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An Analysis of Spatial Distribution Characteristics and Influential Factors of China's A-Level Logistics Enterprises

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Abstract: Logistics enterprise is an economic entity to specialize in organization and operation of logistics activities. In recent years, with the rapid and steady development of China's economy, the logistics industry has grown rapidly, and more and more logistics companies have transformed into A-level logistics enterprises. A-level logistics enterprises are the backbone of the logistics industry whose development level determines that of the logistics industry. Therefore, a correct understanding of the different patterns of logistics enterprise layout and the mechanism of comprehensive economic and industrial factors on the comprehensive role of A-level logistics enterprises will help all levels of government and logistics enterprises to achieve optimal layout of enterprises. Based on it, this paper obtains a list of national A-level logistics enterprises from the website of China Federation of Logistics and Purchasing. It draws pictures by using tableau software and analyze the layout characteristics of Chinese logistics enterprises from the provincial scale. Moreover, this paper uses multiple regression models from a quantitative perspective to study the influencing factors of the differences in the layout of A-level enterprises. Through the above research, we draw conclusions that the distribution of China's A-level logistics enterprises has obvious geographical differences. Most of them are located in the southeast coastal area. What's more, it obtains a regression model between comprehensive economic strength factor, logistics demand level factor, infrastructure level factor and the number of A-level logistics enterprises, which can provide some reference for the layout optimization and logistics activities organization of Chinese logistics enterprises.

Keywords: Logistics Enterprise, Factor Analysis, Regression Model, China

1. Introduction

The efficient operation of any regional or national socio-economic system is inseparable from specialized logistics enterprises. Due to the important position of the A-level logistics enterprise in the logistics industry, its development level largely determines that of the logistics industry. A correct understanding of the differentiated pattern of A-level logistics enterprise layout and the mechanism of comprehensive economic and industrial factors on the comprehensive role of A-level logistics enterprises will help all levels of government and logistics enterprises to achieve optimal layout of enterprises.

The concept of logistics was formed in the 1950s and was introduced to China in the 1980s. It is an emerging field of research. Logistics geography research is an important part of logistics research. The earliest research on logistics activities from the perspective of geography was mainly abroad. Hanson [1] (1995) and Hoyle [2] (1998) first added relevant content of logistics in the work of traffic geography. Hesse et al [3] (2004) emphasizes the connection of logistics in geographical space. In recent years, many scholars have proposed to construct the concept of logistics geography, such as Lv Lachang et al [4] (2003), Wang Chengjin [5] (2006), Pan Yujuan et al [6] (2007), Zong Huiming et al [7] (2010), Abuduweili H [8] (2012). They have carried out logistics geography research from the perspective of theory and practice and analyzed the spatial organization and spatial differences of logistics activities by geography techniques and methods.

At present, the spatial distribution of logistics enterprises has attracted the attention of some scholars. The research on the spatial distribution and influencing factors of logistics enterprises has become a hot spot. Zeng Xiaoyong [9] (2010), Cao Weidong [10] (2011), Qian Qinglan [11] (2011), Liang Shuangbo [12] (2013), Zhu Hui [13] (2017), Jiang Tianying

[14] (2017) analyzed the spatial layout of logistics enterprises in Guangzhou, Suzhou, Shanghai, Yiwu and Zhejiang from the scale of provinces and cities. Han Zenglin et al. [15] (2007), Wang Guanxian et al. [16] (2008) studied the layout problems and location factors of logistics enterprises from the national scale.

In the research on logistics enterprises, there is less research on the spatial layout of A-level logistics enterprises. Only Jiang Tianying [14] (2017) and Wang Chengjin [17] (2014) conducted research on A-level logistics companies. However, they only analyze the influencing factors of the spatial distribution difference of A-level logistics enterprises from simple statistical descriptions, and lack of statistical models to study the relationship between the number of A-level enterprises and their influencing factors.

In general, due to the difficulty of data collection, most of the existing research is concentrated in specific cities or regions where data is easily accessible. In view of the limitations of research methods, most papers only make a simple qualitative analysis of the layout of logistics enterprises. There is a lack of quantitative research on the spatial layout of logistics enterprises.

Based on the current research situation, this paper collects the latest national A-level logistics enterprise data, and describes, sketches and analyzes the spatial layout characteristics of Chinese logistics enterprises from the perspective of the province; On this basis, from the perspective of quantitative analysis, factor analysis and multiple regression model are used to study the relationship between the number of A-level logistics enterprises and the related factors.

2. An Analysis of the Spatial Layout Characteristics of China's A-level Logistics Enterprises

This article obtains a list of national A-level logistics enterprises from the website of China Federation of Logistics and Purchasing through web crawling. The number of A-level logistics enterprises in each province has been compiled, and the list of national A-level logistics enterprises has been drawn into maps with tableau software.

From the figure 1, China's A-level logistics enterprises are distributed in 31 provinces in China. In addition to Tibet, each of the other 30 provinces has at least 15 A-level logistics enterprises, all of which have certain logistics enterprise development foundations. Overall, the A-level logistics enterprises are mainly concentrated in the three provinces of Jiangsu, Zhejiang and Hubei, and the distribution of each province has obvious differences. The southeast coastal areas have the largest number of A-level logistics enterprises. Shandong, Jiangsu, Zhejiang, Fujian, and Guangdong have a total of 1638 A-level logistics enterprises, accounting for 41% of the country. The number of A-level logistics enterprises in the eastern and central regions is also large. Hubei, Shandong, and Liaoning provinces have more than 100 A-level logistics companies. Especially in Hubei Province, there are up to 370 A-level logistics enterprises, accounting for 9% of the country. The western region has less distribution except Sichuan. In the western region, only a large number of A-level logistics enterprises are available in Sichuan province, showing regional gatherings.

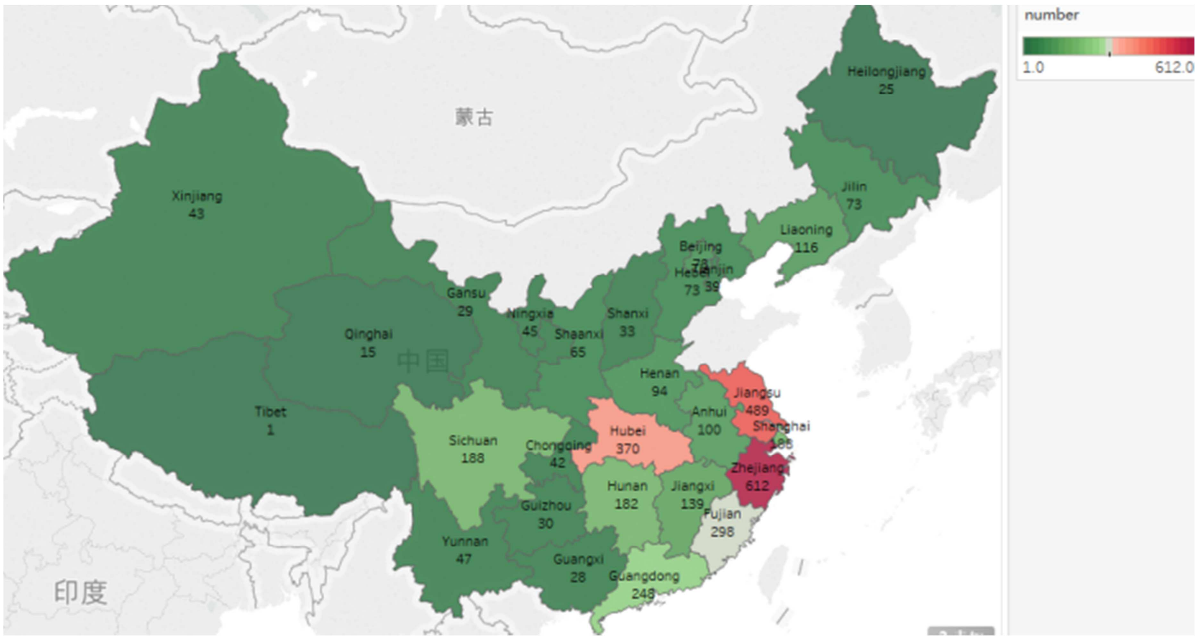

Figure 1. *Provincial Distribution Map of China's A-level Logistics Enterprises.*

The reasons for the distribution of A-level logistics enterprises are as follows. Most of the cities in the southeast coastal areas are relatively developed, thus providing financial support for the development of the logistics industry. Moreover, they are near the sea and rivers where there are many ports, which have natural geographical advantages, so the A-level logistics enterprises here are the most densely distributed. In the west, due to the small population, the small market, and the disadvantages of the location, there are fewer A-level logistics enterprises. Sichuan is located in the west and it does not have the geographical advantage of relying on the sea. However, it is located at the junction of the southwest and the northwest, connecting nine provinces, communicating the west and east, the south and the north, so the logistics industry here has also been well developed. Sichuan Province also has a large population, strong demand in the logistics market, and cities with more developed economies such as Chengdu, so there are more A-level logistics companies.

3. Empirical Analysis of Influencing Factors

3.1. Indicator Selection and Description

It can be seen from the figure 1 that there are obvious differences in the distribution of Chinese A-level logistics enterprises in different regions. Referring to other scholars' selection of influencing factors of logistics enterprise layout and the above distribution of A-level logistics enterprises in different regions, it finds that economic strength, industrial development level, infrastructure, technological development level, service industry development level, logistics industry development level and opening level may all affect the distribution of A-level logistics enterprises in various provinces.

In order to further explore the impact mechanism of various factors on the distribution of logistics enterprises, this paper establishes the following model. In order to make the dependent variable obey the normal distribution, this paper logarithmically transforms the number of A-level logistics enterprises owned by each province, and select LN (number of A-class logistics enterprises in each province +1) as the dependent variable Y. Moreover, considering the difficulty of obtaining index data and facilitating data visualization, this paper selects the following index data of 2015 as the independent variable X for the empirical analysis. All indicators are obtained through the China Economic Information Network statistical database and statistical yearbooks at all levels.

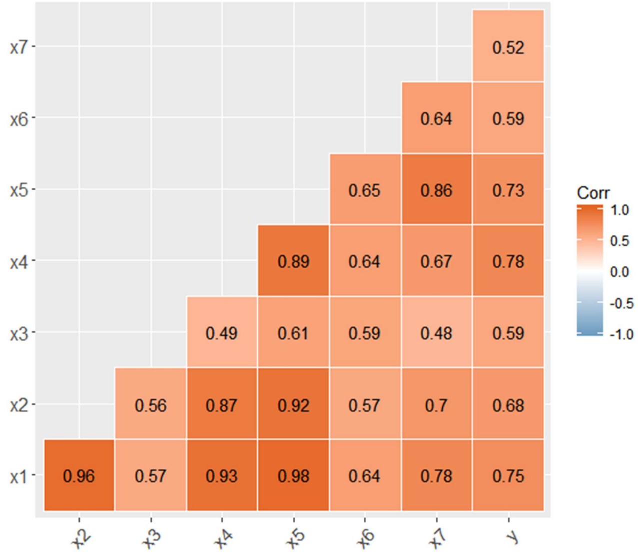

Figure 2. *correlation coefficient diagram.*

It can be found from the correlation coefficient diagram that the correlation coefficient between some independent variables is large. For example, the correlation coefficient between X1 and X5 is 0.98. There is a high correlation between x1 and x5, and there is a possibility of mutual influence. In this case, the model will exhibit multicollinearity, and the estimation of the model will be distorted.

In order to avoid multicollinearity, factor analysis of independent variables is performed before modeling. Factor analysis is a multivariate statistical analysis method that simplifies more complex variables into a few factor variables. Using factor analysis, one can find fewer factors to replace the original variables for multiple regression, cluster analysis, and so on.

Table 1. *Indicator Table.*

Influencing factors selected in this paper	Selected indicator	Independent variable	Influence Mechanism
Economic strength	Gross Regional Product (100 million yuan)	X1	Economic development will promote the growth of logistics demand
Industrial development level	Income from main business of industrial enterprises above designated size (100 million yuan)	X2	Industrial enterprises are the main service targets of logistics enterprises. The development of industrial production will bring about an increase in logistics demand
infrastructure	Logistics network density (1/km): (railway mileage + road mileage) / province area	X3	Good accessibility is conducive to logistics enterprises to expand customer base and logistics market, facilitate the transportation route organization of logistics activities, and improve the logistics organization efficiency of enterprises.
Technological development level	Broadband network access port (10,000)	X4	The development of technology will help improve the efficiency and quality of service in the logistics industry.
Service industry development level	Third industry added value (100 million yuan)	X5	The development of the tertiary industry will bring a lot of logistics needs
Logistics industry development level	Cargo turnover (100 million tons)	X6	The development level of the logistics industry directly affects the number of A-level logistics enterprises
Opening level	Total import and export (US$10,000)	X7	External development helps expand logistics market and technology exchange

3.2. Factor Analysis

KMO and Bartlett tests are performed prior to factor analysis with a KMO value of 0.763 > 0.7. The Bartlett test has a significance of 0.000, which is less than 0.05. The Bartlett test has passed. This case is suitable for factor analysis.

These 7 variables are imported into SPSS for factor analysis, and the output results are as follows:

The results of the factor analysis are shown in Table 2, and three principal component factors are selected. These three factors can explain the variance of 93.036% of all variables.

Table 2. *Shows the total number of variances.*

Element	Starting eigenvalue			Intercept the squares and load			Loop the squares and load		
element	Total	Mutated %	Accumulate %	total	Mutated%	Accumulate %	Total	Mutated %	Accumulate %
1	5.354	76.479	76.479	5.354	76.479	76.479	3.630	51.860	51.860
2	.698	9.971	86.449	.698	9.971	86.449	1.638	23.402	75.262
3	.461	6.587	93.036	.461	6.587	93.036	1.244	17.774	93.036
4	.347	4.964	98.000						
5	.105	1.505	99.505						
6	.029	.410	99.914						
7	.006	.086	100.000						

Note: Method of extraction: analysis of the main component.

Table 3. *Rotating component matrix.*

	Element		
	1	2	3
Gross Regional Product (100 million yuan)	.902	.337	.252
Main business income of industrial enterprises above designated size	.902	.216	.292
Logistics network density	.289	.251	.912
Broadband network access port	.862	.315	.203
Third industry added value (100 million yuan)	.851	.419	.266
Cargo turnover (100 million tons)	.283	.823	.382
Total import and export (US$10,000)	.610	.680	.079

Note: Method of extraction: analysis of the main component.

Spindle method: The largest variation method with Kaiser normalization.

Table 4 shows the results of the extraction factor and factor rotation, showing the overall interpretation of the extracted three component factors for the original variables. According to the Table 3 and the practical significance of each factor, the three factors are named as comprehensive economic strength factor, logistics demand level factor and infrastructure level factor. As shown in Table 4 below:

Table 4. *Factor naming table.*

Factor naming	Select variable
Comprehensive economic strength factor (G1)	Gross Regional Product (100 million yuan), main business income of industrial enterprises above designated size, broadband network access port, added value of tertiary industry (100 million yuan)
Logistics demand level factor (G2)	Cargo turnover (100 million tons), total import and export (US$10,000)
Infrastructure level factor(G3)	Logistics network density

Table 5. *Component scoring coefficient matrix.*

	Element		
	1	2	3
Gross Regional Product (100 million yuan)	.345	-.159	-.044
Main business income of industrial enterprises above designated size	.411	-.376	.079
Logistics network density	-.197	-.262	1.134
Broadband network access port	.344	-.143	-.093
Third industry added value (100 million yuan)	.254	.000	-.054
Cargo turnover (100 million tons)	-.425	.954	.050
Total import and export (US$10,000)	-.029	.676	-.406

Note: Method of extraction: analysis of the main component.

Spindle method: The largest variation method with Kaiser normalization.

From the component scoring coefficient matrix, the score functions of the three factors are:

$$G_1=0.345X_1+0.411\ X_2-0.197\ X_3+0.344\ X_4+0.254\ X_5-0.425\ X_6-0.029\ X_7$$

$$G_2=-0.159X_1-0.376X_2-0.262X_3-0.143\ X_4+0.000\ X_5+0.954\ X_6+0.676\ X_7$$

$$G_3=-0.044\ X_1+0.079X_2+1.134X_3-0.093\ X_4-0.054\ X_5+0.050.425\ X_6-0.406\ X_7$$

3.3. Regression

Regression analysis is a method of studying the extent to which changes in one or more independent variables affect the variation of dependent variables. In this paper, in order to determine the influence degree of each factor's change logistics enterprise layout, the research uses stepwise regression method to carry out multiple regression. Taking each factor as an independent variable, LN (the number of A-level logistics enterprises +1) as a dependent variable, input SPSS software, and the output results are shown in the following table:

Table 6. *Model Summary Table.*

model	R	R square	Adjusted R And square	Standard skewness error	R square change	F value change	df1	df2	Significant F value change	Durbin-Watson
1	.776[a]	.602	.558	.779547834894133	.602	13.599	3	27	.000	1.739

It can be seen from Table 6 that the correlation coefficient R is 0.776, indicating that the correlation between the three independent variables and the dependent variable is better. R2 is 0.602, indicating that these three factors can explain the variability of the dependent variable by 60.2%.

The observed value of the F test is 13.599. The F distribution is significantly 0.000, and the null hypothesis that the regression coefficient is 0 is rejected. The linear relationship between the independent variable comprehensive economic strength factor, logistics demand level factor and infrastructure level factor and the dependent variable LN (the number of A-level logistics enterprises + 1) is significant, and a linear model can be established.

Table 7. *Coefficient Table.*

Model		B	Standard error	Significance
1	(constant)	4.304	.140	.000
	Comprehensive economic strength factor	.715	.142	.000
	Logistics demand level factor	.317	.142	.035
	Infrastructure level factor	.463	.142	.003

The output results from Table 7 show that comprehensive economic strength factor, logistics demand level factor and infrastructure level factor have all passed the significant test, so these three factors have significant effects on the layout of the A-level logistics enterprises. The equation for the linear model is:

$$Y=4.304+0.715G_1+0.317G_2+0.463G_3$$

Among them, G1 is the comprehensive economic strength factor, G2 is the logistics demand level factor, and G3 is the infrastructure level factor. It can be seen from the above model that the comprehensive economic strength level factor has the greatest impact on the number of A-level logistics enterprises, followed by the infrastructure construction level, and finally the logistics demand level factor.

Analysis of the reasons: the level of development of productivity promotes or restricts the location distribution of logistics enterprises. The development and growth of logistics enterprises and the layout of logistics enterprises are often compatible with the spatial layout of productivity, and economic strength has the greatest impact on logistics level.

A sound infrastructure is a prerequisite for better accessibility. The good accessibility is conducive to the logistics enterprises to expand the customer base and logistics market, and facilitate the transportation route organization of logistics activities. It improves the logistics organization efficiency of the enterprise, accelerates the development of the logistics industry, and promotes the production of more A-level logistics enterprises.

The logistics demand factor is also an important reason for the layout differentiation of logistics enterprises. The greater the logistics demand, the larger the logistics market is, which is conducive to the development of the logistics industry.

4. Conclusion

Reviewing the above analysis, the distribution of A-level logistics enterprises in China has obvious spatial differences. The number of A-level logistics enterprises in the southeastern coastal areas is the largest, while that in the southwest and northwest is the least, showing the characteristics of the degree of economic development in all regions of China. Moreover, the difference in the distribution of A-level logistics enterprises is the result of a combination of factors, including: comprehensive economic strength factor G1, logistics demand level factor G2 and infrastructure level factor G3. Among them, the economic strength factor is the main influencing factor of the layout difference of A-level logistics enterprises, and the impact effect is the most significant. Factors of infrastructure level and logistics demand level are important reasons for the difference in distribution of a-level logistics enterprises.

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References

[1] Hanson S, Giuliano G. 1995. The geography of urban transportation. New York: Guilford.

[2] Hoyle B S, Knowles R D. 1998. Modern transport geography. London: Wiley.

[3] Hesse M, Rodrigue J P. 2004. The transportation geography of logistics and freight distribution. Journal of Transportation Geography, 12(3): 171-184.

[4] Lv L C, Yan X P. 2003. Modern physical attribution and economic geography. Areal Research and Development, 22(2): 5-7.

[5] Wang C J. 2006. Geographical study on modern logistics and its development trend. Human Geography, 21(6): 22-26.

[6] Pan Y J, Chen Z N, (2007) review of logistics geography research, [J], Yunnan geographical environment research, 19 (6): 91-95.

[7] Zong H M, Zhou S H, Yan X P. 2010. Progress in the logistics study and its implications for China: an economic geographical perspective. Progress in Geography, 29(8): 906-912.

[8] Abuduweili H, Yang D G. 2012. Research progress of logistics geography in China. Progress in Geography, 31(2): 231-238.

[9] Zeng X Y, Qian Q L. 2010. Distribution pattern of storage company and the influence factors in Guangzhou. China Market, 17(32): 6-9.

[10] Cao W D. 2011. Spatial pattern and location evolution of urban logistics enterprises: taking Suzhou as an example. Geographical Research, 30(11): 1998-2007.

[11] Qian Q L, Chen Y B, Li Y, et al. 2011. Spatial distribution of logistics enterprises in Guangzhou and its influencing factors. Geographical Research, 30(7): 1254-1261.

[12] Liang S B, Cao Y B, Wu W. Spatial pattern evolution of port logistics enterprises in Shanghai metropolitan area [J].Geographic study, 2013, 32 (08): 1448-1456.

[13] Zhu H, Zhou G G. Evolution of Spatial Pattern of Logistics Enterprises in International Continental Ports and Its Influencing Factors: A Case Study of Yiwu City [J].Economic Geography, 2017,37(02): 98-105.

[14] Jiang T Y, Wu Z T, Chen C C. Study on the Spatio-temporal Pattern Characteristics of A-level Logistics Enterprises in Zhejiang Province [J].Geography, 2017,37(11): 1720-1727.

[15] [Han Z L, Li X N. 2007. Position influencing factors of third-party logistics enterprise. Areal Research and Development, 26(2): 16-25.

[16] Wang G X, Wei Q Q, (2008), logistics enterprise location research: summary and reflection [J], logistics technology, (6): 10-13.

[17] Wang C J, Zhang M T, (2014). Layout characteristics and formation mechanism of China's logistics enterprises [J]. geographic science progress, 33 (1): 134-144.