



The importance of the inland leg of containerised maritime shipments: An analysis of modal choice determinants in Spain

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ARTICLE INFO

Article history:

Received 20 July 2010

Received in revised form 29 October 2010

Accepted 16 November 2010

Keywords:

Intermodality

Freight transport

Stated preference

Discrete choice models

ABSTRACT

While most of the studies that address competition between road and rail transport focus on national or international non-maritime shipments, there is practically no empirical evidence on the modal choice determinants of the inland leg of maritime shipments. This paper intends to fill that gap by estimating a modal choice model between road and rail transport on the inland leg of Spanish containerised maritime freight shipments, using a mixed logit model and stated preference techniques.

The results obtained confirm the vital role that frequency plays in the relative competitiveness of rail transport and also provide subjective values of transport attributes that are deemed essential for an accurate cost-benefit analysis.

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1. Introduction

The Spanish modal split currently suffers from a series of limitations that are preventing cargo from being distributed in a balanced and environmentally friendly manner. Most freight at national and intra-European level is transported by road and the share of this mode of transport has increased over recent years, further accentuating the polarisation of the modal split. On an international scale, 90.5% of Spanish trade with non European Union countries in 2009 was channelled to the maritime mode, whereas road haulage remained the most used mode in door-to-port/port-to-door overland transport with a share of 95%, rail transport accounting for only a very small percentage. This situation is creating traffic congestion problems in the national road network at the same time, causing significant environmental and social spillovers.

Solving problems related to access roads to ports becomes even more urgent when we take into consideration that the majority of ports are nowadays located in urban areas. Therefore, fostering the use of rail transport on the inland leg of maritime shipments constitutes a priority goal of current national (Spanish Ministry of Public Works, 2004) and European transport policies (European Commission, 2001). However, the political willingness to consolidate the rail mode as a real transport alternative for European freight shipments contrasts with the enormous delays in the deregulation of the sector. While road and maritime services in Europe have been fully deregulated since 1993, the European rail sector is still immersed in a liberalisation process that has lasted for nearly two decades.

The document entitled ‘Community Rail Policy’ opened the door to deregulation in 1990 and was used as a basis to design the current common rail system. The most characteristic features of this system are that it separated infrastructure from operations and incorporated new rail operators as part of the process towards deregulation and opening up the market.

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Since the enactment in 1991 of Directive 91/440/EC regarding the development of railways (Council of Europe, 1991), which laid the foundations for opening up the rail market in Europe, there have been several more Directives, grouped into so-called 'Rail Packages', which have in turn been extended by other laws and the 2001 White Paper on transport (European Commission, 2001). However, as incorporating these Directives into national law is the responsibility of each State, procedures and actions related to deregulating the sector unavoidably differ substantially from one member State to another.

In the case of Spain, even though the Rail Sector Act (Act 39/2003) opened up the rail sector to competition with new operators entering the market, the Act itself did not come into force until 2005. As a result, freight transport by rail was not fully liberalised until November, 2006. On that day, the Spanish Minister of Public Works, through the Administrator of Railway Infrastructures (ADIF in Spanish), awarded the safety certificate to the first private rail operator in Spain, which allows it to be granted capacity slots to transport freight on the General Interest Railway Network. Since then, the incorporation of new operators has been slow. At present, 11 private companies have obtained their licence as rail operators and only five have been awarded the safety certificate to be able to provide freight services.

While the level of competition in the Spanish rail sector, as far as freight is concerned, is far from high at present, the growth rate observed is not that different to other countries which began the deregulation process earlier and where rail has since captured a significant share of the market (in Germany, for example, deregulation began in 1995 and there are currently more than 350 licensed companies, which account for close to 20% of total rail transport). The Spanish rail sector can therefore be expected to gain ground in both port and intra-European flows in the next few years.

However, deregulation of the rail sector alone is not enough to consolidate the sector in freight transport. The possibility of rail transport emerging as a real alternative in freight transport will ultimately depend on how well this new supply adapts to the requirements imposed by demand.

Modelling modal choice between road and rail transport on the inland leg of Spanish containerised maritime freight shipments, using a mixed logit discrete choice model and stated preference techniques, will contribute towards designing efficient transport policy. The analytical tool proposed here will allow policy-makers to clearly identify the critical issues that public measures aimed to foster rail transport connecting ports and their hinterland should focus on. Similarly, the model specified will provide subjective values of transport attributes, which are deemed essential for an accurate cost-benefit analysis and of which there is little empirical evidence due to the difficulty involved in obtaining detailed data.

The article is structured as follows: Section 2 reviews the existing literature and presents the theoretical model. Section 3 details the fieldwork carried out along with the data included, Section 4 discusses the findings and, finally, Section 5 presents the conclusions drawn from the research.

2. Literature review and theoretical model

2.1. Literature review

This paper falls into the field of research devoted to modelling freight transport demand and modal choice determinants in European traffic that has developed in Europe over recent years as a result of the enormously unbalanced modal split on the continent (see among others, the references detailed in Table 1).

There are many references to the importance of inland transport connecting ports to their hinterlands. Van Klink and van den Berg (1998) identify rail transport and intermodality as an instrument for port competition. Notteboom and Rodrigue (2005, 2009) identify a clear trend involving the growing level of integration between maritime transport and inland freight transport systems with a door-to-door corridor approach. The importance of inland transport, the cost of which represents between 40% and 80% of the total costs of container shipping, and the opportunities derived from intermodal transport are the basis for the development of the Port Regionalisation concept as a port development phase where seaport–hinterland relations are established to provide more efficient door-to-door solutions. Aligned with this, De Langen (2008) discusses the role that Port Authorities can play to ensure hinterland access (together with shipping companies and maritime terminal initiatives) and different types of involvement.

At present, freight transport by rail is mainly based on port rail connections with the hinterland. For this reason, and to ensure that rail transport successfully increases its market share of intra-European traffic, we must have a good understanding of what determines modal choice on the door-to-port and port-to-door legs, as these traffic flows are the basis for incorporating domestic freight into rail corridors. Spain in particular, where rail transport has a very small market share, could be a very interesting country to assess how this mode of transport consolidates at European level. The fact that the corridor being studied connects the economic region of Madrid to the main Spanish container port is also undoubtedly relevant.

However, most of the European studies that analyse modal choice determinants focus on competition between modes on national or international non-maritime shipments, applications addressing modal choice determinants in the inland leg of maritime shipments being scarce.

To the best of our knowledge, even if some research teams differentiate container traffic in their analyses of intermodal traffic (Beuthe & Bouffioux, 2008; Jiang & Calzada, 1997), only Blauwens et al. (2006) have specifically addressed the modal choice issue for carrying containerised shipments from a European seaport to its hinterland. These authors use an inventory-theoretic framework (Baumol & Vinod, 1970) to analyse the effectiveness of certain policy measures aimed at triggering a significant modal shift from road to alternative modes (rail and inland waterways) in a hypothetical transport corridor connecting the port of Antwerp (Belgium) to its hinterland in Germany.

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