Journal of Air Transport Management 52 (2016) 80–89

Contents lists available at ScienceDirect

Journal of Air Transport Management

journal homepage: www.elsevier.com/locate/jairtraman

Airport performance in a tourism receiving country: Evidence from Greece

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ARTICLE INFO

Article history:
Received 29 June 2015
Received in revised form
19 December 2015
Accepted 29 December 2015
Available online 11 January 2016

Keywords:
Greek airports
Airport performance
Tourism
DEA
Bootstrap
Tobit regression

ABSTRACT

The aim of this study is to estimate the performance of 38 Greek airports. The analysis is performed in two stages. Firstly, efficiency scores for each airport are estimated using Data Envelopment Analysis (DEA) original and bootstrap techniques. Secondly, statistical assessments (Mann–Whitney U and Kruskal–Wallis tests) and a censored Tobit regression model are employed to identify which factors significantly explain variations in the airport efficiency. The results indicated the scope for substantial efficiency improvements. In addition, island location, connectivity, and hotel infrastructure in the area were found to be significant factors affecting airport efficiency.

1. Introduction

Greece is the southeastern gate of Europe, with 5000 years of cultural history. It constitutes a world tourism destination. The country's geomorphology includes about 1400 islands, of which about 227 are inhabited and vary greatly in size, population and development. As a result, air transport plays a crucial role both in the social coherence, and the economy, of the country. In fact, Greece has a large number of civil aviation airports—38 in operation—relative to its population of 10.8 million (Hellenic Statistical Authority, 2014). All Greek airports until now (October 2015) are state owned and centrally controlled and managed. However, 14 out of a total of 38 Greek airports have been selected by the Greek government to be privatized. The official process was initialized on April 1st 2013 with the call for interest by the Hellenic Republic Asset Development Fund – HRADF (2013a,b). The aim is to attract private capital and investment that will fund infrastructure and development in selected Greek airports, as this cannot be financed otherwise given the current financial state of the country. Along with the financial aims, privatization is expected to contribute to tourism development, connectivity and employment. The privatization process is in its final stage (HRADF, 2015).

In recent years, the number of visitors to Greece has climbed significantly, exceeding the country's population. In 2011 visitor numbers reached 16.4 million, of which 71% arrived by air (Bank of Greece, 2015). Greece is a tourism receiving country with very high seasonality that poses a great burden on investment planning, infrastructure, and operations in the tourism and hospitality industry, as well as the transport sectors. The increase of incoming tourism in recent years has resulted in a constantly increasing demand for aviation. Infrastructure development has become a necessity for Greek airports, along with the acute need for further investment.

The content of this paper is organized as follows: This introduction includes the description of the country and its particular characteristics relating to air transport and tourism. Section 2 presents a review of the relevant literature on airport performance. Section 3 describes the methodology. Section 4 presents and discusses the data used and the reasoning behind the data selection. The empirical results derived from the methodology are documented in Section 5. The conclusions are presented in Section 6.

2. Airport performance

There has been growing recognition amongst airport operators, and other organizations involved with the airport industry, of the value of continuous performance appraisal and the use of benchmarking. Airports along with regulators use benchmarking in their

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http://dx.doi.org/10.1016/j.jairtraman.2015.12.010
0969-6997/

policy for setting user charges. Investors and bankers that are interested in airport privatization use benchmarking techniques to identify possible business opportunities. As a result, various studies have utilized a variety of techniques for airport benchmarking (Graham, 2005).

Data Envelopment Analysis (DEA) has been employed in various studies in order to analyze the efficiency of numerous airports around the world. DEA is a non-parametric technique which uses linear programming to fit a frontier based on best practices. It is by far the most popular method in airport benchmarking. Some of the studies using this approach for estimating the efficiency of airports include Sarkis (2000), Martin and Roman (2001), Fernandes and Pacheco (2002), Barros and Dieke (2007), Psaraki-Kalouptsidi and Kalakou (2011), Adler et al. (2013) and Wanke (2012). For example, Sarkis (2000) used DEA to evaluate the operational efficiencies of 44 major US airports, observing that airlines tend to favor more efficient airports. Factors such as the airport being the hub of a major air carrier, the airport being part of multiple airport system or single airport system, and the environment (snowbelt or not), were examined for affecting airport efficiency. The first and third factors were found to affect airport efficiency significantly.

Martin and Roman (2001) used DEA to measure the efficiency of 37 Spanish airports and to extract some policy considerations prior to privatization. Fernandes and Pacheco (2002) used DEA to analyze the capacity of 35 domestic Brazilian airports in order to monitor which of them were efficient in terms of passenger processing and use of airport resources. Barros and Dieke (2007) analyzed the financial and operational performance of Italian airports with panel data for 2001–2003, examining the relative roles of dimension, managerial status, and workload unit (WLU) in determining the proximity of airports to the frontier of best practices. The findings indicated that totally private airports, and those with higher WLUs, had higher efficiency scores.

Psaraki-Kalouptsidi and Kalakou (2011) used DEA to assess the efficiency of Greek airports for the period 2004–2007, first by evaluating airside and landside infrastructure to serve passengers and aircraft, and then by analyzing economic efficiency. The total number of passengers and aircraft movements was selected as outputs. The inputs included the total area of the passenger building, ground floor area, departures area, arrivals area, check-in area and employees. The airside operations were found to be more efficient on average than landside operations and airports with more aircraft and passenger movements were found to be more efficient.

Adler et al. (2013) studied the efficiency of 43 European airports for a period of 10 years using network DEA that described the production process, demonstrating the sequential effects separating final and intermediate outputs including those under partial management control. Their approach connected aeronautical and commercial activities via intermediate products. The network model defined a multiproduct airport in which labor, capital, materials and outsourcing of services produce traffic volume (passengers, cargo and aircraft movements). Following this revenues from aeronautical charges and from commercial terminal-side services to passengers were generated. The role of third parties providing part of those services and the role of management controlling all the above were also considered in the network DEA model. The results provided benchmarks with comparable peer units and target values that were achievable in the medium term for each airport. Wanke (2012) presented a benchmark and efficiency analysis of 63 major Brazilian airports, using cross sectional data for 2009. Starting with the bootstrapping methodology (see Simar and Wilson, 1998) several DEA estimates were generated.

In the present study a standard two-stage approach is applied. This process has been used by a number of researchers including Barros (2008), Chi-Lok and Zhang (2009), Curi et al. (2010), Tsekeris (2011), Gitto and Mancuso (2012), Chang et al. (2013), Ha et al. (2013), Coto-Millan et al. (2014) and Merkert and Mangia (2014). For example, Barros (2008) examined the technical efficiency of airports in Argentina for a five year period of severe economic crisis. The findings showed that major airports remained efficient during the crisis period and the hub status positively contributed to efficiency. Chi-Lok and Zhang (2009) studied the productivity level and its growth for 25 sample Chinese airports, investigating the effects of competition and China's aviation policy reform, including the airport localization program, listed airports on the stock markets, the intensity of competition and other airport characteristics. After controlling for hub status and other airport characteristics such as the local economy, coastal city, tourist city, population and event variables, airline mergers and open skies agreements, and new airport openings, the results showed that efficiency of localized airports, and those facing higher competition, was significantly higher than those of their counterparts. Also the airport localization program was positively correlated with airport efficiency and technical progress.

Curi et al. (2010) studied the impact of Italian Government actions on airport efficiency during the period 2001–2003, which marked the beginning of a new airport management philosophy in Italy. The study was based on 36 major Italian airports. The Government actions included privatization, modification of the concession agreements, the enlargement of the services provided directly by the airport management companies and the creation of two hubs. The analysis showed that there was considerable room for improving technical efficiency. The airports with a majority public holding were on average more efficient, while the presence of two hubs negatively affected efficiency. Tsekeris (2011) evaluated the performance of Greek airports, considering their relative technical efficiencies using cross sectional data for 2007. Determining factors included seasonality, island location, size, access in terms of the distance between airport and the nearest city and civil/military use of airport. His analysis showed that most airports show increasing returns to scale and that for the summer period the overall technical and scale efficiency improved compared with winter or total year results.

Gitto and Mancuso (2012) used a two stage procedure (DEA and truncated regressions) to evaluate the impact of regulatory reforms on the technical efficiency of 28 Italian airports during 2000–2006. Their analysis utilized two models, operations and monetary, to analyze the management's exploitation of aeronautical and non-aeronautical business. The results indicated that private capital inflows and “Total” concession agreements contribute to airport efficiency. Chang et al. (2013) used DEA to examine the technical efficiency of 41 Chinese airports for 2008 and then used regression with environmental factors to assess whether geographical characteristics and service strategies influence the performance of Chinese airports. Airports located in large cities, able to accommodate very large aircraft and those used by more airlines were more efficient. In addition the airport efficiency improved with the higher number of airlines using them, while distance from the local central business district did not significantly affect efficiency. Ha et al. (2013) investigated the impact of airline market structure on airport productivity based on a sample of eleven major airports in Northeast Asia, viewing airlines as downstream users of an airport. The impact of airline concentration on efficiency was studied controlling for factors such as airport governance structure, airport competition and user impacts (i.e. customer power, airline concentration). Strong airport competition led to higher airport efficiency, and the technical efficiency was negatively correlated with decentralization of airport ownership and operations. The analysis also showed an inverse U-shaped relationship between airport efficiency and downstream airline market concentration.