Table 3. Rotated component matrix

Name of index	Component	
	1	2
x1	.965	-.178
x2	.930	.274
x3	.971	.017
x4	.919	.038
x5	.919	.366
x6	.699	.536
x7	.987	.049
x8	-.040	.951

2.4. Factor Score Analysis

The factor score coefficient matrix can express all the main factors as linear combination of each variable, so as to calculate the score value of each main factor of each sample. See the table below.

Table 4. Component score coefficient matrix

Name of index	Component	
	1	2
x1	.199	-.242
x2	.142	.106
x3	.071	.331
x4	.178	-.094
x5	.167	-.073
x6	-.113	.729
x7	.178	-.072
x8	.130	.177

According to the factor score coefficient matrix, the factor score model of F1-F2 is obtained, as shown in the following formula:

F1=0.199*X1+0.142*X2 +.....+0.130*X8

F2=-0.242*X1+0.106*X2 +.....+0.177*X8

According to the formula of factor scoring model, the comprehensive score of main factor F1-F2 is calculated, as shown in the following table.

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Table 5. The factor coefficient score matrix

F1	F2
0.558706623	1.430056545
-0.174225055	-0.261525811
-1.141792527	0.290400817
-1.200210741	0.592430121
-0.129339466	0.260409571
0.112841342	1.266769397
1.996554197	0.066525442
0.809061398	-1.574468642
0.253996824	-0.759931171
-1.085592595	-1.31066627

2.5. Logistics Comprehensive Score Calculation

Based on the new variables F1 and F2 derived from principal component analysis, the comprehensive score of logistics development in the western region is obtained, and the formula is F=(73.655*F1+17.967*F2)/91.623. F is the total score of logistics development, F1 and F2 are the scores of each principal component.

Table 6. The total score of western provinces and regions logistics development

The name of the province	Total logistics score
Shanxi	0.729569674
Gansu	-0.191342574
Qinghai	-0.860931176
Ningxia	-0.848666057
Xinjiang	-0.052909418
Chongqing	0.339121998
Sichuan	1.618059461
Yunnan	0.341649358
Guizhou	0.055165763
Xizang	-1.12971703

Table 6 shows that Sichuan province has the highest level of logistics development and belongs to the first echelon, with a specific score of 1.62. This may be because Sichuan has invested a large amount of fixed assets investment in postal, transportation and communication industries, has a large number of logistics professionals and relatively complete logistics infrastructure. Shanxi, Yunnan and Chongqing are in the second echelon, with sufficient supply of logistics talents, relatively perfect logistics infrastructure and relatively high level of economic development, all of which are conducive to the development of regional logistics. Guizhou, Xinjiang and Gansu have a lower level of logistics development and belong to the third tier. This level may be due to the fact that this region is located in the western inland, the traffic is relatively not perfect, the level of economic development is not high enough, and the fixed investment in logistics may be insufficient. Qinghai, Ningxia and Xizang have the worst level of logistics development, especially Xizang has the lowest level of logistics development, with a

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total score of -1.13. These three regions are in the most backward state of economic development in China, with fewer local universities and lack of logistics talent supply. All these factors hinder the development of local logistics industry. This shows that the gap of logistics development level in western provinces is quite obvious and the development of regional logistics is extremely unbalanced. The level of logistics development not only has a greater role in promoting or restricting regional economic growth, but also has a significant role in supporting or hindering import and export international trade.

3. THE EMPIRICAL ANALYSIS OF THE IMPACT OF LOGISTICS DEVELOPMENT IN WESTERN PROVINCES ON IMPORT AND EXPORT TRADE

3.1. Index Selection and Data Sources

Because there are too many indicators to measure the level of logistics development, it is not accurate to use a single indicator to measure the level of logistics development. Therefore, the total score (F) of logistics development level in western provinces calculated by factor analysis above is used as the alternative variable of logistics development level, that is, the independent variable of this paper. The total amount of import and export trade (Y) is used as the substitution variable of import and export trade, that is, the dependent variable of this paper. The data are all from China Statistical Yearbook .

3.2. Regression Analysis

According to the theoretical analysis above and the research practice of this paper, the regression model of this paper is constructed as follows:

$$Y = \beta_0 + \beta_1 F + \varepsilon$$

SPSS16.0 software and least square method were used to estimate the parameters of the regression model. The specific parameter estimation results are shown in the table below.

Table 7. Regression analysis result

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1921.795	377.549		5.090	.001
	F	2305.090	480.953	.861	4.793	.001

Note: Significance level 0.05.

The regression results show that: the level of logistics development has a significant positive impact on the total import and export, and each unit of improvement in the level of logistics development, the total import and export trade will increase by 0.861 units. Therefore, we should vigorously develop the logistics industry and promote the further development of international trade.

4. CONCLUSIONS AND DISCUSSIONS

Factor analysis method and regression analysis method are used to comprehensively evaluate the development level of the logistics in 10 provinces and regions in western China to calculate the direction and degree of the impact of logistics development on the import and export trade. The results show that: Sichuan logistics level is the highest, with a score of 1.62; Shaanxi,

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Chongqing, Yunnan and Guizhou came second in terms of logistics development level, with scores greater than 0. Xinjiang, Qinghai, Ningxia and Gansu have a relatively low level of logistics development, and their total score of logistics is less than 0. Tibet has the lowest level of the logistics development, with a score of -1.13. Large gap in logistics level, regional logistics development level is not balanced. In addition, the development level of logistics has a significant positive impact on the total import and export. Therefore, it is necessary to increase the capital investment in the logistics development, further improve the local logistics infrastructure, and vigorously cultivate professionals in logistics in order to provide a strong guarantee for the further development of import and export trade and local economic growth.

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