

# An Empirical Study on the Competitiveness of Some Logistics Listed Companies

Lang Chen\*

School of Economics and Management, Chongqing University of Posts and Telecommunications, Chongqing 400065, China

## Abstract

As an industry which started simultaneously with the reform and opening-up policy, logistics has penetrated into various fields after more than 40 years' development. With the increasing demand for logistics, more and more businesses are expanding into the field of logistics, making the competitiveness of enterprises in the logistics industry more intense. This paper selects 31 listed logistics companies as the research object, and use the factor analysis method to carry out empirical research on enterprise competitiveness from four aspects: profitability, debt paying ability, development ability and innovation ability. The results show that: profitability, debt paying ability and development ability have the largest impact on the competitiveness of listed logistics companies, accounting for 29.752%, 20.339% and 19.938%. The five most competitive companies are Yunda shares, Aoyang shunchang, Xinning logistics, Guanghui logistics and Yuantong express; The five least competitive enterprises are Huapengfei, Changlian shres, Xiamen port, Dongfang jiasheng and Huamao logistics. According to the factors score and ranking, the author puts forward some suggestions for listed logistics companies to improve their competitiveness.

## Keywords

Logistics ;listed companies;competitiveness; Factor analysis.

## 1. Introduction

In the 1970s, the term logistics was introduced from Japan to China. Since then, as the door to reform and opening has opened wider, the logistics industry, as an emerging industry, has developed rapidly in my country. After resources are regarded as the "first source of profit" and labor as the "second source of profit", modern logistics is now generally regarded as the "third source of profit". Therefore, more and more enterprises are transforming into the logistics industry, which not only promotes the development of the logistics industry as a tertiary industry, but also promotes the development of my country's national economy. From 2010 to 2018, China's total social logistics increased from 125.4 trillion yuan to 283.1 trillion yuan, with an average annual compound growth rate of 10.71%, which fully illustrates the rapid development of China's logistics; at the same time, the total cost of social logistics costs from 7.1 Trillion yuan increased to 13.3 trillion yuan; the total logistics costs in 2010-2018 accounted for the GDP of the year were: 17.8%, 17.8%, 18.0%, 18.0%, 16.6%, 16.0%, 14.9%, 14.6%, 14.8 % [1]. It can be seen from the above data that my country's logistics industry has made great efforts in cost reduction and made substantial progress. However, compared with developed countries in Europe and America, China's logistics costs are still very high, and it has no advantage in international competition. Today, with the economic globalization and the institutionalization of the market economy, the competition faced by enterprises is more intense than ever. Therefore, if enterprises want to occupy a certain share in the logistics market, they must improve their competitiveness. The comprehensive competitiveness of an enterprise is not only reflected in financial data, but also in certain non-financial indicators such

as the composition of technical R&D personnel and corporate culture. Therefore, the evaluation and analysis of financial and non-financial indicators can more accurately reflect the competition of enterprises, and it is convenient to provide accurate enterprise information to stakeholders such as stakeholders, operators, government economic management departments, etc., and to achieve self-development and external supervision of enterprises. It is very important.

Reviewing domestic and foreign literature, using factor analysis to study problems has become a hot topic. With the continuous expansion of the computer field and the development of technology, SPSS statistical analysis software is gradually updated, and the factor analysis method is gradually applied by researchers. Tao Xuan (2018) used factor analysis to study the scientific and technological innovation of Anhui Province that the first problem that Anhui Province needs to solve at present is to realize a new round of development in Anhui Province [2]. Li Xiaojuan used factor analysis method to study the listed Chinese medicine companies: my country's listed Chinese medicine companies have a big gap with Western countries such as Europe and the United States in terms of research and innovation [3]. He Qiang used the factor analysis method to analyze the operating performance of a representative small and medium-sized enterprise [4]. Peng Xiaojie used the factor analysis method to evaluate the performance of 67 listed agricultural companies in my country. The show that the companies have developed unevenly in the four areas of profitability, operating capacity, development capacity and debt-servicing capacity [5]. Zhu Zhengcai applied factor analysis method to prove that the language ability aggregation degree, discrimination degree, and fitting degree can well describe the language ability structure characteristics of the College English CET-4 test paper [6]. Wang Yong used the factor analysis method to build a complete, scientific and standardized evaluation index system for the performance of agricultural product supply chains [7]. Zhang Jincui used the review method to build a relatively complete evaluation index system of enterprise competitiveness [8].

Through the above literature, it is found that there are few literatures involving empirical analysis of logistics enterprises, and there are few literatures that use factor analysis to study the competitiveness of logistics enterprises. Therefore, this article uses comparative analysis method and factor analysis method to study the competitiveness of some listed logistics companies based on the existing evaluation system indicators of enterprise competitiveness, trying to find out the factors that have a significant impact on the competitiveness of logistics companies, and Make reasonable suggestions

## **2. Method Selection and Model Building**

### **2.1. Method Selection**

Li Feng (2014) pointed out that the essence of factor analysis is a method of recombination of variables. Its premise is that each original data must be correlated. Using mathematical methods, multiple variables with complex relationships are extracted into a few independent new variables (that is, linear combinations of some original variables)-called factors, and the original variables are used. These factors show an analysis method that replaces most variables with a few variables [9]. In view of the large number of indicators that can be selected to measure competitiveness from a financial perspective, a more representative comprehensive indicator can be extracted through factor analysis, so that this paper can make a more prepared and comprehensive analysis and comparison of enterprise competitiveness.

## 2.2. Model Building

The calculation formula of the factor analysis method is as follows: if there are  $p$  original variables in factor analysis, and  $p$  original variables can extract  $m$  common factors, most of the information of  $p$  original variables can be reflected by  $m$  common factors. The model is:

$$\begin{cases} x_1 = a_{11}F_1 + a_{12}F_2 + \cdots + a_{1m}F_m + \varepsilon_1 \\ x_2 = a_{21}F_1 + a_{22}F_2 + \cdots + a_{2m}F_m + \varepsilon_2 \\ \vdots \\ x_p = a_{p1}F_1 + a_{p2}F_2 + \cdots + a_{pm}F_m + \varepsilon_p \end{cases} \quad (1)$$

Among them  $x_1, x_2, \dots, x_p$  are  $p$  original variables;  $F_1, F_2, \dots, F_m$  are the extracted common factors ( $m < p$ ),  $\varepsilon$  is an indefinite variable, which cannot be explained by the common factor, and  $a_{ij}$  is the factor load, which reflects the variable in the factor On the importance level.

## 3. Empirical Analysis

### 3.1. Data Source

This article selected 40 listed logistics companies in West China Securities, Oriental Fortune, and Sina Finance. During the analysis, it is found that the financial data of some companies is too abnormal, which may affect the research results. For the accuracy of the research, the relevant indicators of 31 listed logistics sample companies were finally selected for research and analysis. The relevant indicators are shown in Table 1:

### 3.2. Data Processing

#### 3.2.1. Positive Indicators

Generally, financial indicators are divided into three categories, one is positive indicators, one is moderate indicators, and one is reverse indicators. The greater the value of the financial indicator, the better the indicator is called the positive indicator, otherwise it is the reverse indicator; the closer to a certain value, the better the indicator is called the moderate indicator. In order to make all indicators evaluate in the same direction (the positive direction is selected in this article), it is necessary to normalize the reverse index and the moderate index, that is, the processed index value is positively related to the corresponding ability, the larger the index value The better the corresponding ability. The indicators selected in this article are only moderate indicators and positive indicators, so only three moderate indicators (current ratio, quick ratio, and asset-liability ratio) need to be positively processed. After reading the literature on the normalization processing of the appropriate index data of the factor analysis method, the final selection of the normalization processing method is as follows:

**Table 1.** Competitive evaluation indicators

comment content	Evaluation index	Evaluation standard
Profitability	Operating net interest rate: the ratio of net profit to operating income	Positive indicator
	Operating profit margin: the ratio of operating profit to total business income	Positive indicator
	Weighted return on net assets: the ratio of net profit to average net assets during the reporting period	Positive indicator
	Return on total assets: (pre-tax profit + interest expense) and the ratio of the average amount of total assets	Positive indicator
Solvency	Current ratio: ratio of current assets to current liabilities	Moderate index
	Quick ratio: the ratio of quick assets to current liabilities	Moderate index
	Asset-liability ratio: the ratio of total liabilities to total assets	Moderate index
Development capability	Total asset growth rate: the ratio of total asset growth this year to total assets at the beginning of the year	Positive indicator
	Net asset growth rate: the ratio of net asset growth this year to the beginning of the year	Positive indicator
Innovation capacity	R&D ratio: R&D investment as a percentage of operating income	Positive indicator
	Proportion of technical staff: the proportion of technical staff in all staff	Positive indicator

$$x'_{ij} = \max |x_{ij} - k| - |x_{ij} - k| \tag{2}$$

In the formula, max represents the maximum value in each indicator, (i=1,2,3, ,31) i represents the number of enterprise samples, (i=1,2,3, ,11) j represents the number of enterprises' competitive evaluation indicators, represents the first The value of the sample enterprises on the first evaluation index is the data after normalization, which is a moderate value. In this paper, the average number of the original variables of the 31 sample enterprises selected is used.

**3.2.2. Dimensionless Evaluation Indicators**

The selected evaluation indicators have different measurement units. Therefore, after the index is normalized, it needs to be dimensionless. The purpose is to solve the problem of different measurement units for each evaluation index. The method of dimensionless in this paper is the standardization method, and the processing method is as follows:

$$y'_{ij} = \frac{x_{ij} - \bar{x}_j}{s_j} \tag{3}$$

In the formula,  $i$  ( $i=1,2,3, \dots, 31$ ) represents the number of enterprise samples,  $j$  ( $j=1,2,3, \dots, 11$ ) represents the number of enterprises' competitive evaluation indicators,  $x_{ij}$  Represents the  $i$  value of the sample company on the  $j$  evaluation indicator, and represents the average value of 31 sample companies on the first indicator.

### 3.3. Factor Analysis Adaptability Test

Before factor analysis, you need to perform Bartlett sphericity test and KMO (Kaiser-Meyer-Olkin) test to determine whether the data is suitable for factor analysis. The test results are shown in Table 2:

**Table 2.** KMO value and Bartlett test

Kaiser-Meyer-Olkin_Measuring_the_appropriateness_of_sampling		0.607
Bartlett's sphericity test	Approximate chi-square	369.655
	df	55
	Sig.	0.000

It is generally believed that when the KMO value is greater than 0.6 and the significance is less than 5%, it is suitable to use factor analysis. This paper tests  $KMO=0.607>0.6$ , and the significance probability is  $0.000<5\%$ . The results show that the evaluation indicators selected in this paper are suitable for factor analysis.

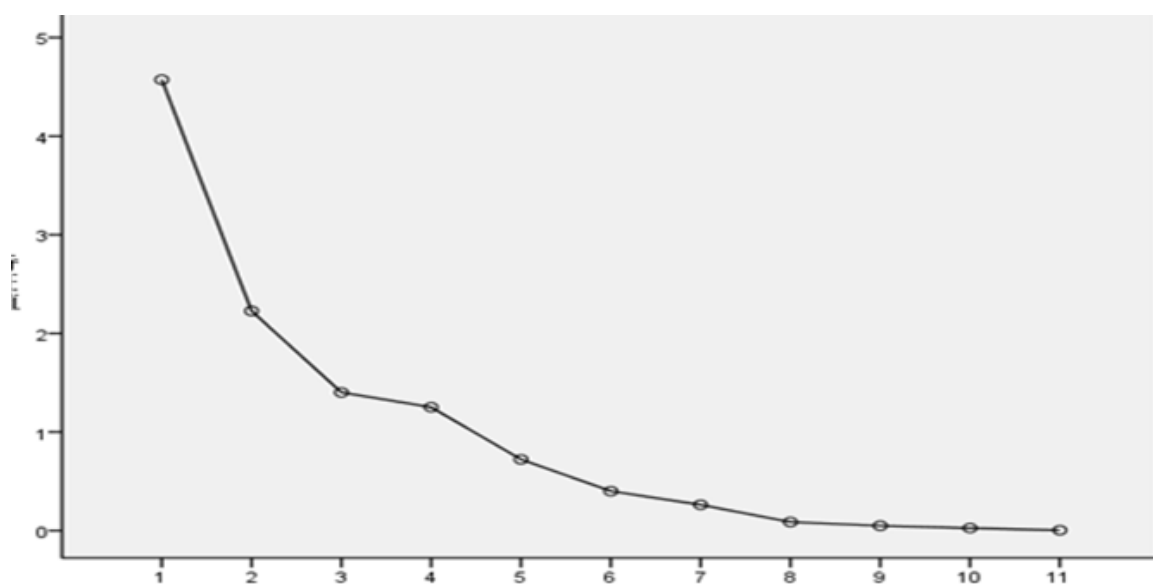
### 3.4. Extract Common Factors

The principal component analysis method is used to extract public factors. Under the calculation results of SPSS21.0 software, the obtained factor characteristic values and variance contribution rates are shown in Table 3:

Table 3 shows the situation where the common factor reflects the variance of the original data. It can be seen from the table that there are 4 components with eigenvalues greater than 1, and their variance contribution rates are: 29.752%, 20.339%, 19.938%, and 15.835%. The results show that these four common factor components can explain the original 11 85.865% of the information of the indicator, that is to say, the public factor covers most of the original data information, and the amount of lost information is less; while the characteristic values of the following 7 components are less than 1, these 7 indicators only cover the original data. 14.135% of information. Therefore, it is appropriate to use these four public factors to evaluate the selected 31 listed logistics companies for competitive research. According to the principle that the eigenvalue is greater than 1, and the cumulative variance contribution rate is greater than 85%, the number of public factors can be determined as four, which are represented by  $F_1, F_2, F_3, F_4$  and respectively. A gravel map (also called a steep slope map) combining various components is shown in Figure 1:

**Table 3.** xplained overall variance

Ingred ients	Initial eigenvalue			Extract square sum load			Rotate square sum loading		
	tot al	Variance percentage	Cumulative percentage	tot al	Variance percentage	Cumulative percentage	tot al	Variance percentage	Cumulative percentage
One	4.572	41.56	41.56	4.572	41.56	41.56	3.273	29.752	29.752
Two	2.222	20.204	61.764	2.222	20.204	61.764	2.237	20.339	50.091
Three	1.4	12.729	74.492	1.4	12.729	74.492	2.193	19.938	70.03
Four	1.251	11.373	85.865	1.251	11.373	85.865	1.742	15.835	85.865
Five	0.717	6.515	92.38						
Six	0.41	3.731	96.111						
Seven	0.263	2.393	98.504						
Eight	0.087	0.791	99.295						
Nine	0.049	0.444	99.739						
ten	0.025	0.23	99.969						
eleven	0.003	0.031	100						



**Figure 1:** Gravel map (steep slope map)

According to the gravel map, the initial eigenvalues of the first four common factors are relatively large, and the four eigenvalues according to Table 3 are: 4.572, 2.222, 1.4, and 1.251 are all greater than 1; the turning point of the curve is also It is more obvious that by the fourth common factor, the eigenvalues are beginning to stabilize. Starting from the fifth common factor and later, the eigenvalues of the components are relatively small and the eigenvalues are all less than 1, which is relatively flat, which shows that the four common factors extracted are suitable.

### 3.5. Establish Factor Load Matrix and Name Common Factors

After determining that the number of common factors is four, using the factor analysis program of SPSS21.0 statistical software and selecting the maximum variance method to rotate the factors, the factor load matrix constructed is shown in Table 4:

**Table 4:** otational component matrix

	Ingredients			
	1	2	3	4
Net operating margin	0.961	-0.067	0.117	-0.038
Operating margin	0.943	-0.037	0.131	-0.02
Weighted return on net assets	0.786	0.041	0.411	-0.305
Return on total assets	0.767	-0.028	0.456	-0.256
Current ratio	0.024	0.944	-0.151	-0.031
Quick ratio	0.068	0.93	-0.097	-0.111
Assets and liabilities	-0.216	0.67	0.245	0.188
Growth rate of total assets	0.279	0.048	0.92	-0.091
Net asset growth rate	0.283	-0.122	0.91	-0.114
Technical staff accounted for all staff	-0.037	-0.054	-0.112	0.87
R&D investment as a percentage of operating income	-0.206	0.064	-0.076	0.868

It can be drawn from Table 4 that the distribution of indicators in each component sector is normal, and the load on the common factors of the four financial indicators of operating net interest rate, operating profit rate, weighted return on net assets, and return on total assets are 0.961, respectively. , 0.943, 0.786, 0.767, which have a strong correlation with the profitability of the enterprise, so it is named as the profitability factor; the load on the three indicators of the current ratio, quick ratio, and asset-liability ratio are 0.944, 0.93, 0.67, respectively, Which has a strong correlation with the solvency of the enterprise, so it is named as the solvency factor; the total load of the two indicators of total asset growth rate and net asset growth rate is 0.92 and 0.91, respectively, which is strongly correlated with the development ability of the enterprise, So named as developmental capacity factor [15]; The two indicators on the ratio of technical staff to total staff and R&D investment in operating income are 0.87 and 0.868, respectively, which are related to the innovation ability of the enterprise, so they are named as innovation ability factor.

### 3.6. Calculate Factor Score

In the calculation results of the SPSS21.0 calculation window, the scores of the sample company's public factors  $F_1, F_2, F_3, F_4$  and can be obtained, and the single factor scores of the sample company can be calculated by computer to obtain a comprehensive score and then

ranked. The company's individual public factor score ranking and comprehensive score ranking are shown in Table 5 below:

**Table 5.** The company's individual public factor score ranking and comprehensive score ranking

company name	Profitability capability $F_1$		Solvency capability $F_2$		Development capability $F_3$		Innovation capacity $F_4$		Comprehensive ability $F$	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Yunda shares	1.0622	4	1.17878	2	2.12721	2	0.01764	13	1.14446	1
Aoyang Shunchang	0.43205	6	0.75986	7	0.08082	11	2.471	2	0.80416	2
Xinning Logistics	0.15983	14	0.72402	9	0.24382	7	2.78238	1	0.79662	3
Guanghui Logistics	1.21293	1	0.67017	12	-0.34087	19	0.17817	9	0.53273	4
YTO Express	0.31008	11	1.15562	3	0.43961	4	-0.46774	20	0.39699	5
STO Express	1.08789	3	0.68169	11	0.08428	10	-0.90156	26	0.39173	6
Henderson	1.20888	2	-0.5	23	-1.04821	30	1.80904	3	0.39066	7
Hongchuan Wisdom	0.86422	5	0.22132	15	0.29695	6	-0.22495	18	0.37934	8
Jiayou International	-0.56978	30	-1.68774	29	4.04447	1	0.06329	11	0.35360	9
Chuan hua Zhilian	0.14934	15	0.00714	17	-0.01024	12	1.51619	4	0.33067	10
Long-term logistics	0.20874	13	1.14482	4	0.23467	8	-0.73728	23	0.26203	11
SF Holdings	0.01189	17	0.55122	13	0.10432	9	0.12579	10	0.18211	12
Debon shares	-0.06273	19	0.72517	8	0.40739	5	-0.82111	25	0.09321	13
Milkwe	-0.189	22	-0.62421	25	1.42014	3	-0.28733	19	0.06342	14
Tianshun shares	-0.41976	27	1.23091	1	-0.2629	15	-0.15389	17	0.05670	15
Yuanshang shares	0.30945	12	-0.18536	18	-0.37711	21	0.25609	7	0.02298	16
Wanlin Logistics	0.41331	7	0.06166	16	-0.65811	27	-0.11302	15	-0.01584	17
Felida	-0.48889	28	0.68682	10	-0.26933	16	0.03521	12	-0.06276	18
Sinotrans	0.04557	16	1.02636	5	-0.59903	26	-1.02423	28	-0.06908	19
Shanghai Yashi	-0.40925	26	0.98475	6	-0.2025	13	-1.03037	29	-0.14558	20
Proton	0.38624	9	-0.97971	27	-1.44075	31	0.4999	6	-0.34059	21
Wanjiang Logistics	-0.27805	23	-0.28396	21	-0.39707	23	-0.55295	22	-0.35778	22
Antong Holdings	-0.00447	18	-0.34513	22	-0.27328	17	-1.15985	31	-0.36065	23
Jiacheng International	0.39678	8	-2.06091	30	-0.3816	22	0.2532	8	-0.39260	24
Xiamen Xiangyu	-0.38071	25	-0.19599	19	-0.22417	14	-0.9672	27	-0.40876	25
Bonded Technology	-0.34585	24	-0.24899	20	-0.67715	28	-0.55266	21	-0.43797	26
Huamao Logistics	-0.13251	21	-0.74327	26	-0.50123	25	-0.80518	24	-0.48685	27
Dongfang Jiasheng	-0.11518	20	-0.50208	24	-0.76681	29	-1.05156	30	-0.53082	28
Xiamen Port	-0.56732	29	-1.1745	28	-0.28036	18	-0.12241	16	-0.56246	29
Changlian share	0.32085	10	-2.75894	31	-0.42574	24	-0.0131	14	-0.64361	30
Hua Pengfei	-4.61677	31	0.48051	14	-0.34719	20	0.97848	5	-1.38605	31



The comprehensive score calculation method is based on the variance contribution rate of each public factor in Table 3, and the comprehensive score of each factor can be calculated by combining the scores of each factor in Table 5. The comprehensive score calculation formula is as follows:

$$F = \frac{29.752F_1 + 20.339F_2 + 19.938F_3 + 15.835F_4}{85.865} \quad (4)$$

It is generally believed that the score of a single item is above 0, indicating that the sample company's corresponding ability is strong, and the higher the score, the stronger the ability; the factor comprehensive score above 0, indicating the company's comprehensive ability. The stronger, the higher the score, the stronger the overall ability. The comprehensive ability of this article is mainly reflected in the competitiveness of enterprises, so the higher the overall score, the stronger the competitiveness of enterprises. According to the comprehensive scores and rankings in Table 5, there are 16 logistics listed companies with a composite score greater than 0, indicating their strong competitiveness; 15 logistics listed companies with a composite score less than 0, indicating their competition Weak. Conclusions and recommendation, The top five companies are Yunda Co., Ltd., Aoyang Shunchang, Xinning Logistics, Guanghui Logistics, and Yuantong Express. The bottom five companies are Huapengfei, Changlian, Xiamen Port, and Oriental. Jiasheng and Huamao Logistics.

## 4. Research Conclusion and Suggestions

### 4.1. Research Conclusion

From this factor analysis, it can be concluded that profitability, solvency and development ability have the greatest impact on the competitiveness of logistics companies. Among them, the profitability variance contribution rate is 29.752%, which occupies a large weight in the comprehensive score and has the largest impact on the competitive evaluation. The companies with comprehensive comprehensive rankings are relatively good in profitability. The second is solvency, with a variance contribution rate of 20.339%. Finally, the ability to develop, the variance contribution rate is 19.938%. The cumulative variance contribution rate of the three is 70.03%; the influence of innovation ability is weaker, and the variance contribution rate is 15.835%. At the same time, it can be seen that the comprehensive scores of the top ranked companies are much higher than those of the bottom ranked companies, indicating that the logistics industry is seriously differentiated.

According to the ranking of the factor score table, it can be concluded that the comprehensive ranked Yunda shares have the highest profitability, debt solvency, development ability, ranking, especially debt solvency and development ability, with scores of 1.17878 and 2.12721. It is only lower than Tianshun shares, and its development ability is only lower than that of Jiayou International. They are ranked second respectively; the innovation ability ranking is weaker than the other three capabilities, but the weight of the three is higher, so the comprehensive ranking is also high. Aoyang Shunchang, which ranks second overall, ranks higher in profitability, solvency, development, and innovation capabilities, especially with an innovation capability score of 2.471, ranking second, only lower than Xinning Logistics; Yunda shares in the first place are not so far apart in terms of their overall scores. Xinning Logistics, which ranks third overall, ranks first in its solvency, development, and innovation capabilities, with an innovation capability score of 2.78238, ranking first, indicating that the company pays more attention to innovation; Guanghui Logistics, which ranks fourth, The profitability and innovation ability are ranked high, and its profitability score is 1.21293, ranking first, indicating

that the company has strong profitability, but poor development ability, and the score is negative. Yuantong Express, which ranks fifth overall, has better profitability, solvency, and development ability, but it has poorer innovation ability, with a score of -0.46774, ranking lower.

#### 4.2. Suggestions for Improving the Competitiveness of Listed Logistics Companies

This article draws a conclusion after studying and analyzing the collected data by using factor analysis method to analyze the competitiveness of listed logistics companies, and puts forward the following suggestions to improve the competitiveness of listed logistics companies:

(1) Enhance the company's profitability and increase company profits. The most influential factor for the company's competitiveness is profitability, which accounts for 29.752% of the weight in the overall score. Therefore, improving profitability is very important for enhancing the company's competitiveness. Companies can enhance cost awareness and strengthen cost budgets to reduce logistics costs; adopt supply chain management methods to implement accurate, punctual, and quantified operations; expand business areas of enterprises and conduct diversified operations; seize cooperation with e-commerce Opportunities, stabilize old customers, attract new customers and many other ways to improve the company's profitability.

(2) Maintain a reasonable capital structure. The contribution rate of the solvency of this paper is 20.339%, which is only lower than the profitability. The company can make the company's capital structure reasonable by means of financing, debt raising, and stock issuance. A reasonable capital structure can reduce the company's financial risk and help the company use the financial leverage effect.

(3) Formulate the company's development strategy plan. The contribution rate of the development capacity of this article is 19.938%, so the logistics company should combine the entire market environment according to its own situation, take the logistics development plan proposed by the government as the guide, make full use of the preferential policies of the logistics industry given by the government, from a global perspective, Starting from the fundamentals, formulate the company's development strategy.

(4) Increase investment in R&D and training of technical personnel. In this empirical analysis, innovation capacity accounts for 15.835% of the overall score. Although the weight in the comprehensive ability score is lower than the profitability, solvency, and development ability, the company's vitality and source come from innovation, and the strength of innovation ability determines the company's future destiny. Especially in today's fierce market competition, only innovation can make the company based on the market for a long time. Logistics companies should follow the trend of "smart logistics" to strengthen the upgrading of logistics technology, the construction of logistics systems and the use of artificial intelligence, and the precise operation and management of logistics; at the same time, they should focus on the cultivation of technical personnel.

#### References

- [1] Information on: <http://www.chinawuliu.com.cn>.
- [2] Xuan Tao. Anhui Province Green Technology Innovation Capability Evaluation Research (MS. Anhui University of Finance and Economics, 2019) .
- [3] Xiaojuan Li. Research on the evaluation of the operating performance of listed Chinese medicine companies (MS. Inner Mongolia Agricultural University, 2018) .
- [4] Qiang He; Zhao Zhao. Research on the performance of securities companies based on factor analysis method , Investment Research, Vol. 33 (2014) No.10, p.149-156.

- [5] Xiaojie Peng; Gao Mengjie. The performance evaluation of agricultural listed companies based on factor analysis method, Research on Financial Problems, Vol. (2014) No.11, p.68-73 .
- [6] Zhengcai Zhu. Ability structure and factor analysis of language testing ,Foreign Language Teaching, Vol. 35(2014) No.5, p.50-54.
- [7] Yong Wang; Xudong Deng. Empirical analysis of agricultural product supply chain performance evaluation based on factor analysis , China Circulation Economy, Vol. (2015) No.3, p.10-16.
- [8] Jincai Zhang; Xiaode Zuo. Construction of enterprise competitiveness evaluation index system, Management World, Vol. (2014) No.10, p.172-173.
- [9] Feng Li. Principle and application of factor analysis , Industry and Technology Forum, Vol. 13 (2014) No.10, p.76-77.