Journal of Applied Sciences

ISSN 1812-5654

science alert

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Comparative Analysis on the Logistics Enterprises Efficiency Evaluation

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Abstract: The efficiency evaluation plays a fundamental role in improving the efficiency of logistics enterprises. The amount of performance assessment is larger than the evaluation of logistics efficiency in logistics enterprises. Through the existing literature, it will be analyzed in two aspects: evaluation objects and methods. The results showed that it is inadequate on the influencing factors and the establishment of the efficiency evaluation index system and empirical testing is deficiency.

Key words: Logistics enterprises, current situation of efficiency evaluation, characteristics, limitations

INTRODUCTION

Currently, with the rapid development of the logistics industry, the accumulated contradictions become increasingly prominent; the overall efficiency of logistics enterprises is not high. It becomes the important bottlenecks which hinder the progress of China’s logistics industry. According to the “Chinese logistics market research report” made by China Warehousing Association in the year 2000-2005, the average utilization rate of warehouse is 83.64% while the railway lines just 59%. The proportion of average expenditures on logistics is 1 times higher in GDP in China than in America (Fig. 1). Consequently, in order to further improve the efficiency of logistics enterprises, scholars have conducted extensive research. The evaluation of the efficiency of logistics enterprises plays a basic role to improve the efficiency of logistics enterprises. This article will make a comparative analysis on the research from both China and foreign countries and summarize from two aspects: Evaluation object, evaluation method, then, find out the inadequacies.

STATUS OF LOGISTICS ENTERPRISE EFFICIENCY EVALUATION

The literature on the efficiency evaluation of logistics enterprise covering a total factor productivity, scale efficiency, technical efficiency, cost efficiency from the evaluation subject, contenting in the DEA (data envelopment analysis) and SFA (stochastic frontier approach) from the evaluation method.

Evaluation objects: According to the evaluation objects which related to scale efficiency, cost efficiency, technical efficiency, total factor productivity. This mainly reflected in the static and dynamic measure of the efficiency of logistics.

In the static measure of the efficiency of logistics, Li and Li (2011) use the one phase DEA evaluate the overall efficiency of 52 listed logistics enterprises in 2008 firstly, then, based on the value chain model, dividing the logistics enterprises production process into output-profit stages and investigate the causes of the technical efficiency of logistics enterprises from the perspective of output and profitability. The results showed that low profitability is the main bottleneck for the development of logistics enterprises. Some scholars expand the level of the efficiency of logistics enterprises innovatively. Kuang (2007) selected scientific port public companies cost efficiency appraisal index system and set up the appraisal.

![Fig. 1: Proportion of Social logistics to GDP (2004-2010)](image-url)

In the aspect of dynamic measure of the efficiency of logistics, in order to evaluating the efficiency of logistics listed enterprises on the continuing nature of the dynamic analysis of trends in its efficiency, Zhang and Meng (2010) used Super-Efficiency DEA model on China’s listed logistics companies for Total Factor Productivity (TFP) and the efficiency of continuous and ongoing empirical analysis. It showed that the size of the logistics enterprises in the pursuit of expansion at the same time to increase the technical inputs. Wang et al. (2008) adopted the approach of Malmquist DEA to evaluate the productivity of the whole transportation sector and four sub-sectors over the period 1980-2005 in China. Jing (2011) selected four input indices and two output indices to study the total factor productivity index and its decomposition of 22 listed companies in China’s logistics (transport and port) industry from 2005-2009 by the method of based-DEA Malmquist productivity index. Lei and Wu (2012) made an empirical study of TFP growth, difference and change of Anhui Province’s logistics industry with panel data of 17 cities between 2003 and 2010 by DEA-Malmquist index approach.

From the previous studies, it focused on TFP, scale efficiency, technical efficiency and cost efficiency. However, there are still some defects (Table 1).

Although, most of the literature studies have concentrated in these aspects, the results are not the same. Taking into account the availability of data, most of the studies are for listed companies, although the year interval for studies is different, the changes on the overall efficiency are the same. Moreover, the conclusion about the efficiency of various types of logistics enterprises is inconsistent. Wang and Xu (2009) and Jing and Zhou (2012) believed that the overall technical efficiency transport of listed Logistics Company’s is greater than the Port companies while scholar’s (Zhong, 2011) research showed that integrated technology of warehousing enterprises have the maximum efficiency. Besides, most scholars believe that there have a significant positive correlation between the scale and efficiency of logistics enterprises, but, scholar (Deng et al., 2009) demonstrated that there is no necessary connection between the scale and productivity of logistics companies, pure technology efficiency of logistics company has a greater effect on efficiency than scale efficiency and improvement of technology is more important than expansion of scale in the logistics companies. Thus, even for the same problem, different evaluation methods also get different results.

**Evaluation method:** The results of the logistics efficiency evaluation is the foundation to improve the logistics behavior and the yardstick of post-evaluation of logistic decision, the evaluation method used directly affects the accuracy of the results.

The measurement method for productivity involves two clusters: One is a parametric method which includes econometric approach and stochastic frontier, the other is non-parametric methods containing date envelopment analysis and index-number methods. Currently, the study about the logistics enterprises production efficiency also uses these two methods.


<table>
<thead>
<tr>
<th>Study object</th>
<th>Main conclusions</th>
<th>References</th>
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</thead>
<tbody>
<tr>
<td>Cost efficiency, pure technical efficiency</td>
<td>Cost-effectiveness of the listed logistics company in China is very low, some multi-period in the cost of cutting-edge surface while the individual companies away from that. Efficiency value of transport logistics is higher than that of port listed companies in technical efficiency, pure technical efficiency and scale efficiency.</td>
<td>Zhang and Meng (2010)</td>
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<td>Technical efficiency, scale efficiency</td>
<td>Overall technical efficiency is low and declining, the efficiency of transport companies is greater than the Port. The technical efficiency is affected not only by regional economic factors, but closely related with their own management level.</td>
<td>Wang and Xu (2009)</td>
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<td>Technical efficiency</td>
<td>There is a significant correlation between logistics enterprises size and efficiency; different types of logistics enterprises have different efficiency.</td>
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<td>Total factor productivity</td>
<td>Empirical studies indicated the present efficiency of China’s listed logistics enterprises was low, the contribution of technical progress is greater than the scale efficiency. So it’s time to increase the technical inputs when pursuing of scale expansion.</td>
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stochastic frontier production function to measure the efficiency of China's logistics industry and analyze the main factors. Gang and Nan (2011), who based on the panel data of China's 29 regions during the period of 1991-2007, doing an empirical analysis on the disparity and the exogenous affecting factors of the technical efficiency of logistics industry is conducted by using a single-stage estimation procedure of the stochastic frontier production function.

Efficiency of logistics research with DEA is abundant. Min and Joo (2006) analyzed the efficiency of logistics enterprises in the United States with DEA model, discovered that logistics service network and company scope will affect the operational efficiency of enterprises to some extent. Kemeneyer and Murphy (2004) analyzed the impact of logistics efficiency from the customer's perspective. The results showed that user's trust, effective communication, customer satisfaction, the opportunity behavior, corporate reputation makes a significant impact on the productivity of logistics companies.

SUP-CCR-DEA has solved the problem that traditional DEA method could not differentiate the logistics companies since they have the same efficiency. Li and Ma (2012) introduced the concept of tolerance and proposes an amended J-K data envelopment analysis model and the results show that the modified model of DEA not only can overcome the absolute projection of traditional DEA model (All the indicators must be improved) but excluding the possibility of non-economic program which the J-K model provides (huge cost of input in exchange for a slight increment of output) by empirical analysis. Fan (2010) constructed homogenization efficiency analysis framework using three-stage DEA, compared with the actual operation of the logistics industry in efficiency of eight economic areas in 2008 under the same environment and random conditions.

In the field of logistics, performance evaluation is an extremely important element. So far, the mainstream quantitative performance evaluation methods are: Costing, Analytic Hierarchy Process (AHP), index tree method and DEA method. It is difficult to establish a comprehensive evaluation index system to evaluate the absolute performance because the factors affect the performance of logistics enterprises are large and with complex relationship. The judgment matrix structure of AHP is subjective which rely on the subjective experience of experts. Furthermore, principal component analysis method which can eliminate the correlation between the impact evaluations, but still can not avoid the influence of subjective factors. Although, the measurement of the efficiency of logistics enterprises focused on DEA and SFA methods, the merits of the two methods has not yet formed consistent conclusion, selecting the appropriate method is very important in order to ensuring the reliability of the evaluation results.

CHARACTERISTICS AND LIMITATIONS

Research characteristics: Although, the evaluation of the object is abundant, the evaluation results are inconsistent. It mainly focused on the measure of scale efficiency, technical efficiency, cost efficiency and total factor productivity in the logistics industry, making up purely from the financial aspect of logistics performance evaluation. It enriched the content of the performance evaluation from the perspective of logistics efficiency. However, it showed that there exist inconsistent in various types of logistics enterprises efficiency and the relations of logistics enterprise scale and efficiency which needs further study.

Evaluation method is intent. The evaluation methods of the efficiency of logistics centralized on DEA and SFA in foreign studies while it largely uses DEA and its improvement methods among Chinese researchers. We can see that the research methods also tend to improve gradually. In addition, it focuses on the improvement and innovation of evaluation methods in the evaluation of logistics efficiency in recent years, from "specific evaluation methods and practical application case" to making the evaluation methods rise to general work.

Research limitations: The influence factors about the efficiency of logistics enterprises are inadequate. Although, various methods can evaluate the trends of the efficiency of logistics enterprises in a period, but, most limited to the evaluation of the results. Few scholars continue to exploring its influencing factors. Only by evaluating and finding out the influence factors can it contribute to logistics companies adjust operating policies and truly improve logistics efficiency.

Lack of setting up the efficiency evaluation index system and doing empirical test: From the literature, the study using the internal indicators to set up the efficiency evaluation index system from the logistics enterprises is lack. It will be more comprehensive to use index system than model for the assessment. Meanwhile, there exist the following questions: Some indicators seem reasonable, but it’s difficult to apply to actual operation because of the unavailable data. Moreover, some indicators have too much data which is inconvenience to operation.
CONCLUSION

There still hasn’t established a comprehensive evaluation index system for the logistics efficiency evaluation in the existing literature, meanwhile, the evaluation methods are limited to making evaluations on a period of time or current changes of the logistics enterprises. However, the evaluation isn’t ultimate purpose, it is important to find the key factors which affect the efficiency of logistics enterprises. So, it can be improved from the following aspects:

First of all, find out the key factors which affecting the efficiency of logistics. Identify innovation index, comprehensive index and system metrics which can resolve the essential features of the productivity of logistics enterprises by exploring the microscopic mechanism.

Moreover, set up a scientific evaluation index system. Following the combination of static and dynamic, systematic and unique principle, establish efficient evaluation index system.

At last, verify indicators. Apply the designed evaluation system to the actual operation and management of enterprises to be verified, making efficiency evaluation system more perfect. Furthermore, it contributes to the discovery of logistics enterprises redundant inputs, outputs shortage problems and finding improvement measures.

Therefore, how to find the impact affects of input-output efficiency is important, establishing the corresponding evaluation index system is the next to do.

REFERENCES


