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Analysis of light rail systems in Spain according to their type of funding

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Abstract

Since the year 1994, when the city of Valencia reintroduced the tramway (more specifically, the second generation of trams, known as Light Rail System), this means of transport has been introduced in many urban areas in Spain. It is an innovative transport system that substantially improves the features of the old trams that crossed Spanish cities until 1976.

The technical characteristics of this means of transport make it a sustainable alternative for urban settings, as it produces less acoustic and environmental pollution, and it is safer than other modes of transport. In comparison with the underground and the bus, the Light rail offers an intermediate transport capacity, which makes it adequate for medium-sized cities or certain zones within large metropolitan areas. Finally, the modern design of these modern trams, together with the urban regeneration of the zone where it circulates, is frequently used to improve the image of a city. In 2012 there were 16 Light Rail Systems in 13 Spanish cities (Valencia, Alicante, Madrid, Barcelona, Parla, Sevilla, Vitoria, Bilbao, Murcia, Tenerife, Zaragoza, Jaén, and Vélez-Málaga).

However, in some cases these Light Rail Systems have involved high costs of implementation and operation that the respective financing entities (Public Administration and/or private enterprise) can hardly face. Moreover, they are functioning at a much lower level of demand than their capacity, meaning they could be considered an economic and social failure.

At this point in time, two decades after the introduction of Light Rails in Spain, there is a need to analyse the factors that may have influenced the success or failure of this novel type of transport. Although such an analysis should be approached from diverse perspectives, the present contribution focuses on the influence of private financing in these projects. More specifically, a qualitative and quantitative analysis is carried out to determine if there is a significant relationship between the percentage of private participation in financing this transport system and a series of relevant variables: total investment, cost per unit of length, operating and maintenance costs, percentage of length underground, passengers' demand, investment per passenger, fares and subventions, etc. In view of the results, it will be assessed whether the private funding behind the Light Rail Systems in Spain has proven efficient for society.

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Keywords: Light rail; funding; public-private partnership

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1. Introduction

According to Rivas (1996), the reason to use private funding to finance those infrastructures that traditionally have been publicly funded is the strict deficit policy required by the European Economic and Monetary Union. It requires Member States to reduce budget allocations for infrastructure investments. The situation compels to find new ways of funding to ensure a continued pace of investment without compromising the ultimate objectives of economic development and convergence. In this context, one of the mechanisms proposed more enthusiastically is participation of private enterprises in financing and infrastructure management of public interest. Thus, the model of Public-Private Partnership (PPP) is created in order to fund both the construction and management of transport infrastructures.

Glaister (1999) states that, despite the progress in the use of the PPP model, the involvement of private sector has led occasionally to waste resources. Moreover, in several cases, projects have been carried out that would have been done at a lower cost. Thereby, it is an essential that part of the risk is borne by private participation for the proper functioning of a PPP model. As a result, private enterprise would operate more efficiently.

Meanwhile, Resor and Tuszynski (2012) note that use of PPP model has increased due to the incapacity of Public Authorities to finance transportation projects from revenues of journey fare and taxation. PPP model particularly best fits to infrastructures that have long payback period, especially if these investments generate a considerable profit. Thus, PPP allows private companies to participate in the financing of transport infrastructures, sharing business risks with public administrations and obtaining in return a profit on their investment, as compensation for assumed risks.

In his PhD. thesis, Sastre (2009) compares between Spanish Light Rail (LR) that have been executed by private funding or awarded through concessions to build and exploit them; and which have been carried out by public funding. Furthermore, he established the advantages, disadvantages and adequacy of each of these systems, in terms of different characteristics of the project and its environment.

1.1. Aim of the study

This paper analyses the potential influence that the presence of private funding has had on the cost of light rail systems in Spain. Nevertheless, it should be noted that this analysis is a simplified approach to the problem, since there also are plenty of factors that affect these projects.

2. Light Railway systems in Spain

To perform the analysis, we have selected 14 Spanish LR systems, each of them is described below, emphasizing on the financing system.

2.1. Madrid

Madrid has three LR lines, all of which were opened in 2007.

Line 1 runs from the metro station of Pinar de Chamartín to Las Tablas. It provides service to the new neighbourhoods of Sanchinarro and Las Tablas, whose development has been greatly benefited by the development of this means of transport (Calvo et al., 2013). It is a line of 5.4 km, 3.62 km of them are cut-and-cover tunnel. The line has 2 interchange stations from a total of 9 stations. The rolling stock is 8 trams, Alstom Citadis model 302, that take about 15 minutes per journey. The low-intensity building of these new neighbourhoods developed next to the line and the fact that there are still several no built plots has contributed to the low demand captured by this line. In 2011, it was used by 4.9 million passengers (Romeu, 2012).

Construction works of this line (as well as lines 2 and 3) were initiated in 2006 by public funds through the public company Mintra (Madrid Infraestructuras de Transporte). Due to a major change in accounting consideration of debt of Mintra, it was decided to tender works, financing and exploitation (Consorcio de Transportes de Madrid, 2010).

This concession was awarded to the bid submitted by Metros Ligeros de Madrid S.A., whose shareholders are the public company Metro de Madrid (42.5 %), the infrastructure management company Globalvia (42.5 %) and the transportation company Alsa (15 %) (Consorcio de Transportes de Madrid, 2010). The required investment was 254 M€ (Consorcio de Transportes de Madrid, 2010), which is equivalent to a unit cost of more than 47 M€/km. This cost is extremely high and is mainly due to the fact that a large portion of this line was built underground (67%). Part of this additional cost could have been avoided, especially considering that most of the route of the line was newly developed, so it would be on surface.

Line 2 runs thought the outskirts of Madrid from the subway station of Colonia Jardín to the commuter station of Aravaca, going through the town of Pozuelo de Alarcón. It provides service to office centres, shopping malls and university centres. It has 12 stations and a length of 8.7 km, 2.7 of them are underground. The rolling stock is 12 trams, Alstom Citadis model 302 travelling at a commercial speed of 24 km/h. Journey time is about 22 minutes (Consorcio de Transportes de Madrid, 2010). Except the two ends, line 2 runs through a sparsely populated area and no chance to be urbanized. Its demand is rather low, being used by 3.7 million passengers in 2011 (Romeu, 2012).