



Spatial analysis of the competitiveness of the high-speed train and air transport: The role of access to terminals in the Madrid–Barcelona corridor



Juan Carlos Martín^{a,*}, Concepción Román^a, Juan Carlos García-Palomares^b, Javier Gutiérrez^b

^a Department of Applied Economic Analysis, Institute of Tourism and Sustainable Economic Development, University of Las Palmas de Gran Canaria, 35017 Las Palmas G.C., Spain

^b Department of Human Geography, Complutense University of Madrid, 28040 Madrid, Spain

ARTICLE INFO

Article history:

Received 2 March 2012

Received in revised form 9 September 2014

Accepted 15 September 2014

Keywords:

Mode choice

Transport mode competitiveness

GIS

Terminal access time

HST stations

Airports

ABSTRACT

This paper analyzes the effect of access and egress time to transport terminals over the spatial competitiveness of the high-speed train (HST) in the Madrid–Barcelona (Spain) corridor, one of the densest airline domestic markets in the world. Applying spatial data from 2010 provided by a geographical information system (GIS) to a mode choice model estimated with sample travelers in this corridor, the present study examines whether and how the level-of-service of transport terminals spatially affects the competitiveness or modal distribution of HST and air transport in the provinces of Madrid and Barcelona; and, in particular, the degree of competitiveness that can be accrued by the access time provided by private car and transit in different market segments, especially mandatory and leisure trips. In a number of urban zones near train stations and airports, terminal accessibility clearly favors one transport mode in comparison to the other. Improving terminal accessibility via private car or public transit not only affects the relative access to terminals, but also represents a key strategy for readjusting the market shares of the competing modes in the corridor.

© 2014 Elsevier Ltd. All rights reserved.

1. Introduction

High-speed trains (HST) are usually considered a sign of modernity and prosperity for those travellers who can be benefited from their use. In the European Union, France was the first nation inaugurating the line Paris–Lyon in 1981 after the relative success of the first line in the world, Tokyo–Osaka. China has now the world's most extensive network in absolute terms, followed by Spain¹, Japan and France. According to Tapiador et al. (2009), the main nodal points in the intermodal networks of present-day Europe are the European high-speed train stations.

* Corresponding author.

E-mail address: jcmartin@daea.ulpgc.es (J.C. Martín).

¹ It is out of the scope of this paper to present a detailed analysis of the master plans of HSTs in Spain. Interested readers are referred to Martín and Nombela (2007) and Albalade and Bel (2012).

HST competitiveness is highly influenced by the location (central or peripheral) of the stations and their accessibility by public and private transport (Huang and Morgan, 2011). Good access to transport terminals is a key element in the competitiveness of the transport modes for interurban passengers². This is especially important when modeling the modal choice between HST and air transport, as these transport modes are close substitutes. Promoters of the HST have traditionally claimed an advantage over air transport in terms of the better accessibility to train stations in comparison with airports, normally located several kilometres away from the city center. Air transport, in contrast, remains still the most attractive alternative in terms of in-vehicle travel time. Considering that travellers choose the transport alternative with the maximum utility (or the minimum generalized cost), as stated in the classic theory of rational choice (McFadden, 1981), the effect of access and egress times over the attractiveness of the different transport alternatives should not be regarded as negligible. In particular, different patterns of access/egress times to/from transport terminals along the territory affect the modal competitiveness at the spatial level.

Accessibility to transport terminals stations has been analyzed in a number of studies under very different perspectives like for example in the analysis of: (1) multi airport systems (Pels et al., 2000, 2001, 2003); (2) service quality in HST stations and HST operators (Chang and Lee, 2008; Chou et al., 2011); (3) catchment areas of railways stations according to different access transport modes (Rietveld, 2000; Martens, 2004; Givoni and Rietveld, 2007); (4) modal competition in interurban transport (Wardman and Tyler, 2000; Clever and Hansen, 2008; Román et al., 2010; Román and Martín, 2011); (5) comparison of the catchment areas between HST stations and airports (Dobruszkes, 2011).

For example, Chang and Lee (2008) find that poor HST station accessibility is after the price the main reason for not using the Korean HST. Likewise in Taiwan, Chou et al. (2011) find that HST station, mostly away from the city center, make that the access to the terminals is perceived as the least appreciated attribute of the service quality by HST users. Clever and Hansen (2008) highlight in this respect that for a given line-haul travel time, the modal competition depends more on the access and egress times to the transport terminals. Summarizing, it can be said that: (1) access time to terminals plays a significant role in determining their catchment area for the different access transport modes; (2) the relative competitiveness of each mode seems to be highly affected by the spatial location of the terminals being all other factors similar, that is HST is more competitive when train stations access presents an advantage over airports; (3) access to terminals are usually in the top-priority quality indicators that need to be addressed in order to improve customer satisfaction; (4) it is the door-to-door travel time and its quality and not that of station-to-station or airport-to-airport travel time that are important in mode choice decision (Givoni and Dobruszkes, 2013).

There are also a number of papers analyzing interurban modal competition between HSTs and other transport modes. Most of them used discrete choice analyzes, based on SP (Stated Preference), RP (Revealed Preference) or mixed data (see e.g., Bel, 1997; Chang and Chang, 2004; González-Savignat, 2004; Ivaldi and Vibes, 2005; Román et al., 2007; Mao, 2010; Román and Martín, 2011; Pagliara et al., 2012). The corridors under analysis, the variables included and the type of data vary on diverse circumstances, but it can be said that in general, total travel time –which includes access/egress, schedule delay and in-vehicle travel time–, fare, comfort, reliability are the most common variables that characterize the service levels of the transport modes. Other variables that affect passengers' mode choice are more related with socio-economic characteristics of the travellers or the trip, e.g. gender, income and leisure or mandatory trip. However, this literature does not provide any analysis of the spatial effects in the territory around the transport terminals.

Spatial effects of HSTs have been previously studied at a macro level, using regions or provinces as the unit of analysis (see e.g. Fröidh, 2005; Gutiérrez et al., 1996; Gutiérrez, 2001; Martín et al., 2004; Vickerman et al., 1999). These papers analyze the effects of the spatial accessibility component for a particular transport investment without considering how the equilibrium between different transport modes will evolve, that is there is not any consideration of modal competition. In this study, we extend the previous literature analyzing not only the presence of a HST station or an airport as a driver of transport mode attractiveness, but also the 'level-of-service' provided. The term 'level-of-service' comprises many aspects that affect modal competitiveness and one of them – access times to transport terminals –is the focus of this paper.

This research attempts to integrate these two scientific traditions that have evolved separately: accessibility analysis to transport terminals and modal choice modeling. The paper extends the previous literature on accessibility to transport terminals and their spatial effects at a more micro-level unit, analyzing the effect that access and egress times to transport terminals has over the spatial distribution of the modal shares of the HST and air transport within the metropolitan areas of Madrid and Barcelona. The corridor under analysis links the two most important economic poles in Spain, and the HST is directly competing with one of the densest domestic airline markets in the world. It is clear that when HST entered in operation, its attractiveness, versus other transport modes, such as coach, private cars, or air transport, increased. However, as we will see, this attractiveness is very different at spatial level around the transport terminals.

Therefore, we will address this up-to-now neglected aspect of interurban transport competitiveness, whether and how the level-of-service of transport terminals affects the relative attractiveness of HST and air transport. The analysis will be made using two different access modes, private car and transit, and two different market segments, mandatory and leisure

² Other important components have been analyzed in Schönharting et al. (2003), where six criteria (short time intervals, sufficient parking, integrated timetables, integrated tariffs, connected crossings and short-distance transfers) were studied in order to characterize the relative importance for the different intermodal combinations that can occur at an HST station (HST-private car, HST-taxi, HST-transit). Pagliara et al. (2012) analyzed the modal competition in the corridor Madrid-Barcelona, finding that check-in and security controls at the airport are a crucial variable for users in making their modal choices, but other policies, such as the improvement of parking facilities at train stations, play a secondary role.

Download English Version:

<https://daneshyari.com/en/article/6781579>

Download Persian Version:

<https://daneshyari.com/article/6781579>

[Daneshyari.com](https://daneshyari.com)