Operational Efficiency Evaluation of Airports in Taiwan Using Data Envelopment Analysis

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ABSTRACT

Facing the competition from road traffic and recently, high speed rail, together with the soaring fuel price, airline companies in Taiwan have reduced flight frequency in order to lower costs. As a result, flight movements, numbers of passengers, and volume of cargo at the airports in Taiwan are dropping in recent years. Costs to construct and maintain airports are high. The government has been working hard in order to improve the operational efficiency of resources for the benefit of overall development.

This study applies Data Envelopment Analysis (DEA) technique to evaluate the operational efficiency of the airports in Taiwan. Data of the eighteen airports in Taiwan were collected, including five inputs, four intermediate products and three outputs. The five inputs are runway length, runway width, apron area, passenger terminal area and cargo terminal area. The four intermediate products include flight movement capacity, numbers of apron, passenger transport capacity and cargo transport capacity. The three outputs are numbers of flights, number of passengers and volume of cargo. Two-stage Data Envelopment Analysis is applied to evaluate the efficiency of each airport. In addition, using hypotheses testing, how airport grade, functional classification and location affect operational efficiency of the airports is examined.

It is shown that functional classification and grade of the airports do not affect airport performance. As for the testing with regard to location, the scale efficiency exhibits significant difference in both the single-stage DEA and the second stage of the two-stage DEA. It shows a considerable gap in efficiency between the airports in the main island and those in the off-shore islands.

Keyword: Airport Operational Efficiency   Data Envelopment Analysis