

Chapter 2

Intercity Transport Policy and Planning System: International Comparison Between the EU, USA, China and Japan

**Tetsuo Yai, Koichi Fujisaki, Ryo Itoh, Keiji Kariyazaki, Hidetoshi Kume,
Haixiao Pan, Werner Rothengatter, Atsushi Suzuki and Naoyuki Tomari**

2.1 Introduction

It has been pointed out in Sect. 1.1.2 that the share of intercity transport of total passenger-kilometres is estimated to be more than 40% and will probably increase substantially in the future. In freight transport, the share of intercity transport is much higher and can account for more than 80% of the total tonne-kilometres in industrialised countries. This underlines—in spite of the statistical difficulties for international comparisons—that intercity transport is a highly relevant segment of transport when it comes to analysing the responsibility of the transport sector to global warming and the potential for mitigation.

This chapter gives an overview of the current status and the intercity transport policies concerning greenhouse gas (GHG) reduction. Our focal points here are how the impact of global warming is treated in the existing transport planning processes and how to integrate the avoid/shift/improve strategies described in the previous chapter into the long-term planning context. International comparison will be made, including Japan, the USA and Europe, partly extended by incorporating Chinese examples. As a consistent intercountry comparison is possible only for a

T. Yai (✉)

Graduate School of Engineering, Tokyo Institute of Technology, Tokyo, Japan
e-mail: tyai@enveng.titech.ac.jp

K. Fujisaki

(Formerly) Institution for Transport Policy Studies (ITPS), Tokyo, Japan
e-mail: fujisakiyk@gmail.com

R. Itoh

Graduate School of Economics, Nagoya City University, Nagoya, Japan
e-mail: itoh@econ.nagoya-cu.ac.jp

K. Kariyazaki

Kanto District Transport Bureau, Ministry of Land, Infrastructure,
Transport and Tourism, Tokyo, Japan
e-mail: kariyazaki-k55qn@ktt.mlit.go.jp

© Springer International Publishing Switzerland 2015

Y. Hayashi et al. (eds.), *Intercity Transport and Climate Change*,

Transportation Research, Economics and Policy 15, DOI 10.1007/978-3-319-06523-6_2

few characteristics, we also chose to give more detailed information and data on a specific country only when an international comparison was not possible.

2.2 Current Situation and Issues of Intercity Transport

2.2.1 Current Situation of Intercity Transport

2.2.1.1 Key Trends of Intercity Transport

In the past 40 years, people's mobility has significantly increased globally as shown by the aggregate national trends for selected countries in Fig. 2.1. The share of road transport has increased all over the world due to the progress of motorisation while the share of railways in total passenger transport has continuously decreased in most countries. Currently, the railway's share in passenger transport is small, except for Japan.

Regarding intercity transport, in general the share of car use decreases and those of railways and air increase with the travel distance, but the situation is different across some of the countries. For example, railways are dominant in Japan for medium distance travel (between 300 and 750 km), while air transport is dominant for longer distances (see upper left figure of Fig. 2.1).

In contrast to Japan, in the USA, the rail share is almost zero pretty much for all distances. Only on the Northeast Corridor (NEC) between Washington and Boston, intercity rail transport has a relevant modal share. Private car is the most dominant mode even for longer trips up to 1000 km while most people use air transport for longer trips. Also in the UK, road transport is high on average, but about 10% of passengers of all distances use railways. Therefore, the characteristics of the modal split of the UK are somewhere between Japan and the USA. Germany and, in

H. Kume

JICA Expert, Ministry of Public Works and Transport, Phnom Penh, Cambodia

e-mail: kumehidetoshi@gmail.com

H. Pan

Department of Urban Planning, Tongji University, Shanghai, China

e-mail: hxpank@gmail.com

W. Rothengatter

Karlsruher Institut für Technologie (KIT), Karlsruhe, Germany

e-mail: werner.rothengatter@kit.edu

A. Suzuki

Department of Civil Engineering, Meijo University, Nagoya, Japan

e-mail: atsuzuki@meijo-u.ac.jp

N. Tomari

Institution for Transport Policy Studies (ITPS), Tokyo, Japan

e-mail: tomari@jterc.or.jp

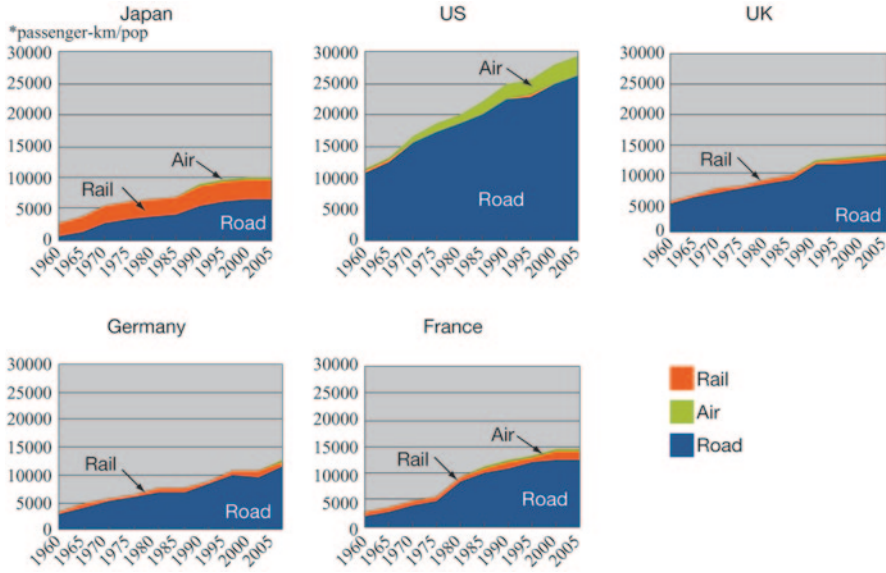


Fig. 2.1 Passenger mobility trends for selected countries. (Source: MLIT 2012b)

particular, France have partly modernised their railway systems and show higher railway patronage for intercity passenger transport. Nevertheless, the average modal share over all distance ranges is only 8% for Germany and 9.2% for France (2011).

However, we should note that the railways in European countries and the USA play an important role in freight transport, which is not treated in this book. The shares of railways in freight transport in the USA and Germany were over 40 and 17% in 2009, respectively, while in Japan, it was just 6%. On average, in the EU, the share of freight rail is about 11%, while it is higher in countries with high foreign trade and efficient railway freight service.

In the process of rapid economic progress, China has experienced a rapid growth of transport, as shown in Fig. 2.2, for the years 2000–2010. Total transport activities have increased in the decade by 146%; in particular, 316% for civil aviation and 126% for public roads. Also the railway transport increased strongly by 93% due to massive investments in high-speed rail (HSR) which now offers competitive rail services between major agglomerations.

The extension of the HSR networks and services has in particular influenced the railway transport development. Figure 2.3 shows the extension of the HSR networks over time in different countries.

According to Fig. 2.3, the HSR operation started in 1964 in Japan which has kept the largest HSR network of the world for more than 40 years. But it was recently taken over by China, which has increased its HSR network since 2007, exceeding 8000 km in 2011 and approaching 10,000 km in 2013. Now Japan, France and Spain have almost the same HSR network length of 2000–2400 km, which is about

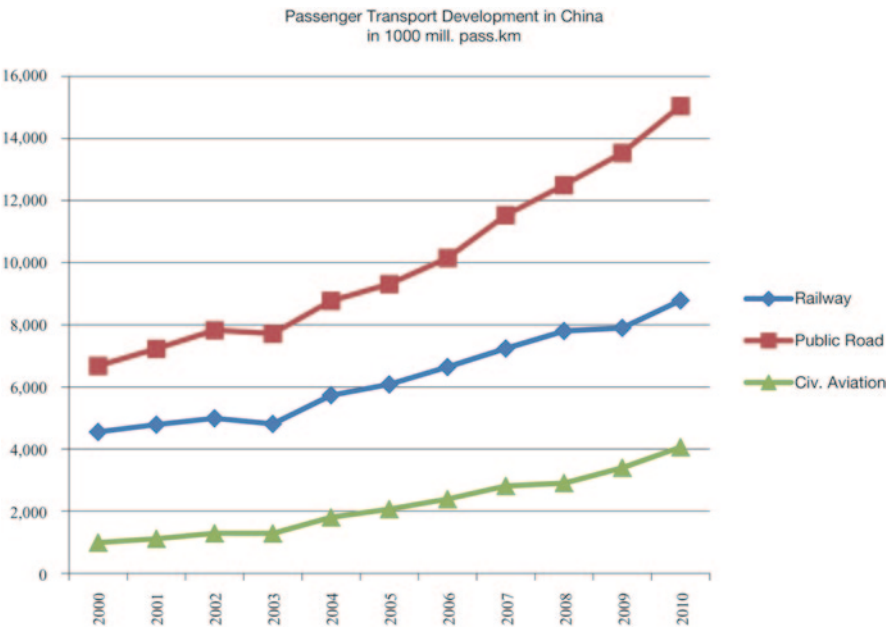


Fig. 2.2 Development of passenger transport in China from 2000 to 2010. (Source: National Bureau of Statistics of China 2002–2011)

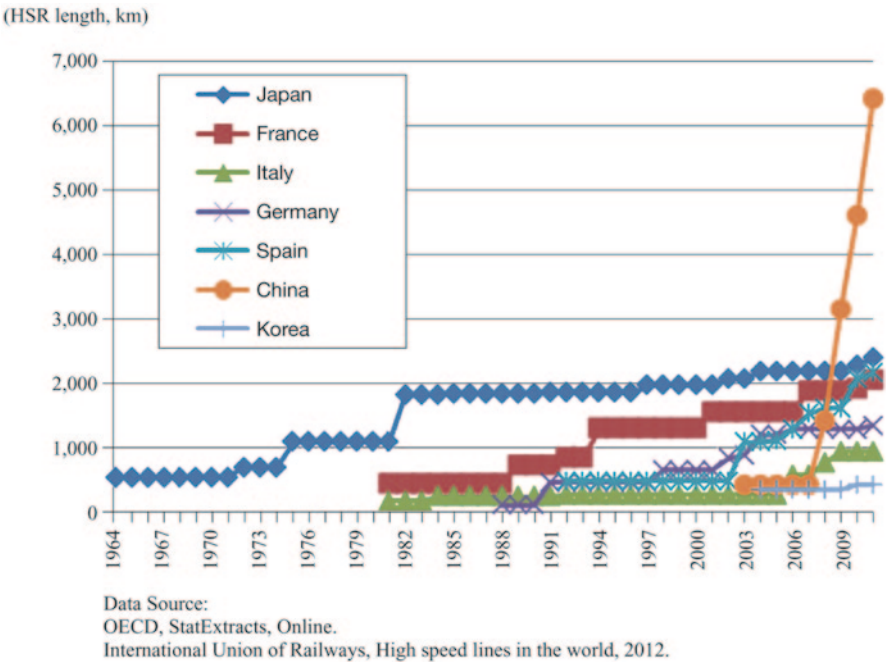


Fig. 2.3 Development of high-speed railways (HSR) in several countries. (Source: International Union of Railways 2013)

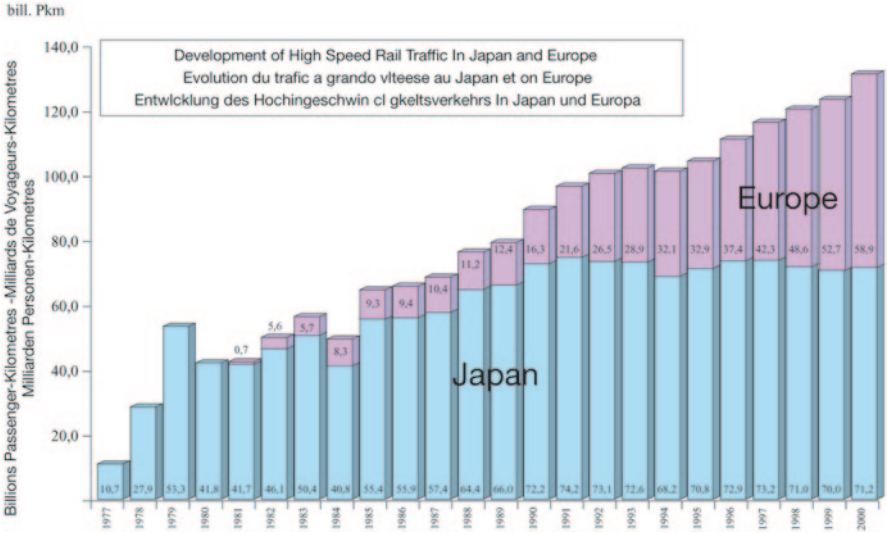


Fig. 2.4 Comparison of the development of HSR patronage in Japan and Europe (billion passenger-km). (Source: UIC 2011)

double the length of HSR lines of Germany and Italy in 2010. Spain has made the most significant progress in the past decade and has developed the longest HSR network in Europe (2144 km in 2012).

The development of HSR infrastructure and services had a significant influence on demand. Figure 2.4 compares the development of HSR in terms of passenger-kilometres in Europe and Japan. Japan started in 1964 with HSR on the most densely populated Honshu corridor between Tokyo and Osaka, followed by the Western and Eastern lines (Sanyo, Tohoku, Joetsu Shinkansen until 1990). After accomplishment of this important HSR network, the patronage rose to a high level, and remained almost stable until year 2000, from which point some complementary links were added (Nagano, Kyushu Shinkansen). In the years following the Asian HSR traffic, development was further driven by the investments in Korea and Taiwan (opened in 2005 and 2007, respectively; see Fig. 2.5).

The European HSR development started in 1981 in France with the first TGV line between Paris and Lyon (425 km) followed by Germany, where the first HSR lines (Hanover–Würzburg; Stuttgart–Mannheim) were opened 10 years later. Figure 2.6 adds complementary information on the HSR performance in Europe. It is obvious that the French TGV is carrying by far the most HSR passengers in Europe (around 52 billion pkm in 2009). The traffic volume of the German HSR service is less than one half (22.6 billion pkm) and that of Spain and Italy is less than one quarter (11.5 and 10.7 billion pkm, respectively) of the French figure. Spain shows the steepest traffic increase in the last few years, due to a rapid extension of their HSR network (see Fig. 2.3).

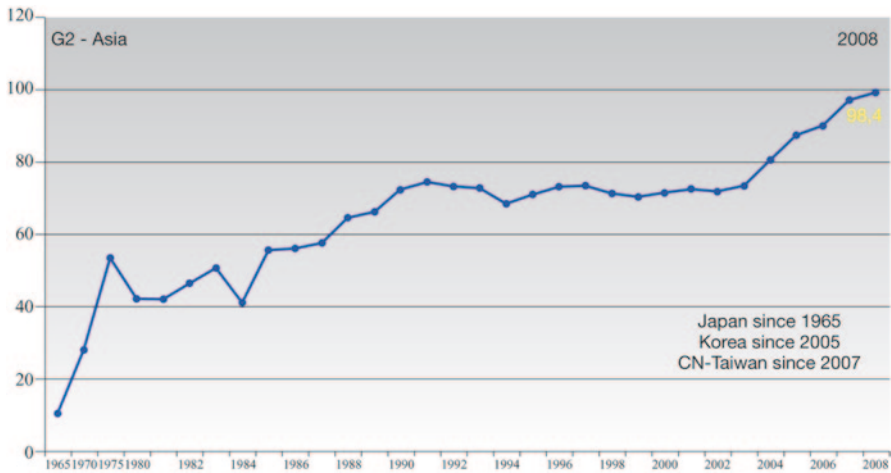


Fig. 2.5 Development of HSR in Asia (Japan, Korea, Taiwan). (Source: UIC 2011)

The upturn of rail passenger traffic in Spain in the past two decades is in particular due to the rapid HSR development. Figure 2.7 demonstrates that HSR in Spain makes already more than 50 % of the overall railway patronage. As only 46 million people live in Spain—compared to 127 million in Japan—the overall HSR patronage is still modest, and it is obvious that HSR in Spain will—despite its very successful development in the past 10 years—never reach the financial viability of the Japanese Shinkansen system. (Source: UIC 2011)

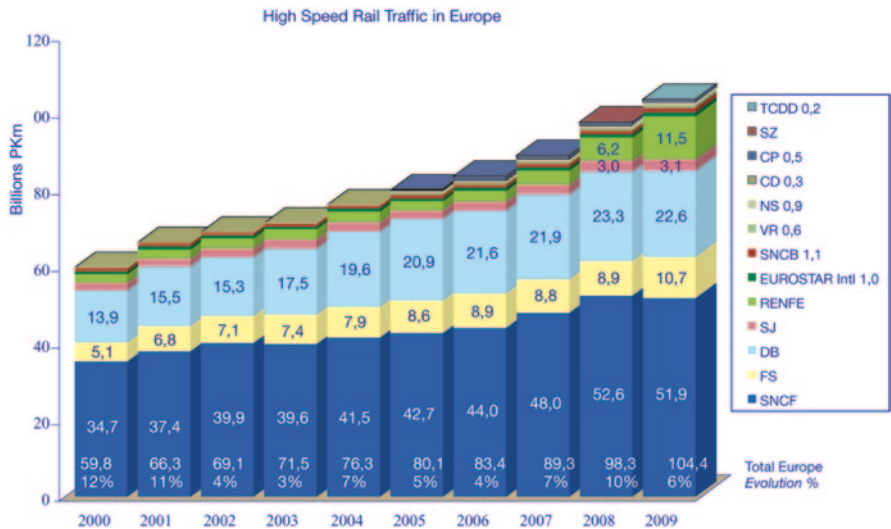


Fig. 2.6 Development of HSR performance in Europe by rail companies. Biggest companies: SNCF (France), DB (Germany), FS (Italy), RENFE (Spain). (Source: UIC 2011)

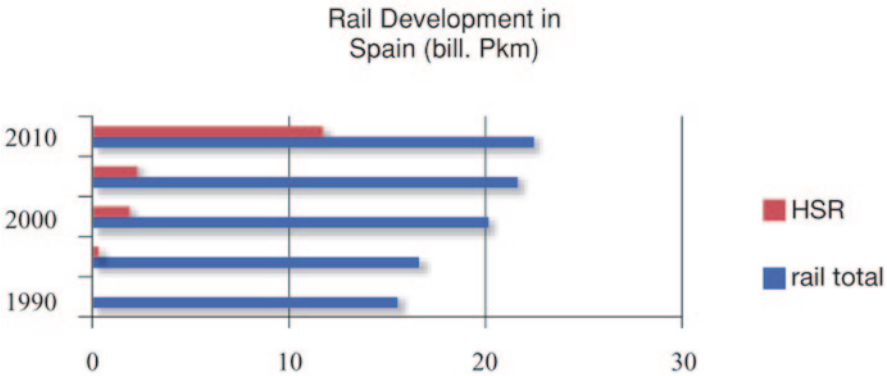


Fig. 2.7 Development of rail passenger transport and HSR in Spain (1990–2010). (Source: EU Commission 2012)

2.2.1.2 Modal Competition in Intercity Transport

The examples in the EU and other countries show the possibility of modal shift from airlines to railways in intercity transport or cooperation between airlines and railways. Figure 2.8 exhibits that the HSR link Madrid/Seville (471 km, opened in 1991) generated a remarkable modal shift from air to rail within 10 years from 33% in 1991 to 83.6% in 2000. This is higher than the HSR share, 72.9%, between Tokyo and Osaka (515 km) in 2010.

Figure 2.9 gives a comparison of the passenger modal split by distance categories in Japan, the USA and the UK. HSR is dominating the intercity travel patterns in Japan up to a distance of 750 km, while the competition with low-cost carrier

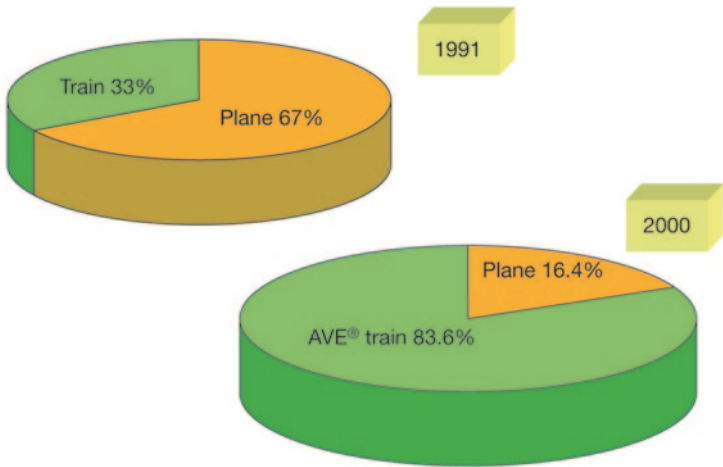


Fig. 2.8 Modal impact of HSR connection between Madrid and Seville within 10 years. (Source: UIC 2010)

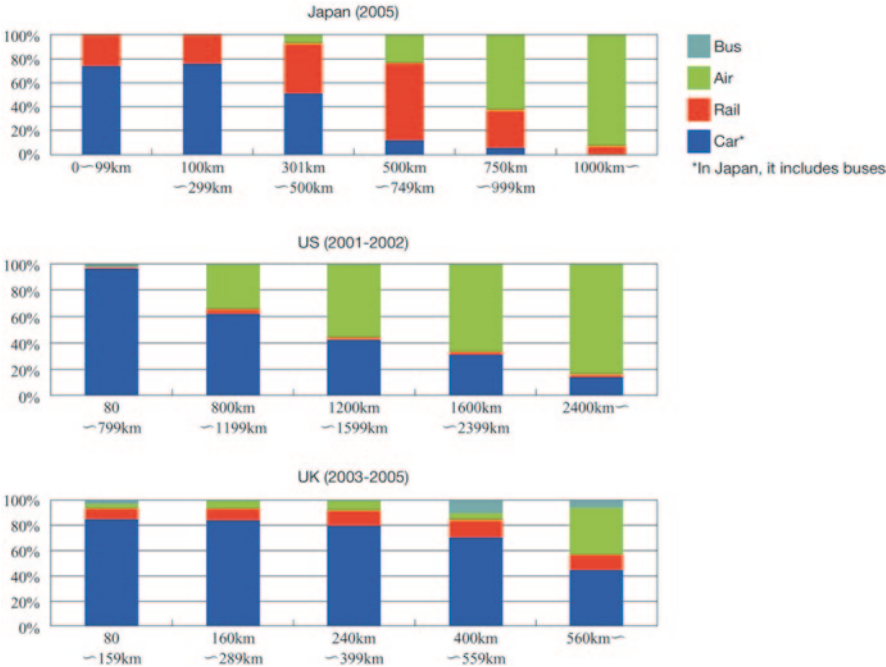


Fig. 2.9 Modal share by travel distance. (Source: Japan—MLIT 2010, USA—US Dept. of Transportation 2001, UK—Dept. of Transportation 2006)

(LCC) on distances between 500 and 1000 km has increased significantly. The US intercity travel is dominated by car and air transport; rail only plays a role in a few corridors like the NEC (Boston–New York–Philadelphia–Baltimore–Washington). Long-distance bus transport has been widely crowded out by LCC. In the UK, intercity rail transport shows a modest modal split and is subject to strong competition from LCC and partly from intercity bus service on distances beyond 500 km.

Intercity travellers compare the characteristics of each mode before making choices: fare, travel time, access to stations and airports, comfort, frequency, etc. Among these attributes of intercity modes, total door-to-door travel time—including access and waiting time—is a key for their choice.

The travel time of intercity railways is largely dependent on infrastructure policies, and is largely different, even among developed countries. Figure 2.10 exhibits the railway distance of major cities from the capital cities in various countries. There are big differences in railway travel time between the countries with HSR and those without. While the average travel speed is above 200 km/h in the countries with (Japan with the Shinkansen, France with TGV), it is just about 100 km/h in those without (the USA with Amtrak and the UK).

Figure 2.11a shows the share of railways compared to air on major domestic origin–destination (OD) pairs in Japan, the US and the UK. Railway shares are high in the regions along the Tokaido/Sanyo Shinkansen lines and low in the regions

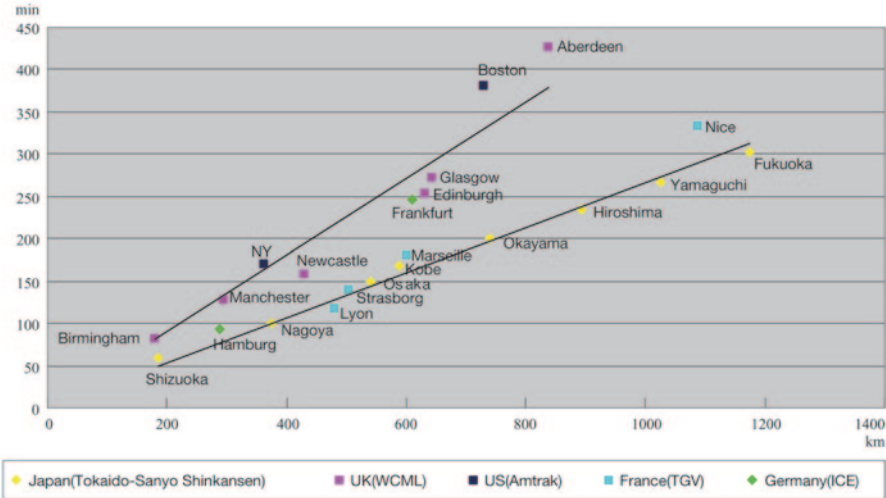


Fig. 2.10 Travel time versus distance from capital city by railway by country. (The figure was prepared according to the timetables of the respective railway companies in 2009)

without Shinkansen. Figure 2.11b shows the travel times by railway and its modal shares for selected OD pairs of Fig. 2.11a. It is possible to anticipate that railways are generally competitive with air when the travel time is no longer than 3–4 h. However, there are other factors such as fare, frequency and the level of service of rail companies and the competing airlines. In countries where LCCs are popular, such as the USA and the UK, the share of air transport is relatively higher than that in Japanese areas without Shinkansen service which indicates that in Japan LCC have not reached the low fare level of the USA and the UK.

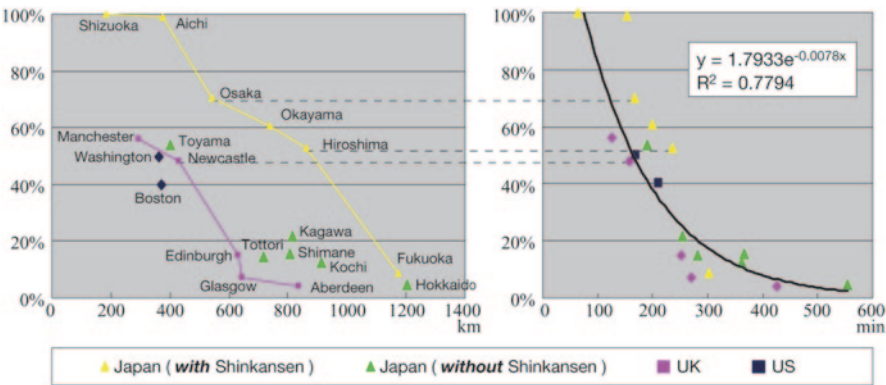


Fig. 2.11 a Distance and share of railway for selected OD pairs. b Travel time and share of railway (the origin of each journey is Tokyo for Japan, New York for the USA, London for the UK). (Source: Japan—Ministry of Land, Infrastructure, Transportation and Tourism 2009, USA—US Dept. of Transportation 2001, UK—Dept. for Transport 2007a.)

Table 2.1 Distance, travel time, and average speed of trains on selected origin–destination (OD) relationships in China

	Distance (km)	Time (min)	Speed (km/h)
Beijing–Shanghai	1318	288	274.6
Beijing–Tianjing	120	33	218.2
Guangzhou–Wuhan	1069	220	291.5
Guangzhou–Shenzhen	102	36	170.0
Shanghai–Nanjing	295	67	264.2
Shanghai–Jinan	912	201	272.2
Shanghai–Xuzhou	626	149	252.1
Beijing–Zhengzhou	693	150	277.2
Shanghai–Hangzhou	159	59	161.7
Shanghai–Kunshan	50	17	176.5
Shanghai–Suzhou	81	23	211.3

The comparison of the Tokaido Shinkansen between Tokyo and Osaka (515 km) and the NEC between Boston and Washington DC (730 km) is a typical example to explain the railway conditions of Japan and the USA. While the fastest Shinkansen train takes 2 h 25 min from Tokyo to Osaka, the Boston–Washington one takes more than 6 h, even with the fastest Acela Express. Although the maximum speed of Acela Express is 240 km/h in some sections, the speed is often restricted due to commuter trains using the NEC. Moreover, the frequency of the Tokaido Shinkansen (between Tokyo and Osaka) is about 330 trains per day, while that of Acela Express is less than 20 trains per day, even on weekdays. The difference in level of service has obviously affected the demand. Accordingly, the number of passengers for the Tokaido Shinkansen is 400,000 per day, while that of the Amtrak NEC is only 32,000.

Despite the similarities in geography and population distribution along the two megacity corridors, these two major railways corridors show remarkable differences with respect to travel speed, frequency, service quality and the resulting number of passengers. These differences may be attributed to the history of transport policy of the two countries. While the USA have concentrated on the construction of motorways and airports after WWII, Japan has developed the Shinkansen HSR system since the 1960s.

In China, HSR is also competitive on distances of 1000 km and more. Table 2.1 gives the reason: The high average speeds of 250 km/h or more provide acceptable travel times for long distances. Even on a distance of more than 1300 km, the travel time is not more than 5 h. Nevertheless, the majority of HSR passengers are counted on travel distances between 300 and 700 km (see Fig. 2.12).

2.2.2 *CO₂ Emissions from the Transport Sector*

A comparison of the trends of CO₂ emissions from various countries' transport sector, shown in Fig. 2.13a, b, indicates that per capita emission from transport sector is increasing while emission per gross domestic product (GDP) is decreasing. Japan

<http://www.springer.com/978-3-319-06522-9>

Intercity Transport and Climate Change

Strategies for Reducing the Carbon Footprint

Hayashi, Y.; Morichi, S.; Oum, T.H.; Rothengatter, W.

(Eds.)

2015, XIV, 280 p. 128 illus., 114 illus. in color.,

Hardcover

ISBN: 978-3-319-06522-9