

THE HIGH-SPEED RAIL IN THE WORLD

The construction of the High-speed infrastructure has always been related to the concepts of innovation and technological development.

The first country to develop a high-speed rail system was Japan in 1964 with the conclusion of the 515 km of line between Tokyo and Shin Osaka. The maximum speed permitted on the line was 270 km/h.

France was the first country in Europe to invest in the construction of the high-speed rail in the eighties with the line “LGV Paris-Sud Est”. It was followed by Italy with the end of the link between Rome-Florence in 1992, the so-called “Direttissima”. The duration of the journey between the two cities was reduced to 1 hour and 30 minutes.

Before starting the analysis is necessary to give a clarification about the difference between high-speed of first and second category.

The term first category refers to lines with a maximum speed is more than 250 km/h, while the second category is used to indicate lines with a maximum speed until to 250 km/h.

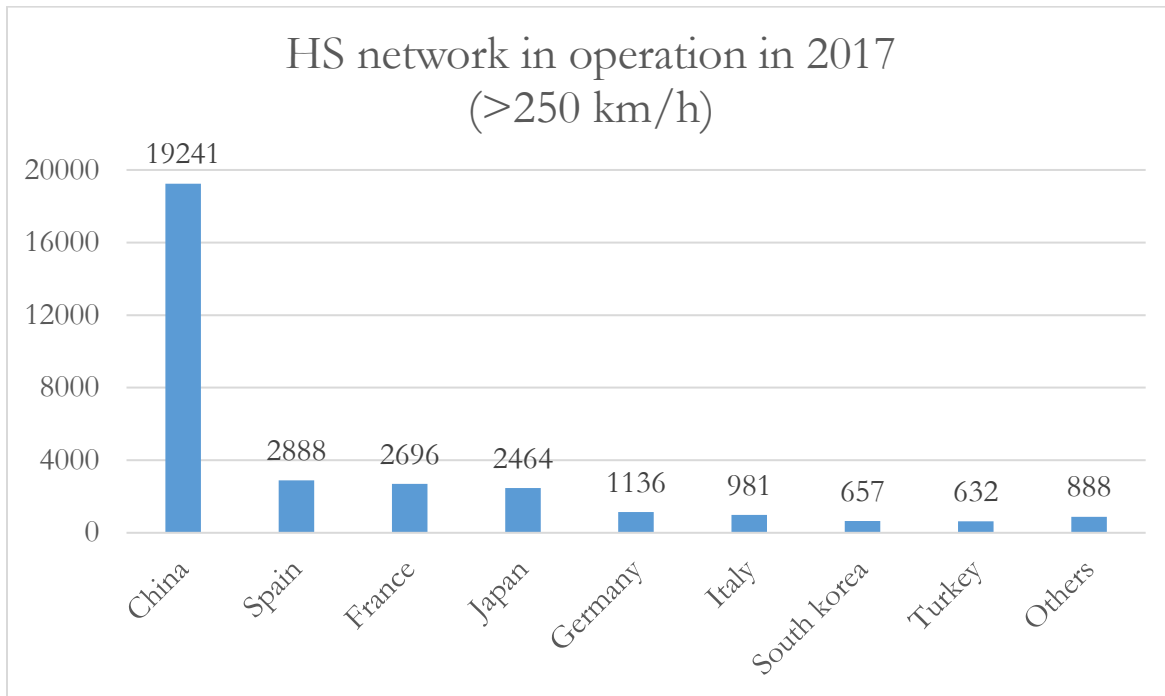
China with its 19241 km is the first country in the world for length of its I category high-speed lines.

Spain is the first country in Europe and the second after China in the world, considering just the high-speed lines of first category (the UIC figure has been corrected with the one of the Spanish infrastructure manager, ADIF).

France represents the third country in the world for length of high-speed infrastructure of first category, slightly lower than Spain.

In the graph below are shown the number of kilometers of high-speed rail of first category in the world, according to a study of the UIC (International Union of Railways).

Graphic 1: High-Speed rail in the world in 2017



Fonte: UIC-High Speed lines in the World (updated 3rd July 2017) and ADIF for Spain

Japan is the fourth country in the world followed by Germany and Italy, the last one reached 981 km of HS rail with the construction of the link between Milan (Treviglio)-Brescia.

Italy has an HS infrastructure just of first category, whose speed is between 250 km/h and 300 km/h.

Box case – the Japanese privatization

Japan was the first country to operate HS trains but also to privatize the rail system in the eighties.

The Government separated the rail operators based on the different geographic areas (for example JR East for the east part of Japan). During this process of privatization, a good part of the rail debt was paid by the Government.

In this country was maintained the vertical integration between infrastructure manager and the rail operator. In addition, the revenues relating to the development of the *real estate* have been considerably developed.

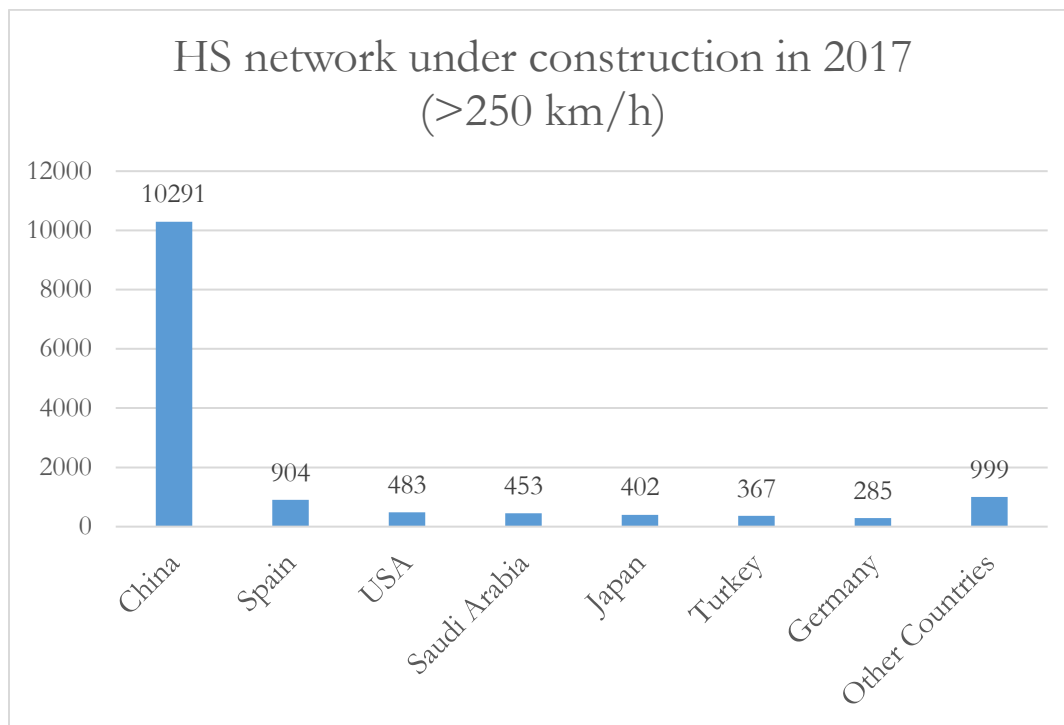
The actual situation sees a poor competition with the air transport with local monopolies in the rail transport. It is not a case that in Japan the average price of the tickets of the HS rail for the same distances is almost double respect to Italy.

South Korea, Turkey, Taiwan and Belgium hold the final positions. In the graph, Netherlands, UK and Switzerland haven't been represented because of the low number of HS km of first category, less than 150 km. Netherlands has 120 km of HS infrastructure of I category, UK 113 km and Switzerland just 92 km.

In 2016, Switzerland finished the construction of the Gotthard tunnel which has improved the time of the train journeys connecting faster the north of Italy to the north of Switzerland and theoretically to Germany.

The graph below represents the km of HS infrastructure of I category under construction in the world.

Graphic 2: HS rail under construction in the world



Source: UIC-High Speed lines in the World (updated 3rd July 2017)

Also in this case China holds the first place for km of HS rail under construction with more than 10 thousand km. Spain is first in Europe with 904 km under construction.

According to the study of the UIC the end of the works on the Spanish HS infrastructure will not be before 2022 with the conclusion of the link between Vitoria and Bilbao-San Sebastian.

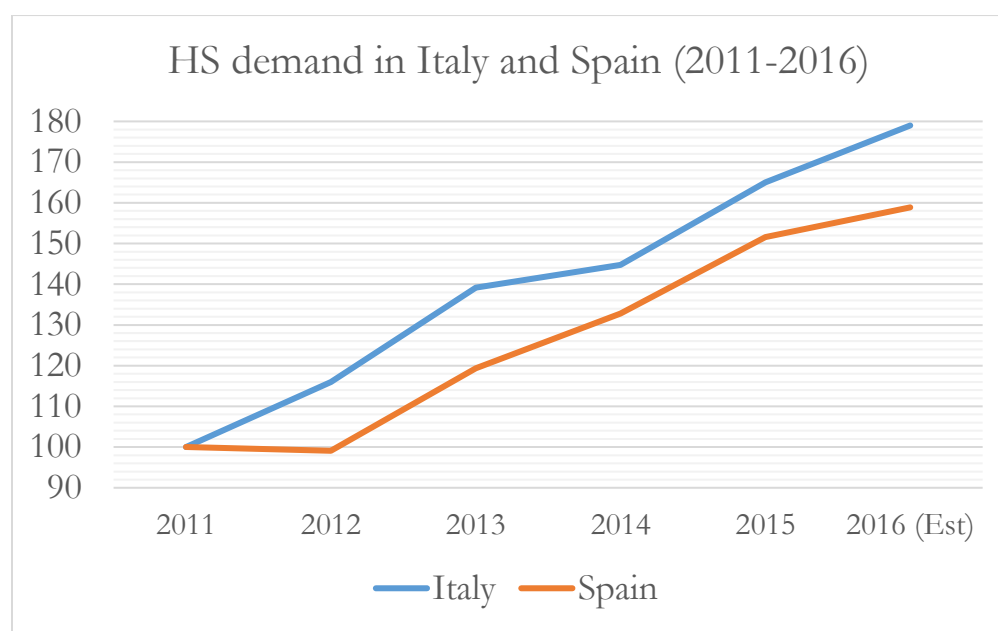
The United States of America have 483 km of HS rail infrastructure of I category under construction. The link from Fresno and Bakersfield will be concluded in 2022, part of the first route from Los Angeles to San Francisco. Now the USA have just a high-speed rail of II category, the “North East Corridor” where the maximum speed is 240 km/h.

Also, Saudi Arabia began a project of construction of a HS link, Medina-Jeddah, Mecca, which should be concluded in 2018. Followed by Japan with 402 km under construction, Turkey, Germany, Iran, Austria, Morocco and South Korea.

Italy is building 67 km, but in the last years the factor which allowed a doubling of the demand has been the opening of the HS rail market to competition.

If we compare the Italian and the Spanish case, is evident the difference in terms of development of the HS rail system.

Graphic 3: the HS demand in passenger-km (Base year 2011=100)



Source: data Ministerio Fomento for Spain and estimation for Italy Prof. Andrea Giuricin

The demand in Italy has grown around 80 percent between 2011 and 2016, while in the same period Spain registered an increase of traffic of 59 percent in number of passenger-km.

The Italian figure underlines a strong growth of the HS rail system, higher in comparison to the Spanish case, also considering that Spain holds the vastest HS rail infrastructure in Europe.

Between 2011 and 2016, the number of HS kilometers in Spain increases of 24 percent. Instead in Italy, the increase of the HS lines was 6 percent due to the construction of link between Treviglio and Brescia. The new Italian infrastructure was inaugurated at the end of 2016 and it hasn't had yet a considerable effect on the rail traffic.

The increase in the number of the Italian passenger-km is more than significant, taking into consideration that the Italian HS infrastructure hasn't had any changes between 2011 and the end of 2016.

South Korea – The second country to open to competition

Italy has been the first country to liberalize the HS rail market in the world. The second was South Korea, where the incumbent had started to operate in 2004 with the KTX service, while the new entrant SR in December 2016.

In December 2013, Suseo High-Speed Railway Corporation (SR) obtained the license, while in March 2014 ordered 10 trains. All the trains have 10 coaches, 410 seats and they can reach a maximum speed of 300 km/h. The number of seats are higher than the incumbent to reduce the cost per available seat km.

The new entrant SR uses a new station in Seoul, as well as a part of the line, which is the different than the one used by the incumbent. Overall the two operators share the lines.

In South Korea, there is vertical separation between the manager of the infrastructure and the rail incumbent.

Another difference with Italy is that the 41 percent of the shares of SR is owned by the incumbent, while the Italian operator NTV is completely private.

NTV and SR have signed a MOU (Memorandum of Understanding) in November 2015 with the aim of sharing the experience of the liberalization.

Conclusions

The China is the first country in the world for the length of its HS infrastructure, but also for number of passengers. The figures are impressive also because the first HS line was built less than 10 years ago.

Italy was the first country in the world to open the HS rail market to competition, followed by South Korea after 4 years.

Spain is the first country in Europe for the length of the HS rail infrastructure, but the traffic is lower than Italy because it hasn't opened yet to competition.

Japan was the first country to have private rail operators, but Italy has the only completely private operator in a competitive environment.

Italy is a very good example in the HS sector, because thanks to the liberalization process was experienced an outstanding increase of passengers without large network of high speed rail infrastructures.