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How Efficient are Malaysian Shipping Companies: A Stochastic Frontier Approach with Malmquist Productivity Indices

S Venkadasalam, R Balaji

Malayasian Maritime Academy, Melaka, Malyasia

✉ *: v.saravanan@alam.edu.my*

Abstract

The purpose of this paper is to analyse the performance of the Malaysian Shipping Companies. The company's performance indicators such as technical efficiency and total factor productivity (TFP)have been measured using the stochastic frontier approach and subsequent Malmquist index. A secondary data for selected shipping and transportation service provider's annual reports for the past five years were analysed using Frontier 4.1 and Data Envelopment Analysis Program (DEAP)software. It was found that 80% of the shipping companies were operating below the frontier line (<1.0). The findings are expected to contribute significantly to the business progress and performance metrics of Malaysian companies and also help to benchmark the shipping industry's best practices.

Keywords: *Stochastic Frontier Approach, Total Factor Productivity, Malmquist index, Data Envelopment Analysis,Shipping companies.*

Introduction

Sea transportation is still the preferred mode for transporting billions of tonnes of goods. United Nation Conference on Trade and Development (UNCTAD) reports a steady increase in global trades by sea transportation every year. In the year 2014, about 40% of the world total goods loaded were from the Asian nations[1]. Similarly, 60% of the world total goods unloaded were in Asia region. Its shows a dynamic, strong economic development in the Asia region.

In Malaysia, international trades significantly contributed to the economy to make it the third largest nation in South East Asia controlling the trades through the Straits of Malacca. On an average, MYR 100 million monthly traded externally in Malaysia[2]. With its strategical central location between East and West Asia trade routes, shipping companies in Malaysia were presumed to perform better within this region. But, a recent study on Malaysian Shipping Companies shows most of the shipping companies were facing a financial distress condition[3]. If this condition continues, bankruptcy of the companies would become unavoidable.

Monitoring and evaluating the company's performance is important to identify the best practices in the industry [4].It not only helps to understand their competitive position, but also would help to strategize the long term policies [5]. In the literature review, the efficiency analysis of shipping companies were insufficient or can be considered as absent. The current literature

mainly focuses either on the port management or a component of the international trades such as container liner, container terminal, etc. This study will further enrich the existing literature by evaluating the Malaysian shipping companies' efficiencies and measure their total factor productivities. Based on the outcome, a benchmarking was also carried out for the companies.

Methodology

In the year 2015, a total of 14 shipping companies were listed on the Kuala Lumpur Stock Exchange. Only five companies were trading in international trade zone. Others were providing services to oil and gas sector locally and internationally. To obtain a balance panel data, all these 14 companies' data, such as equity values, total current assets and total current liabilities of past three years were extracted from the company's annual reports and the profitability, liquidity and leverage ratios were computed. The analysis of performance was conducted in two stages.

Firstly, the Bayesian stochastic production frontier model was used to analyze the technical and cost efficiencies. This is a proven parametric analytical method for evaluating company's efficiency. The approach is feasible, even in complex problems and with small samples [6].Since the number of shipping companies in Malaysia were not many, the stochastic production frontier analysis model was adopted as a best tool to evaluate the performance. The data were analysed using the Frontier 4.1 software.

Secondly, the Malmquist total factor productivity analysis was conducted to measure the technical efficiency change, pure technical efficiency change, scale efficiency change and total factor productivity change. The means of three year efficiency scores were computed to rank the companies.

The initial study shows many companies were operating far from the frontier line. Total about 80% of the companies were inefficient and only 50 % were significantly positive total factor productivity change. The study also shows that many companies were operating far from the frontier line. Total about 80% of the companies were inefficient.

Table 1 shows the outcome of the non-parametric output oriented model's efficiency analysis using Data Envelopment Analysis Program (DEAP) version 2.1 developed by Tim Coelli for selected shipping companies in Malaysia. On average, shipping industry in Malaysia operates inefficiently.

Table 1 : Technical efficiency scores for selected shipping companies in Malaysia

	2008	2009	2010	2011	2012	2013
Global Carrier	1.000	1.000	1.000	1.000	1.000	1.000
MISC Bhd	0.013	0.005	0.004	0.004	0.005	0.005
PDZ	1.000	1.000	1.000	1.000	1.000	1.000
Maybulk	0.279	0.067	0.136	0.166	0.269	0.338
Habour link	0.600	0.538	0.435	0.394	0.446	0.469
Hubline	0.294	0.229	0.174	0.201	0.173	0.220
Perisai	0.509	0.474	0.423	0.250	0.191	0.134
Tanjong	0.440	0.324	0.250	0.309	0.602	0.770
Alam Maritime	0.306	0.228	0.205	0.223	0.173	0.164
Sealink	1.000	0.266	0.226	0.242	0.242	0.224
Overall	0.367	0.228	0.214	0.216	0.234	0.241

Conclusion

Two hypotheses can be tested in this study. Firstly, there was no efficiency variation between the shipping companies operated in Malaysia. Thus, all shipping companies were operating at the same production frontier. Secondly, there was no productivity change variation between the shipping companies in Malaysia. The null hypothesis was that the shipping companies have the same total factor productivity change. This research may be used to benchmark all shipping companies in Malaysia.

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