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## A comparative efficiency analysis of Spanish and Turkish airports



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## ABSTRACT

AENA in Spain and DHMI in Turkey operate a large majority of the airports in their respective countries. These two airport operators share some similar characteristics, but also present many differences with respect to their management strategies. For instance, the Turkish DHMI introduced a Build-Operate-Transfer (BOT) model and concession agreements, which enables active private participation in airport management. In contrast, management and operation responsibilities at all airports in Spain –with a few exceptions– have remained with AENA. This paper utilizes a data envelopment analysis (DEA) to compare the relative efficiency of airports within AENA and DHMI for the years between 2009 and 2011. Based on the efficiency scores, it further identifies the sources of inefficiencies resulting from various management strategies and other external factors. The results indicate higher average efficiency levels at Spanish airports, but private involvement enhances efficiency at Turkish airports. The majority of the airports in Spain and Turkey operate under increasing returns to scale. Certain policy options, including a higher private involvement and improvement of the airport network by closing some inefficient airports, should be considered in order to increase the airport efficiency in both countries.

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## 1. Introduction

Involvement of the private sector in airport ownership and management has increased continuously in the last two decades, but a significant amount of public control is still present around the world. Airport services are considered as public goods, hence the existence and financing of these services should be based on social and demographical considerations, rather than a pure profit orientation. Furthermore, small airports and airports with low international scope attract little interest from private companies, as their opportunities to create higher profit margins are limited. These factors explain the ongoing dominance of state involvement in airport management. One of the several options is operating the airports from a central perspective by an airport authority. Finavia (Finland), Hellenic Civil Aviation Authority (Greece), Avinor (Norway), PLL (Poland), ANA (Portugal), AENA (Spain), LfV Group (Sweden) and DHMI (Turkey) are the major airport operators in Europe (ACI Europe, 2010).<sup>1</sup>

Adler et al. (2013) find a significant negative effect on efficiency of belonging to an airport group and discuss the lack of incentives for cost minimization due to cross subsidies. Moreover, motivation

for commercial strategies to create additional revenues at group airports seems to be low in comparison to individual airports (Halpern and Pagliari, 2007). Spanish airports (Murillo-Melchor, 1999; Martin and Roman, 2001, 2006; Tapiador et al., 2008) have frequently been investigated with regard to efficiency, but only a limited amount of research has been conducted on Turkish airports (Kiyildi and Karasahin, 2006; Peker and Baki, 2009).<sup>2</sup> Moreover, smaller regional airports in both countries have generally been analyzed within samples composed of only domestic airports. Hence, expanding the sample to those countries with similar market characteristics would enhance the validity of efficiency results and deliver improved policy implications (Lozano and Gutierrez, 2011a; Ar, 2012).

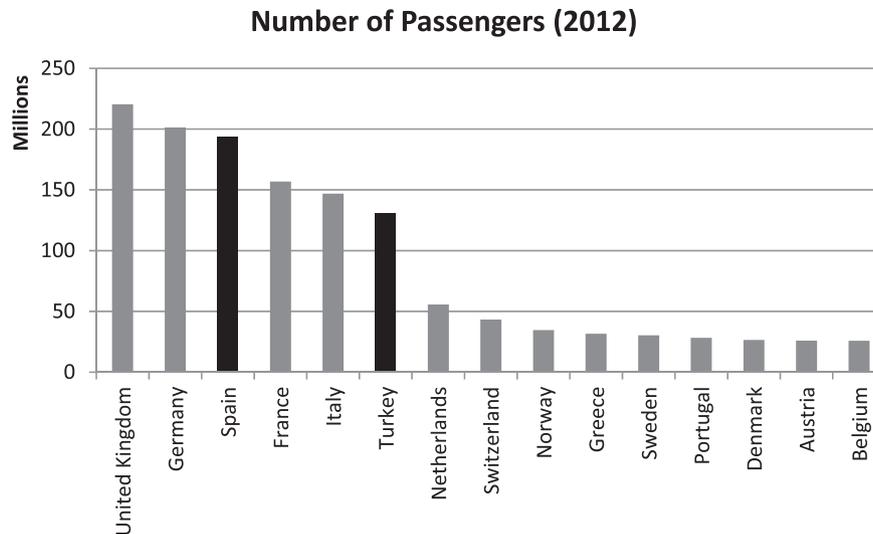
Similarities between Spain and Turkey in terms of the aviation industry motivate this comparative analysis of efficiency. First of all, the entire airport network<sup>3</sup> in these two countries and air navigation services are managed by a single state enterprise in their respective country. AENA (Aeropuertos Españoles y Navegación Aérea) in Spain and DHMI (Devlet Hava Meydanları İşletmesi) in Turkey are responsible for operating the airports as well as air navigation services. Second, both countries have a similar number

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<sup>1</sup> It should be noted though that there are differences regarding a complete coverage of airports in a country and whether these networks represent a corporatized organization or a civil body as a part of the administration.

<sup>2</sup> For a detailed overview and main findings of efficiency studies on Spanish and Turkish airports, see “Literature Review” section.

<sup>3</sup> There are only a few exceptions such as Lleida–Alguairé in Spain and Istanbul–Sabiha Gökçen in Turkey.



**Fig. 1.** Airport traffic in selected European countries, 2012.  
(Source: Own compilation by using data from CAA, ADV, AENA, DGAC, Assaeroporti, DHMI, Eurostat).

of commercial airports. AENA currently operates 46 airports and 2 heliports, and DHMI operates 52 airports.<sup>4</sup> Nevertheless, airport density in terms of both per capita and per thousand square meter is higher in Spain than in Turkey, because the former has a population and area of approximately 47 million and 500 thousand square meters respectively and the latter 76 million and 780 thousand square meters. Third, airports within both networks are subject to cross-subsidization, in which profits of financially sound airports cover the losses of non-profitable airports. Financial data for 2011 show that 19 airports in Spain and only 6 in Turkey were able to recover the operating costs and documented operational profits in terms of “earnings before interests, taxes, depreciation and amortization” (EBITDA). Fourth, the relative importance of both markets in Europe is worth mentioning. In 2012, Spain was the third largest air transport market in Europe in terms of airport passengers<sup>5</sup> following the United Kingdom and Germany. On the other hand, the demand for air traffic in Turkey presented an average of 26 percent annual increase since 2001, reaching 131 million airport passengers in 2012, making the country the sixth most important market in Europe. Fig. 1 shows the airport traffic in terms of number of passengers in Europe and Fig. 2 presents the annual development in Spain and Turkey between 2001 and 2012.

Despite the liberalization of the air transport sector in Turkey in 1983, which prepared the ground for market entry and the privatization process of various companies in the aviation value chain, the practical implementations were limited in the initial stages. Subsequently several re-regulations were applied, which had an influence, especially on the domestic market.<sup>6</sup> The removal of entry barriers in the domestic market in 2003 is one of the milestones in Turkish air transport history. In addition, tax advantages for airline companies were introduced and airport charges were reduced. As a result of the deregulation process, a number of private airlines introduced new domestic routes that broke up the monopoly of the flag carrier Turkish Airlines. This led to a substantial increase in the number of domestic passengers. Fig. 3 shows the development of air traffic in domestic and international markets following the deregulation in 2003. The privatization of Turkish Airlines in 2004,

and the strategy of focusing on transfer flights by using Istanbul-Atatürk airport as hub, boosted the international traffic. Moreover, an average annual 5% GDP growth in Turkey between 2003 and 2012 contributed to the increasing demand for air travel.

Another similarity between the two countries is with respect to the importance of tourism. Both countries attract a large number of tourists, especially in summer months, due to the good weather conditions as well as cultural and historical richness. Particularly in the Canary and Balearic islands in Spain and in the western and southern parts of Turkey, airports play a crucial role for international and domestic tourism by providing the necessary infrastructure. Seasonal variations at some airports show similarities and are investigated in detail in the following sections.<sup>7</sup>

Differences with regard to management strategies exist too. Although AENA and DHMI are both responsible for airport operations as well as air navigation services, AENA separated the airport business by establishing “AENA Aeropuertos S.A.” in June 2011 as a 100 percent subsidiary, whereas such a separation within DHMI does not exist. Another difference between AENA and DHMI can be observed in their international presence regarding airport management. While the former “participates directly or indirectly in the management of 15 more airports worldwide”,<sup>8</sup> the latter has only focused on the management of airports in the country. AENA’s international airport management activities are run by *Aena Desarrollo Internacional S.A.* that is active in countries including Mexico, Colombia, United Kingdom, United States, Bolivia,<sup>9</sup> Sweden, Cuba and Angola<sup>10</sup>. Although the financial status of *Aena Desarrollo Internacional S.A.* is independent of AENA Aeropuertos S.A., the latter potentially benefits from the international experience of the former in airport management and translates this experience into higher efficiency as far as the domestic business is concerned.

A main difference between the two airport systems is how they overcome the capacity problems at major airports. Even though airport privatization has been on the agenda of the government in Spain for a long time, AENA and AENA Aeropuertos have remained

<sup>4</sup> By September 2014.

<sup>5</sup> Spain served approximately 195 million passengers.

<sup>6</sup> For a detailed overview of regulations in aviation industry in Turkey, see [Gerede \(2010\)](#).

<sup>7</sup> See Fig. 7.

<sup>8</sup> <http://www.aena-aeropuertos.es/csee/Satellite/conocenos/es/Page/1237548071568/> last visited on 27.05.2014.

<sup>9</sup> In February 2013, the Bolivian government nationalized the three airports leaving AENA out of management.

<sup>10</sup> 2011 Annual Report, AENA.

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