



GLOBAL JOURNAL OF MANAGEMENT AND BUSINESS RESEARCH: G
INTERDISCIPLINARY

Volume 15 Issue 3 Version 1.0 Year 2015

Type: Double Blind Peer Reviewed International Research Journal

Publisher: Global Journals Inc. (USA)

Online ISSN: 2249-4588 & Print ISSN: 0975-5853

Empirical Research on the Performance Evaluation of Logistics Enterprises

By Li Zhou, Hong Zhang & Anjie Deng

Beijing Wuzi University, China

Abstract- The paper analyze the logistics enterprise's financial date using factor analysis, and analysis to questionnaire investigation of financial data for analysis using the hierarchical, finally build the logistics enterprise performance evaluation index system, determined the different dimensions, the weight of each index between relations. The paper is through the empirical study of logistics enterprise, verify the feasibility of system building and simplicity. This paper proposed empirical analysis by 2013 financial data of 11 logistics enterprises to verify feasibility and operability of index system, and proves that the index system can really evaluate the financial performance of logistics enterprises.

Keywords: *logistics enterprise, performance evaluation, analytic hierarchy process(AHP), factor analysis method(AHP), empirical analysis.*

GJMBR - G Classification : *JEL Code : L32*



Strictly as per the compliance and regulations of:



Empirical Research on the Performance Evaluation of Logistics Enterprises

Li Zhou^α, Hong Zhang^ο & Anjie Deng^ρ

Abstract- The paper analyze the logistics enterprise's financial data using factor analysis, and analysis to questionnaire investigation of financial data for analysis using the hierarchical, finally build the logistics enterprise performance evaluation index system, determined the different dimensions, the weight of each index between relations. The paper is through the empirical study of logistics enterprise, verify the feasibility of system building and simplicity. This paper proposed empirical analysis by 2013 financial data of 11 logistics enterprises to verify feasibility and operability of index system, and proves that the index system can really evaluate the financial performance of logistics enterprises.

Keywords: *logistics enterprise, performance evaluation, analytic hierarchy process (AHP), factor analysis method (AHP), empirical analysis.*

I. INTRODUCTION

Shaw Arch was considered the first to propose the logistics concept, and the practical exploration of the scholars. In 1915 he first had a number of issues in the market circulation and pointed out that the important part of enterprise circulation was to create demand and logistics activities. The book also presents material after time or space transfer, will generate additional values, The activities of creating demand and supply of physical objects are the basis of balance and mutual existence, The lack of coordination between the creation of demand and logistics is the cause of major failure in the circulation activities. Although he did not specify the process of logistics activities, but still produced the basis for logistics theory and practice, namely, balance, coordination and interdependence.

In 1935, the American sales association had the earliest definition of the logistics: distribution physical was the material and service that was produced in the activities of the production to the sales ground.

In 1986, the American Association of logistics management will narrow the field of "physical distribution" changed to "logistics", the change exceeded the range of flow of goods, the logistics activities extended to the production field.

In 1998, the American Association of logistics management of logistics of the new definition is: logistics is to effective rate of the goods, services and related information from the source to point of consumption flow and storage, and plan of the whole process, implementation and control process. Its ultimate aim is to in order to meet the needs of the customers. The definition of logistics are more likely and the definition of logistics management, rather than the definition itself connotation of the concept of logistics, nevertheless, this definition still have the desirable and importance, because he emphasizes the logistics activities of objective and controllability.

II. EMPIRICAL RESEARCH

a) Data source

Due to non-acquisition of the non-financial indicators, this paper selects the financial index taken as a case study, but the actual enterprise performance evaluation shall fully consider the enterprise non-financial indicators. Only so the results of the evaluation will be more close to the real situation of the enterprise.

In order to verify the correctness of the financial index system, 11 financial statements of the 2013 listed logistics enterprises were selected, and the factor analysis of the financial index X1-X11 was carried out.. These 11 enterprises are Wuzhou Communications (1), the Hong Kong Group (2), Tielong logistics (3), Delivery of shares (4), COSCO Shipping (5), Jinzhou Port (6), Lianyungang (7), Tianjin Port (8), Chiwan (9), Yingkou Port (10) and Henderson Daxin (11).

Author α ο: School of Information, Beijing Wuzi University, Beijing, China. e-mail: 514050209@qq.com

Author ρ: School of Banking and Finance, University of International Business and Economic, Beijing, China.

Table 1 : The original data in 2013 of 11 listed logistics enterprises

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}
	Main business profit margin	Cost rate	Total return on asset	Net assets yield	Property ratio	Assets liability ratio	Inventory turnover rate	Fixed asset turnover	Main business revenue growth rate	Net profit growth rate
1	13.35	3.78	9.46	6.41	0.01	0.01	3.15	0.84	14.60	24.66
2	32.88	35.68	23.10	10.55	0.02	0.03	6.55	0.79	-0.77	7.47
3	14.64	14.47	27.38	9.70	0.05	0.05	2.00	2.47	4.05	-8.93
4	11.45	5.35	26.21	9.47	0.02	0.02	8.10	3.87	6.64	15.40
5	6.09	0.20	27.13	0.50	0.01	0.02	25.54	0.72	18.03	-3.71
6	26.73	13.66	13.27	2.75	0.01	0.02	30.80	0.27	57.84	21.57
7	24.50	12.16	25.36	5.04	0.01	0.02	77.05	0.80	-4.52	6.74
8	17.81	12.04	24.72	8.41	0.02	0.02	36.52	1.47	23.22	7.58
9	48.51	67.67	34.76	12.74	0.03	0.03	42.75	0.63	-0.17	4.34
10	32.42	22.54	25.10	5.23	0.02	0.03	46.83	0.31	7.13	2.37
11	45.64	53.98	35.71	5.73	0.04	0.05	239.67	0.29	-6.48	-24.07

b) Data processing

The sample data are input into spss20.0 software, and it is concluded that the correlation matrix

of the following ten indicators. Standardize data, and the standardization of the data were analyzed by factor analysis. The findings are as follows:

Table 2 : common factor variance

	Initial	Extraction
Zscore(Main business profit margin)	1.000	0.972
Zscore(Cost rate)	1.000	0.974
Zscore(Total return in asset)	1.000	0.832
Zscore(Net assets yield)	1.000	0.976
Zscore(Property ratio)	1.000	0.975
Zscore(Assets liability ratio)	1.000	0.959
Zscore(Inventory turnover rate)	1.000	0.813
Zscore(Fixed asset turnover)	1.000	0.871
Zscore(Main business revenue growth rate)	1.000	0.877
Zscore(Net profit growth rate)	1.000	0.974

According to the variables common degree table 2, we can get that values of variable degree are relatively high, which reflects that most information on

variables were extracted by the factor, and variable and common factors are closely related, so factor analysis result is effective.

Table 3 : spherical test results

KMO metric	0.831
Bartlett spherical degree test	96.847
df	45
sig.	0.000

According to the table 5-3, P-value is 0.000, correlation between the data. Factor analysis can be carried out. which is lower than 0.05, so the original hypothesis H_0 is rejected. This result indicates that there is a certain

Table 4 : factor contribution rate

Component	Initial eigenvalue			Extraction of squares and loading			Rotating square and loading		
	Total	Variance %	Cumulative %	Total	Variance %	Cumulative %	Total	Variance %	Cumulative %
1	5.008	50.079	50.079	5.008	50.079	50.079	2.898	28.894	28.894
2	2.081	20.814	70.893	2.081	20.814	70.893	2.555	25.550	54.534
3	1.379	13.789	84.662	1.379	13.789	84.662	2.000	19.995	74.529
4	0.755	7.549	92.231	0.755	7.549	92.231	1.770	17.701	92.231
5	0.370	3.702	95.932						
6	0.286	2.858	98.790						
7	0.075	0.752	99.543						
8	0.025	0.253	99.795						
9	0.019	0.190	99.895						
10	0.001	0.0215	100.00						

Extraction method: principal components analysis

According to the principle that cumulative contribution rate should be more than 80%, we can see that the first four public factor of sample variance cumulatively explained to 92.231% from the factor analysis results table 5-4. The first four public factor can reflect more than 90% information volume of the original indexes, indicating that most information of variables has been extracted by first four common factors. Factor analysis result is effective.

Table 5 : Initial component matrix

	Component			
	F_1	F_2	F_3	F_4
Zscore(Main business profit margin)	0.718	-0.452	0.498	0.065
Zscore(Cost rate)	0.833	-0.249	0.484	0.045
Zscore(Total return in asset)	0.856	0.100	-0.160	-0.250
Zscore(Net assets yield)	0.438	0.608	0.644	-0.006
Zscore(Property ratio)	0.777	0.458	-0.118	0.384
Zscore(Assets liability ratio)	0.848	0.180	-0.249	0.382
Zscore(Inventory turnover rate)	0.650	-0.534	-0.384	-0.154
Zscore(Fixed asset turnover)	-0.111	0.910	-0.141	-0.105
Zscore(Main business revenue growth rate)	-0.667	-0.272	-0.015	0.598
Zscore(Net profit growth rate)	-0.830	0.078	0.529	0.002

Extracting method: principal component Four main ingredients have been extracted

From the table 5, we can see the relationship of the initial factor load structure is not very clear and the load values of the 4 factors are not very different. It is not easy to explain the factor. In order to achieve the purpose of simplifying the structure, this paper is to rotate the load factor, so the variables have a higher load in some factors and in the rest of the factor only

have a small to medium load, which makes the public factor classification and interpretation becomes easier. In this paper, the orthogonal rotation of the factor load matrix is carried out by using the maximum of variance method (i.e. Varimax method), and the factor load matrix of the rotation is as table 6.

Table 6 : Rotating factor load matrix

	Component			
	F_1	F_2	F_3	F_4
Zscore(Main business profit margin)	0.205	0.935	0.196	0.137
Zscore(Cost rate)	0.320	0.840	0.295	0.279
Zscore(Total return in asset)	0.533	0.237	0.237	0.051
Zscore(Net assets yield)	0.184	0.163	0.163	0.932
Zscore(Property ratio)	0.904	0.054	0.054	0.352
Zscore(Assets liability ratio)	0.934	0.201	0.201	0.075
Zscore(Inventory turnover rate)	0.336	0.501	0.501	-0.496
Zscore(Fixed asset turnover)	0.155	-0.750	-0.750	0.508
Zscore(Mainbusiness revenue growth rate)	-0.182	-0.087	-0.087	-0.251
Zscore(Net profit growth rate)	-0.758	-0.167	-0.167	0.324
Extracting method: principal component Rotation method: orthogonal rotation method with Kaiser standardization The rotation is convergent after 5 iterations.				

The coefficients in table 6 are loads of rotated factors, which indicates the correlation coefficient between the variables and the factor. The linear relationship between each factor and the original index was fully displayed in table 6. It is clearly seen that rotated factor loads matrix structure is clearer, and the meaning of each common factor is clearer. Specific meaning are as follows:

The first common factor F_1 represents the logistics enterprise debt paying ability. From table 6 we can see that values of factor load of the assets and liabilities rate and equity ratio index are largest, and these two are related to the solvency of enterprises. So F_1 is called its solvency factor. It contributes to the overall variance rate for 28.894%.

The second common factor F_2 represents the profitability of logistics enterprises. Due to large load factor value of main business profit rate and cost rate index, and the two indicators link up with corporate profitability, it can be called profit factor. Its contribution to overall variance rate is 25.550%.

The third public factor F_3 represents the growth potential of logistics enterprises. Because factor loading

value in the main business income growth rate and net profit growth rate index is relatively large, the two are related to enterprise growth potential, so it can be called growth factors. The contribution to the overall variance offer rate is 19.995%.

The forth public factor F_4 represents the enterprise operating capacity. Although net rate of capital return accounts for a relatively high proportion, inventory turnover rate and fixed asset turnover rate index occupies the main position, and these two reflect the logistics enterprise operation ability, so the factor can be called Camp transport capacity factor. The contribution to the overall variance offer rate is 17.701%.

Through the analysis of 2013 financial data of 11 listed companies, we can draw the conclusion that the financial indicators of logistics enterprises can be divided into profitability factor, operating capacity factor, debt capacity factor and potential factor four factor. Next, this paper will use the unified factor score relationship to analysis the weaknesses each enterprise should improve and the advantages continue to maintain.

Comprehensive analysis of treatment results Because we has used the multi data to obtain the financial index correlation factor score:

$$F_{\text{财务}} = 0.61F_1 + 0.154F_2 + 0.099F_3 + 0.136F_4$$

Debt service factor F1 score column:

$$F_1 = 0.124X_1 + 0.186X_2 + 0.489X_3 + 0.288X_4 + 0.967X_5 + 0.952X_6 + 0.09X_7 + 0.013X_8 - 0.13X_9 + 0.002X_{10}$$

Debt service factor F2 score column:

$$F_2 = 0.898X_1 + 0.896X_2 + 0.654X_3 + 0.533X_4 + 0.179X_5 + 0.194X_6 + 0.146X_7 - 0.423X_8 - 0.156X_9 + 0.255X_{10}$$

Debt service factor F3 score column:

$$F_3 = -0.011X_1 + 0.12X_2 - 0.064X_3 + 0.681X_4 - 0.001X_5 - 0.018X_6 - 0.046X_7 - 0.615X_8 + 0.726X_9 + 0.854X_{10}$$

Debt service factor F4 score column:

$$F_4 = 0.209X_1 + 0.005X_2 - 0.223X_3 + 0.008X_4 + 0.029X_5 + 0.132X_6 + 0.936X_7 + 0.457X_8 - 0.085X_9 + 0.005X_{10}$$

Table 7 : According to the factor score and the annual index data of the enterprise, the Excel is used to sort the factor scores, as

Logistics enterprise	F_1	R	F_2	R	F_3	R	F_4	R	CS	R
Winbase	57.26	1	145.51	1	-28.51	11	229.22	1	88.04	1
Chiwan	43.21	2	140.83	2	16.04	5	229.24	3	57.69	3
Lianyungang	26.73	3	65.51	5	2.42	10	46.22	2	37.66	2
Yingkou Port	25.34	5	74.73	4	9.54	7	73.02	4	35.17	4
Port Group	25.81	4	84.89	3	15.63	6	45.73	8	32.81	8
Tianjin Port	19.30	7	50.46	6	27.94	3	10.18	5	27.42	5
Jinzhou Port	8.47	10	47.26	7	61.53	1	31.80	6	22.62	6
Delivery of Shares	17.94	8	39.71	9	25.27	4	27.49	9	21.08	9
Logistics	20.45	6	45.54	8	3.17	9	5.76	11	20.69	11
COSCO Shipping	14.18	9	23.33	11	7.75	8	0.37	7	16.03	7
Wuzhou Communications	7.29	11	29.10	10	36.10	2	17.92	10	13.23	10

R : Ranking

CR : Comprehensive ranking

CS : Comprehensive score

From table 5-7 we can see Winbase's comprehensive performance status is the best. All aspects of strength is very strong for the reason that in the ranking of F1, F2 and F4 are located on the first,. Despite the growth factor is at a disadvantage, due to the low proportion of growth factors in comprehensive performance, so it ranked the first position. Therefore, Winbase should focus more on how to improve the development potential of the enterprise in the future.

Various aspects ability of Shenzhen Chiwan is relatively balanced. The reason is that it has a higher solvency and profitability and the ranking of the enterprise in the four factors is on the comparison and close, so among the second. This shows that it is a

comprehensive development oriented enterprises. If it can be more excellent in all aspects of business management, corporate performance can get a further breakthrough.

Lianyungang shows strong earnings and operating ability for the reason that it received high marks in the common factor F1 and F4. Score in the other two common factors belong to medium or lower. But due to earnings factor and operating factor in comprehensive score occupy a high proportion, Lianyungang achieved the third place. It should put more attention in the ability of the growth in the future development.

Yingkou port and Port group are in a medium level in all aspects, so their rankings are in the position of fourth and fifth. This paper suggests that it should learn essence from enterprise with better performance in the business process in the future, carry forward the strengths and make up for weaknesses.

Tianjin port has good growth potential compared to the other factors. Despite its common factor F3 ranked near the top, the scores of the other three public factors are in the middle position, so its comprehensive ranking is in the sixth. Tianjin port also needs to continue to improve the profitability, debt service and operational capabilities.

Jinzhou port showed strong growth potential rather than other enterprises, and its score in the common factor F3 ranked the first, which showed it had very good potential for development. Secondly scores in F2 and F4 ranked in the middle position, which shows the profit ability and operation ability still need to be improved. While the profitability ranked the bottom second, the problem to be solved is earning problem. The enterprise should focus on business earnings level of business next year.

Eighth to tenth of the logistics companies, ranking in the four factors are relatively lower, so the overall ranking is also lower. So, The delivery of shares, Logistics and COSCO Shipping should find the reasons for the decline of comprehensive ability, and improve them.

Wuzhou traffic's performance is somewhat lacking. It performed relatively worse in terms of profitability, solvency and operating capacity that most of them ranked in the countdown to the first or the second, although it is in the second position on the development potential. Potential accounts for less proportion in comprehensive performance evaluation of development, therefore, comprehensive performance ranking is still in the last one. So simply according to 2013 financial situation, Wuzhou traffic lacks of competitive advantage compared with other logistics enterprises. Compared to other logistics enterprises, regardless of the overall strength or ability of each dimension, it still has far gap, so Wuzhou communications should make efforts in many aspects or find their own areas of strength, to strengthen the breakthrough, and then drive the business forward.

III. SUMMARY

The research and analysis above showed that the performance evaluation index system of the logistics enterprise is feasible and available. So we can evaluate the financial performance of logistics enterprises from four perspectives, that is, profitability, debt service ability, growth ability and operation ability. In these four skills, leading role are mainly the profitability dimension and solvency dimensions, for their size determining the survival ability of logistics enterprises, and they are

symbols of the lifeline of the logistics enterprises. The contribution to the system in the rate is 49.195%. Growth and operating ability contribution rate are in general in comparison, which only accounted for 1/3 of the overall, but in logistics enterprise financial performance is also one of the most important factors, which operation ability reflected in the overall strength of the enterprise logistics management and growth ability reflects the potential of logistics enterprises and the future value may bring, and it has an important significance on the company's future development. Therefore, in the process of financial evaluation of logistics enterprise performance, it should comprehensively and accurately evaluate four levels of ability, and strive to do the evaluation results comprehensively and effectively to reflect the enterprise management status.

IV. ACKNOWLEDGEMENTS

This paper is supported by the Funding Project for Technology Key Project of Municipal Education Commission of Beijing (ID: TSJHG201310037036);

Funding Project for Beijing key laboratory of intelligent logistics system (No.BZ0211) ;

Funding Project for Construction of Innovative Teams and Teacher Career Development for Universities and Colleges Under Beijing Municipality (ID: IDHT20130517);

Funding Project for Beijing philosophy and social science research base specially commissioned project planning (ID: 13JDJGD013); Funding Project for Beijing philosophy and social sciences planning project "Statistical measure and quantitative studies on the development of green logistics in Beijing "(13JGC078);

Funding Project for University Cultivation Fund Project of 2014-Research on Congestion Model and algorithm of picking system in distribution center (0541502703);

Funding Project for Beijing Wuzi University, Yunhe scholars program(00610303/007);

Funding Project for Beijing Wuzi University, Management science and engineering Professional group of construction projects.(No.PXM2015_014214_000039);

Funding Project for the project of National Natural Science Fund, Logistics distribution of artificial order picking random process model analysis and research(Project number: 71371033);

Funding Project for intelligent logistics system Beijing Key Laboratory (No.BZ0211);

Funding Project for scientific-research bases--- Science & Technology Innovation Platform---Modern logistics information and control technology research (Project number: PXM2015_014214_000001).

REFERENCE RÉFÉRENCES REFERENCIAS

1. Hofman. Supply Chain Finance: some conceptual insights [J].Logistic Management, 2005:203-214.
2. Bergera & Udell. A more complete conceptual framework for SME finances [J]. Journal of Banking and Finance, 2006.
3. Han-Christian, Pfohl, Moritz Gomm. Supply Chain Finance: Optimizing Financial Flows in Supply Chains[J].Logistic research,2009(1).
4. F.Mathis, J. Cavina to. Finance the Global Supply Chain: Growing Need for Management Action [J]. Thunderbird International Business, 2010(6).
5. Erik hofman. Inventory financing in supply chains-A logistics service provider approach [J]. International Journal Of Physical Distribution & Logistics Manangement, 2009(9):39
6. R. seifert. Financing the Chain [J]. International Commerce Review, 2011(1).
7. Aberdeen Group. Supply Chain Finance Benchmark Report[R].2006



This page is intentionally left blank

