



High speed rail: implication for cities

Maddi Garmendia^{a,*}, Cecilia Ribalaygua^b, José María Ureña^c

^a School of Civil Engineering, University of Castilla la Mancha, Avda. Camilo José Cela 13071, Ciudad Real, Spain

^b School of Civil Engineering, University of Cantabria, Avda. de los Castros, Santander, Spain

^c School of Architecture, University of Castilla la Mancha, Avda. Carlos III, Toledo, Spain

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ABSTRACT

This paper is a spatial (urban and territorial) approach to high speed rail implications for cities, with focus on recent research and developments. The current situation and future challenges of HSR in Europe are analyzed taking into consideration three main levels of analysis: inter-city relationships, wider spatial implications and the role of HSR stations. The paper reviews the different approaches in two world powers, China and USA, considering their HSR territorial strategies and station location rationale. This dual review, based on European territorial experience, is useful as a reflection on HSR developments in the near future.

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Introduction

The High Speed Rail (HSR) era began with the Tokaido line in Japan in 1964 and was established in Europe with the French TGV in 1981. HSR technology for passenger transportation has subsequently expanded all over the world. By end of 2011, there were 17,166 km of high speed lines in operation globally, and by 2025, considering plans and lines under construction, there will be 42,322 km in 23 different countries (UIC, 2011).

The most extended definition of HSR, given by the European Union in Directive 96/48 (EU, 1996), is infrastructure and rolling stock enabling at least 250 km/h on specially built lines and 200 km/h on upgraded high-speed lines, including different models and specificities (Campos & de Rus, 2009; Givoni, 2006). Nevertheless, there is much more to high speed than speed itself (Plassard, 1990):

“The TGV is not just a train traveling faster than the others. This is a new mode of transportation, with its own characteristics. As such it strongly influences the organization of space, upsetting relations with other transportation and shaping a new fragmented space”

The increase in accessibility gained by HSR has opened up new possibilities for those cities connected to the lines and has often revitalized the role of railway stations. The connection to a HSR

line usually implies urban regeneration opportunities for the HSR city, an increase in accessibility to cities both near and far, and therefore new possibilities for inter-city relationships. Lately, given the changes in the current economic and political situation, new aspects such as sustainability and affordability require consideration, and new HSR projects respond to such circumstances.

As the HSR lines spread and the high speed services are taken for granted, many cities suffer indirectly for not being in the network. Some authors talk about the “peripheralization of the periphery” (Hall, 2009), as the core cities are drawn closer in terms of time-distance, and the more distant places become relatively more remote (Spiekermann & Wegener, 2008). Also, the HSR “favours all the values associated today with the city to the detriment of the countryside. Activities that result dynamized (high-level services to companies, advanced technology, marketing, advertising, etc.), are those specific of the big city. Regular users are urbanites for whom time is valuable” (Plassard, 1992). Therefore, the processes facilitated or developed by high-speed shall be, in any case, urban processes at a regional or local level.

HSR has been studied from different perspectives: economical, environmental, and technical. This paper is a spatial (urban and territorial) approach to high speed rail implications for cities, with focus on recent research and developments. Section ‘Consolidation and new horizons of HSR in Europe’ reviews the current situation and future challenges of HSR in Europe and considers three main levels of analysis: inter-city relationships, wider spatial implications and the role of HSR stations. Finally, section ‘Challenges for HSR in the US and China’ gathers the different approaches in the USA and China to HSR.

* Corresponding author. Tel.: +34 926 295300x6200.

E-mail address: Maddi.Garmendia@uclm.es (M. Garmendia).

Consolidation and new horizons of HSR in Europe

Since the opening of the TGV in France in 1981, HSR lines in Europe have commenced an unstoppable process of consolidation. Still, economic studies on the profitability and affordability of HSR cast serious doubts on this infrastructure. Campos and De Rus (2009) comparing 166 HSR projects around the world conclude that HSR “is a very expensive and risky transportation system that requires a careful case-by-case socioeconomic appraisal”. Also, the current economic and political context leads to question the necessity of such investment or more precisely, to consider less demanding alternatives in relation to the line layout or the location of stations. Countries such as Italy or Sweden consider new HSR projects bearing in mind more realistic expectations and taking real mobility and economic needs into account.

The isolated HSR lines that different countries in Europe began to build in the 1980s and 90s have been connected, making up a real European HSR network. The European Union has supported this consolidation through the trans-European transport network (TEN-T) implementation. The PBKAL (Paris–Brussels–Köln–Amsterdam–London) is the first cross-border high speed passenger rail project that has been completed. Other connections, such as the Southwest (Mediterranean branch Madrid–Barcelona–Perpignan–Montpellier–Nîmes, the Iberian branch Madrid–Lisboa–Oporto) and the Atlantic branch Madrid–San Sebastian–Dax–Bordeaux–Tours), the East axis to Luxembourg and Germany, or the Lyon–Turin rail link through the Alps, are planned to be completed for 2020.

However, interoperability issues are still to be solved. On the one hand, even if it is a matter of time, there are technical problems of incompatibility of electrical systems, rail gauges and signalling systems. On the other hand, each country which has implemented the HSR in its railway system has adapted the new infrastructure to its geographical, economical and spatial characteristics, giving rise to different configurations (Givoni, 2006; Hall, 2009) or exploitation models (Campos & De Rus, 2009).

In addition, service strategies and the rationale behind station settings and infrastructure layout have changed as the high speed system has consolidated. The French original TGV, with no intermediate station except for the so-called “gares de betteraves”, after such experiences, has switched in the last branches to more central locations, following the “Rouvillois Report” recommendations for a more efficient and rational development of the network (Ribalaya-gua, 2005). In Spain, although the initial model was very similar to the French “avion sur rails”, soon the strategy was to connect every provincial capital to the network. Also, RENFE, the Spanish railway operator, has developed new specific short-distance services. The Italian “pendolino” is being replaced by newly-built conventional high-speed trains in the Milan–Rome line.

In short, HSR is well established in Europe but still new challenges and questions remain unresolved, either in relation to the consolidation of a European HSR network or to the evolution of the model. There are both territorial and local issues which recently take up most of the scholarly attention. Territorial issues are those related to inter-city relationships, either short-distance or very long-distance services, but also wider spatial implications, that is, impacts beyond HSR cities. Local issues are mainly related to the setting and level of service of HSR stations.

New inter-city relationships

The most relevant contribution of HSR is the increase in accessibility, that is, the travel time reduction between HSR cities. First studies on territorial impact of HSR, with this improved connectivity between cities in mind, considered that major effects of HSR would be either on long distance connections between big urban

areas or on regional accessibility, on what Blum, Haynes, and Karlsson (1997) called an ‘integrated corridor economy’. However, mixed or intermediate situations, where HSR connects two or more far away major urban areas and some intermediate cities, are more common. Depending on the characteristics of the operating services (stops, frequencies, schedules, fares, etc.) one or another strategy (long distance vs short distance) is promoted.

International HSR services carry, so far, fewer passengers than expected. Menerault and Barré (2005) pointed out the border effect in the Paris–Brussels and Paris–London Eurostar services in the PBKAL line. Currently, when a real European HSR network is being made up, long distance HSR services are gaining attention and more assessment is to be expected. These long distance services have usually been considered in terms of competition with aircraft, but more and more studies do so in terms of compatibility (Fröidh, 2008). HSR/airline integration occurs in cases such as Frankfurt’s International, Amsterdam’s Schipol or Charles de Gaulle in Paris, where HSR connects with a major airport, serving as a short and medium distance feed into longer distance air services (Hall, 2009).

The key variable of these HSR long distance services is travel time, which is the most valuable factor (over fares, comfort or services) for the large group of long distance users: business travelers. Below 1000 km (3 h or 3.30 h) there is usually direct competition between the modes although below 2-h travel time HSR beats most airline competition (Givoni, 2006).

Short and medium distance services (less than 200 km) are, however, what have revolutionized the concept of HSR. In some cases, the HSR has been directly conceived for short or medium distances. That is the case of Germany where traditionally HSR infrastructure has been adapted from traditional railways instead of building a new dedicated line. In Sweden, the Svealand line between Stockholm and Eskilstuna (115 km) has five intermediate stops. The mobility analysis in the corridor showed that the demand had multiplied by seven after the opening of the new line (Fröidh, 2005).

Nevertheless, in other cases, these short or medium distance relationships constitute an unexpected result or an adaptation of the initial model. This is the case of France or Spain where the initial model is a radial network connecting the national capital with distant major urban areas and few intermediate stations.

On the first Spanish HSR line, short distance passengers between the small city of Ciudad Real and Madrid (around 200 km) took up the long distance services Madrid–Seville. In response, RENFE provided a specific medium distance service with lesser quality rolling stock, adequate schedules and discount fares to favor commuting to Madrid, segregating medium and long distance services and releasing the latter (Menendez Coronado, & Rivas, 2002). These services consolidated commuting relationships between Ciudad Real and Madrid, and opened up new opportunities for HSR in Spain (Ureña, Coronado, Garmendia, & Romero, 2012). In fact, these short or medium distance services have been extended to other lines and currently there are five of them on the five existing lines. Three of them have a metropolitan scope allowing commuting relationships with Madrid to small cities between 60 and 200 km. The other two short distance services have a regional scope, though in both cases there is a major urban area involved (Barcelona and Seville).

In addition, the experience of this first line and the time elapsed until the construction of the following lines has changed the initial model of HSR network and the layout decisions have been adapted to favor the integration of a wide range of medium cities to the HSR. For example, the Madrid–Barcelona–French border line diverts to connect the four provincial capital cities and Figueras in the region of Cataluña, providing an improved intraregional connection.

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