California High-Speed Rail Project

International Case Studies

October, 2011

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The global infrastructure community has made great strides towards providing passengers with quality rail transport. To date, at least 20 countries acknowledge that high speed trains are an essential technological advancement in passenger travel. These countries have dedicated billions of dollars to developing and operating rail way systems, substantially altering infrastructure legislation and policy as well as transport development, planning and design. These countries have experienced positive wide rippling effects of high speed transportation, not only in technology progression and development, but also effects such as, economic growth, reduction of green house gases, efficient use of land, increase in employment and efficient access to domestic and international cities, all with the goal of improving the quality of life. In keeping with this ideology, even emerging economies understand the beneficial impact high speed lines have on economic growth. Emerging markets, Brazil, Russia, India and China combined, have over 9,000[1] miles of high speed lines either in operation, under construction or planned.

During the 1980's,[2] only 923 miles of high speed lines were in operation. Currently, as of June 2011, there are over 10,000 miles of high speed lines operating around the world, 11 times more than what existed in the 1980's. Out of the present high speed systems around the world, 6 countries (Japan, Germany, Taiwan, France, United Kingdom and Spain) were analyzed for precedent with a focus on business models, construction costs, ridership, governance, funding sources and lessons learned. Constructing these miles of high-speed infrastructure involved high levels of planning and phasing, demonstrating that deciding which section to begin construction is significant as the impact of delivering the IOS segment effects the overall system and the potential US high-speed rail market. From Japan's Shinkansen bullet train to Germany's ICE network, these countries, among several others, have decades of international experience to share with the United States as it continues the understand how to establish its own high-speed train system.

[1] UIC High Speed Department, High Speed Lines in the World, July 2011; Union Internationale des Chemins de fer ("UIC") or International Union of Railways, is an international railway organization formed in 1922; see www.uic.org

[2] UIC High Speed Department, High Speed Lines in the World, July 2011

Miles of High-Speed Lines Around the World[3]

Miles of High-Speed Lines in the World				
Country	In Operation	Under Construction	Planned	Total
	Asia			
China	3914	2696	1803	8413
India			308	308
Iran			295	295
Japan	1484	200	362	2046
Saudi Arabia			341	341
South Korea	256	116	30	402
Taiwan	214	-	-	214
Turkey	146	317	1043	1506
Asia Total	**6014**	**3329**	**4182**	**13525**
	Europe			
Belgium	130	-	-	-
France	1177	115	1016	2308
Germany	798	235	416	1449
Italy	574	-	245	819
Netherlands	78	-	-	78
Poland	-		442	442
Portugal	-	-	625	625
Russia			404	404
Spain	1735	1325	1058	4118
Sweden	-	-	466	466
Switzerland	22	45	-	67
United Kingdom	67	-	127	194
Europe Total	**4581**	**1720**	**4799**	**10970**
	North America			
North America	224	-	585	809
N. America Total	**224**	**-**	**585**	**809**
	South America			
Brazil	-	-	318	318
Argentina	-	-	196	196
S. America Total	**-**	**-**	**514**	**514**
	North Africa			
Morocco	-	124	298	422
N. Africa Total	**-**	**124**	**298**	**422**
World Totals	**10595**	**5173**	**10378**	**26240**

[3] UIC High Speed Department, High Speed Lines in the World, July 2011

France High-Speed Rail

Overview:

France initiated its high-speed rail program, Train a Grande Vitesse ("TGV"), in the late 70's and opened its first service in 1981 between Paris and Lyon. Since then its hub and spoke network has developed considerably and revolutionized the way people travel, taking market share from air and road travel.

Key Facts:

Date Opened for Service: 1981 Paris – Lyon
Route Length (miles): 1,178
Under Construction (miles): 115[4]
Major Cities Served: Paris, Lyon, Marseilles, Lille, Strasbourg
Infrastructure Owner: Réseau Ferré de France ("RFF")
Infrastructure Operator: RFF
Train Operator: Société Nationale des Chemins de fer Français or French National Railway Corporation ("SNCF")
Annual Ridership: 114 million[5]
Commercial Speed: up to 200 mph

Governance:

In compliance with European Union ("EU") regulations, France has enforced a separation of rail operations and infrastructure management through the creation of RFF. RFF is a government owned company and mainly focuses on debt financing and managing SNCF, which is also state-owned. SNCF operates TGV, the long distance division.

Key Operators/HSR Brand

Source: http://en.wikipedia.org/wiki/SNCF

Source: http://en.wikipedia.org/wiki/TGV

Source: http://en.wikipedia.org/wiki/TGV

Map of HSR System

Underlying Funding and / or Financing Sources for Capital Costs:

Funding of high-speed rail projects up to late 2000 relied on a combination of central, regional and local grants and additional EU

[4] Including TGV Rhin – Rhône (90 miles) to be completed in 2011

[5] International Lessons for U.S. Policy Makers citing UIC High-Speed Rail (2009)

subsidies. However, due to diminishing public funding, new high-speed rail projects depend on a mix of previous sources as well as private sector involvement through concession contracts. LGV Perpignan-Figueres, a high speed rail line connecting France to Spain, was the first project to be financed using a P3 model. In February 2005, TP Ferro, a private consortium of construction companies, signed an agreement with the French and Spanish governments. Parties to the agreement included the Intergovernmental Commission, jointly created by France and Spain, RFF, Gestor de Infraestructuras Ferroviarias ("GIF")[6] and SNCF. LGV Perpignan-Figueres opened in 2010 and construction on TGV Bordeaux is due to start in 2012.

TGV Bordeaux – Tours Example

The Bordeaux – Tours high-speed line is a new 187 mile rail way linking Paris to Bordeaux in 2 hours and 5 minutes (fastest service). The project's total cost is €7.8 bn ($10.9 bn).

The P3 structure involves:

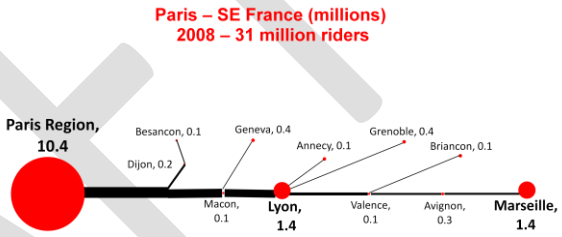
- The Central Government and RFF €4.0bn ($5.6 bn)[7]
- LISEA, Concessionaire lead by VINCI group €3.8bn ($5.3 bn)

The concession agreement was executed on June 2011 by LISEA and RFF. The concession contract includes terms regarding financing, design, build, operations and maintenance. LISEA will receive income from train operating companies through access charges.

Population Served/Ridership/Revenue:

With a population of 65 million,[8] France has the world's fifth largest and Europe's second largest economy. Since the first year of operation ridership has increased dramatically. The TGV network connects passengers to the Netherlands, Germany, Belgium, Italy and Switzerland through the Thalys and to the United Kingdom through the Eurostar.

In 2007, SNCF reports to have generated US$1.75 bn in profits[9] which were mainly a result of the TGV services.[10]



[6] Also an infrastructure manager

[7] Euro to USD exchange rate of 1.4

[8] https://www.cia.gov/library/publications/the-world-factbook/geos/fr.html

[9] http://en.wikipedia.org/wiki/TGV

[10] Demographia World Urban Areas Population & Projections, 2011; Wikipedia.org; http://www.bonjourlafrance.com/index.aspx

Key Lessons Learned:

- Convenient and extensive high-speed routes can be strong competitors against other modes of travel
- A phasing approach leads to generating revenue to all invested parties at an early stage in the process
- The Tour Bordeaux P3 had established players and proven technology which reduced project risk and system interfaces
- Selected business model should have shared funding requirements that reflect allocation of project risk
- P3 models have been successful at transferring capital cost and revenue risk to private sector for HSR system expansions

"It is the largest European rail PPP developed to date. Without this type of procurement, the project would have suffered long delays or would not even have happened."
—Hubert du Mesnil, RFF President (commenting on the size and the complexity of the project)

Germany High-Speed Rail

Overview:

Germany's high speed system, Intercity Express (ICE), has been generationally upgraded from its existing rail system dating back to the 19th century. The network was not planned as an integrated system and is organized in a grid-like pattern unlike the French system which has a hub and spoke network. ICE has a variety of speeds ranging from 155 mph to about 199 mph with connections to other international systems.

Key Facts:

Date Opened for Service: June 1991
Route Length (miles): 798
Under Construction (miles): 235
Major Cities Served:
Frankfurt, Cologne, Munich, Berlin
Infrastructure Owner: Deutsche Bahn ("DB") Netz AG
Infrastructure Operator: DB Netz AG
Train Operator: DB Fernverkehr
Annual Ridership: 74 million (2009)[11]
Commercial Speed: up to 186 mph

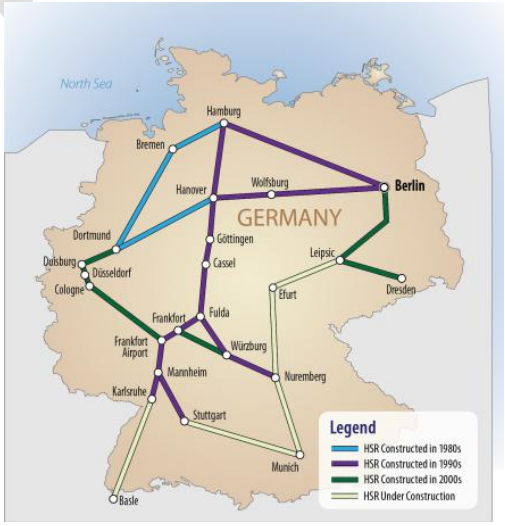
Governance:

Deutsche Bahn Holding is a private joint stock company owned by the government. It has over 500 subsidiaries and is located in over 130 countries. Each division, as mandated under European Union ("EU") liberalization laws, has separate accounts. DB Netz AG is the infrastructure operator and a DB subsidiary that manages operations and provides the railing. It is under the umbrella group, DB Netze Track, which is DB's rail infrastructure unit. DB Fernverkehr, also a DB subsidiary, operates long-distance passenger trains in Germany, particularly the ICE trains, Intercity and EuroCity trains. Although there are other operators throughout Germany, DB Fernverkehr operates the majority of these trains and has agreements with several subcontractors such as Veolia Verkehr.

Key Operators/HSR Brand

Source: SiemensVelaroD-InnoTrans2010.jpg

Map of HSR System



[11] International Lessons for U.S. Policy Makers citing UIC High-Speed Rail (2009)

Underlying Funding and/or Financing Sources for Capital Costs:

Nurnberg – Ingolstadt Example

The Nurnberg – Ingolstadt high-speed section, capable of 186 mph, was built in 2006 and connects passengers from Munich to Nurnberg. The capital cost for the 107 mile section was €3.6bn ($5.0bn[12]). Generally, German infrastructure projects are primarily funded by the federal government with contributions from DB via user charges, state, municipal and EU subsidies. Nurnberg – Ingolstadt was funded with the following structure:

- Federal Government: €2.1bn ($2.9 bn)
- Deutsche Bahn: €1.2bn ($1.6 bn)
- Regional Government: €0.2bn ($0.25bn)
- European Union: €0.2bn ($0.25 bn)

Population Served/Ridership/Revenue:

Germany's population is about 81 million, ranking 16th in the world, ranked first as the largest European economy.[13] From 1991 to 2006, 550 million passengers utilized ICE. In 2005 ICE transported 67 million customers and in 2009, 74 million customers.[14] The system's polycentric network allows passengers to travel east to west, for example, Berlin to Hamburg, and north to south, for example, Amsterdam to Munich. Passenger traffic is heaviest between Frankfurt and Mannheim with the Munich-Augsburg line dispatching 300 trains daily.

DB reports earning €1.9 billion ($2.6 bn) in operating costs during 2010[15] and expects to earn $50 billion during the 2011 in ticket revenues.

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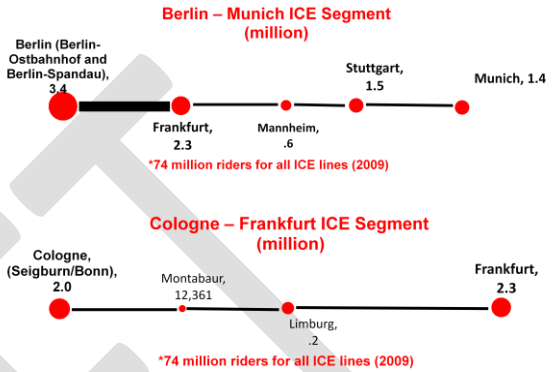


Key Lessons Learned:

- Convenient and extensive high-speed routes can be strong competitors against other modes of travel
- An integrated network of high-speed and conventional trains offers passengers access to wider destination options, even though high-speed service is only available on portions of the network
- Mixed use (passenger and freight) of lines as well as combining high-speed line service with upgraded conventional lines can be complicated and requires effective planning and organization

> *"Rail travel fundamentally changed the lives of the people. It gave them a new degree of mobility and spurred industrial development."*
>
> —Deutsche Bahn

[12] Euro to USD exchange rate of 1.4

[13] https://www.cia.gov/library/publications/the-world-factbook/geos/gm.html

[14] http://en.wikipedia.org/wiki/Intercity-Express

[15] http://www.bahn.com/i/view/GBR/en/about/overview/company_profile.shtml DB AG does not specify which sector of train service yielded these profits

[16] Urban area population from Demographia World Urban Areas Population & Projections, 2011; Wikipedia.org

Japan High-Speed Rail

Overview:

The Japanese Shinkansen system, which opened in the mid 1960's, is the first dedicated high-speed rail system. It is one of the busiest, safest and most reliable systems in the world.

Key Facts:

Date Opened for Service: October 1964 (Tokyo-Osaka)
Route Length (miles): 1,655
Under Construction (miles): 235
Major Cities Served: Tokyo, Kyoto, Osaka, Nagoya, Kobe, Hiroshima
Infrastructure Owner: Japan Railway Construction Public Corporation ("JRCC")
Infrastructure Operator: Japan Railways Group ("JR Group")
Train Operator: JR Central, JR West, JR East, JR Kyushu, JR Hokkaido
Annual Ridership: 289 Million (All lines)[14]
Commercial Speed: up to 186 mph

Governance

Construction and ownership of track is the responsibility of JRCC, which is a public corporation and successor to the government-run Japan National Railway ("JNR"). In 1987 the Japanese government decided to privatize and restructure JNR due to its debt of $300 billion and the government's inability to pay.[15]
JR Group is comprised of six separate passenger companies and one freight company. Of those seven, four operate high-speed passenger trains, JR Central, West, East and Kyushu. JR Hokkaido is currently constructing a high-speed line. JR West, Central and East are private operators, JR Kyushu and Hokkaido is government-owned.

Underlying Funding and / or Financing Sources for Capital Costs:

Traditionally, the Japanese system has been built using 2/3 state loans and 1/3 local government loans with the expectation that local communities contribute matching funds. JNR bonds, World Bank and Japanese government loans also added to financing construction of the system.

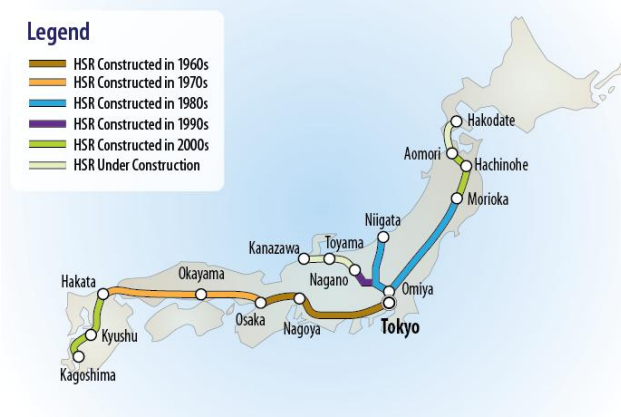
Key Operators/HSR Brand

Source:http://en.wikipedia.org/wiki/File:JR_logo_JRgroup.svg

Source:http://en.wikipedia.org/wiki/Ky%C5%ABsh%C5%AB_Shinkansen

[14] International Lessons for U.S. Policy Makers citing UIC High-Speed Rail (2009)
[15] Center of Financial Services and World Bank Best Methods of Railway Restructuring and Privatization p13

Map of HSR System



Source: http://en.wikipedia.org/wiki/Shinkansen

Population Served/Ridership/Revenue:

With a busy population of 127 million, the nation of Japan has the 3rd largest economy with the 10th largest population in the world.[16] Annual ridership of all high speed lines is about 289 million. The Tokyo to Osaka route, included on the Tokaido Shinkansen network, is the busiest route in the world with annual ridership exceeding 138 million passengers, as of 2010,[17] and revenue surpassing $15 billion. The Tohoku Shinkansen route had 88 million passengers in 2010.[18] By 2010, the Tokaido Shinkansen network had cumulatively transported 4.9 billion passengers since 1967.[19] To date, the entire network has carried over 6 billion customers.[20]

In March 2011, JR Central reported ¥1.5 billion (USD 19.7 million) in operating revenues for FY2011, and just under ¥1.5 billion ($19.7 million) in FY2010.[21] Operating income for that period was reported to be ¥349 million ($4.6 million) in FY2011 and ¥293 million ($3.9 million) in FY2010.[22]

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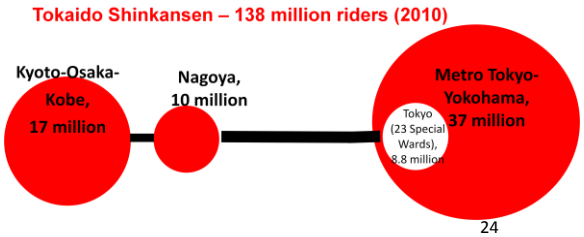

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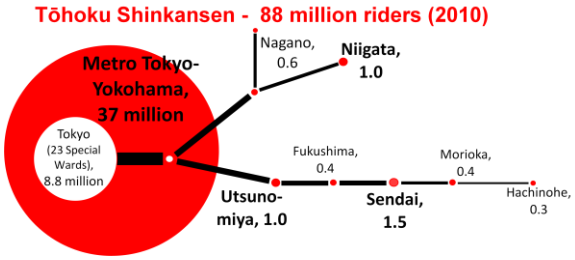


[16] https://www.cia.gov/library/publications/the-world-factbook/geos/ja.html
[17] http://english.jr-central.co.jp/about/outline.html
[18] http://mobile.bloomberg.com/news/2011-04-27/japan-bullet-trains-resume-as-8-500-engineers-fix-quake-damage
[19] http://en.wikipedia.org/wiki/Shinkansen
[20] Id.
[21] http://english.jr-central.co.jp/company/ir/brief-announcement/_pdf/fr33.pdf
[22] Id.; USD to Yen exchange rate of .013
[23] http://english.jr-central.co.jp/about/outline.html Areas in bubble graph only include populations with at least 1 million people.; Demographia World Urban Areas Population & Projections, 2011; Wikipedia.org
[24] http://mobile.bloomberg.com/news/2011-04-27/japan-bullet-trains-resume-as-8-500-engineers-fix-quake-damage

Main Shinkansen Routes and Opening Dates[25]			
JR Line	Operator	Opening Years	Annual Passengers (millions)
Tokaido	JR Central	1964	151
Sanyo	JR West	1972 - 1975	63
Tohoku	JR East	1982 – 2011	84
Joetsu	JR East	1982	38
Nagano	JR East	1997	10
Kyushu	JR Kyushu	2004, 2011	4

"While operating 341 ultra-high-speed services a day that run at 270 kph we have maintained punctuality as well as a perfect safety record with no accidents resulting in fatalities since the commencement of commercial operation."

—JR Central

Key Lessons Learned:

- Phased implementation is a successful strategy for building a profitable high-speed rail network
- Ridership numbers increase over time as speed, reliability, comfort and safety are established
- High frequency with established feeder networks creates significant synergies that benefit passengers and boost ridership
- Ancillary revenue streams (e.g., station-area development revenues) can supplement ticket revenues

[25] http://en.wikipedia.org/wiki/Shinkansen citing Rail Transport Statistics (2007, Ministry of Land, Infrastructure and Transport) (Japanese)". Mlit.go.jp. http://www.mlit.go.jp/k-toukei/saisintoukei.html. Retrieved 2009-11-30.

Spain High-Speed Rail

Overview:

The Spanish high-speed rail system, Alta Velocidad Espanola ("AVE") opened in 1992 to link Madrid with the World Fair Exposition being held in Seville. The popularity of this line led to the additional development that would add more than 1,000 miles of HSR track with more than a dozen new stations to the original Madrid-Seville line making it one of the largest HSR networks in the world.

Key Facts:

Date Opened for Service: April 1992 (Madrid to Seville)
Route Length (miles): 1,278
Under Construction (miles): 1,098
Major Cities Served: Madrid, Barcelona, Seville
Construction Cost per Mile: $28 - $56 million per mile[26]
Infrastructure Owner: Administrador de Infraestructuras Ferroviarias ("ADIF")
Infrastructure Operator: ADIF
Train Operator: Red Nacional de Ferrocarriles Españoles or National Network of Spanish Railways ("RENFE") Operadora
Annual Ridership: 29 million[27]
Commercial Speed: up to 186 mph

Governance:

In 2005, pursuant to European Union ("EU") legislation requiring separation between infrastructure operators and managers, RENFE was divided into two entities: ADIF and RENFE Operadora. Both entities are still state-owned and managed by the Ministry of Public Works and Transport. ADIF oversees most of Spain's rail, signaling and station matters. It also handles construction of new railway lines, manages traffic operations and allocates capacity for rail undertakings.[28] RENFE Operada is Spain's main rail operator, providing freight and passenger transport services.[29]

Underlying Funding and / or Financing Sources for Capital Costs:

Infrastructure project funding is generally a combination of financing from the EU, regional and development funds, Spanish state funds and private development. ADIF contributes to financing through user fees. Some of the EU sources have been:[30]

- Trans-European Transport Network ("TEN-T"), giving priority to cross-border projects
- Cohesion funds, allows Member States to reduce economic and social disparities to stabilize economies
- European Regional Development Funds ("ERDF") stimulates economic development in less prosperous EU regions.

Further, the Spanish government is highly committed to extending its high-speed network and expects to allocate 1.5% of the nation's GDP to infrastructure improvements until 2020.[31]

Key Operators/HSR Brand

Source:http://en.wikipedia.org/wiki/RENFE

Source:http://en.wikipedia.org/wiki/AVE

[26] Strategic Infrastructure and Transport Plan 2005 – 2020 (PEIT)
[27] International Lessons for U.S. Policy Makers citing UIC High-Speed Rail (2009)
[28] ADIF. The Right Strategic Partner for California High Speed Rail
[29] http://www.RENFE.com/EN/empresa/index.html
[30] Ernst & Young, High Speed 2(Dec. 2009)
[31] Id.

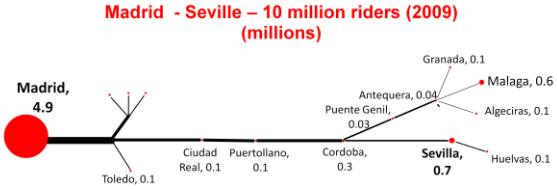
Source: http://en.wikipedia.org/wiki/RENFE

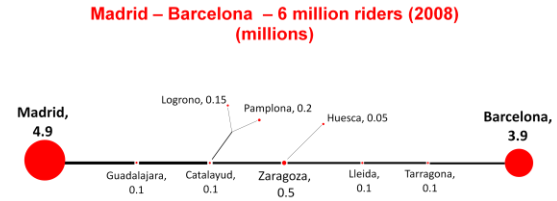
Map of the HSR System

Population Served/Ridership/Revenue:

Today 47 million people live in Spain, the 13th largest economy in the world.[32] The Spanish government began operating with the Madrid-Seville connection in 1992 but has since expanded to reach Barcelona, Valencia and the Levante region with 307 trains operating daily.[33]AVE also plays a prevalent role in Spain's exporting industry. Current construction on the AVE plans to connect Barcelona to the French TGV network. Within the first year, AVE had over 1 million customers.[34]

RENFE Operada reported 19% of Madrid-Barcelona's 2010 operating costs as profits.[35] [36]





[32] https://www.cia.gov/library/publications/the-world-factbook/geos/sp.html

[33] ADIF. The Right Strategic Partner for California High Speed Rail Sacramento. June, 2011 http://www.cahighspeedrail.ca.gov/WorkArea/DownloadAsset.aspx?id=10238

[34] Renfe Institutional Presentation to the CHSRA Board Sacramento. June, 2011 http://www.cahighspeedrail.ca.gov/WorkArea/DownloadAsset.aspx?id=10238

[35] Renfe Institutional Presentation to the CHSRA Board Sacramento. June, 2011 http://www.cahighspeedrail.ca.gov/WorkArea/DownloadAsset.aspx?id=10238

[36] Demographia World Urban Areas Population & Projections, 2011; Wikipedia.org

Key Lessons Learned:

- Ridership mode switch may take approximately five years to achieve a stable user base
- Spain's determination to expand its high-speed system has led the country to be considered one of the best high-speed networks in the world
- Convenient and extensive high-speed routes can be strong competitors against other modes of travel, particularly airlines
- Phased implementation is a successful strategy for building a profitable high-speed rail network and allows for proven performance of the early stage to generate private investment to fund system expansion

> *"The start of the AVE service between Madrid and Seville opened up a new epoch for the railway in Spain. This milestone was a turning point in the process of change for trains, which have re-emerged with force and with a focus on innovation."*
>
> —RENFE

Taiwan High-Speed Rail

Overview

Taiwan's rapid economic growth during the latter half of the twentieth century led to saturation of highway, conventional rail, and air traffic systems in its western transport corridor, which threatened to impede further growth. High-speed rail was identified as the best way to alleviate this congestion. To expedite development and reduce risk, Taiwan used technology based on Japan's Shinkansen coupled with European standards and system components.

Key Facts:

Date Opened for Service: January 2007
Route Length (miles): 214
Under Construction (miles): 0
Major Cities Served: Taipei, Taichung, Kaohsiung, Tainan
Total Capital Cost ($US): $18 billion
Construction Cost per Mile: $84 million
Infrastructure Owner: Taiwan High-Speed Rail Corporation ("THSRC")
Infrastructure Operator: THSRC
Train Operator: THSRC
Annual Ridership: 32 million[37]
Commercial Speed: up to 186 mph

Governance:

In 1998, a concession contract was executed between the Republic of China and THSRC granting a 35-year concession to finance, build and operate the system as well as a concession for high-speed rail station area development for a period of 50 years.

Underlying Funding and / or Financing Sources for Capital Costs:

The project was built by a private sector venture with a Build-Operate-Transfer ("BOT") model through government support. Before operational commencement, government intervention was required to complete the project, with the eventual structure being dictated by the private sector and funders.

Key Operators/HSR Brand

台灣高鐵
TAIWAN HIGH SPEED RAIL

Source: Taiwan High Speed Rail Corporation (THSRC)

Source: Taiwan High Speed Rail Corporation (THSRC)

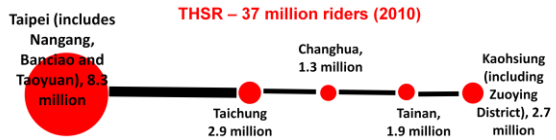
[37] International Lessons for U.S. Policy Makers citing UIC High-Speed Rail (2009)

Map of HSR System

Population Served/Ridership/ Operating Revenue:

Taiwan's population of 23 million[38] travels through mountainous terrain and requires efficient transport for its growing economic demands, particularly along the western coast. Initially, daily ridership forecasts were estimated to be 140,000 passengers per day.[39] However, six months after opening, THSRC carried 50,000 passengers daily.[40] In the third year, average daily ridership grew to 88,000 passengers. [41] In 2010, about 101,000 customers per day utilized THSR.[42]

Although revenues fell in 2008, the second year of operation, revenues grew along with ridership over the first three years. Just after four months of operation, revenues generated a positive operating cash flow. In 2009, THSRC reported ticket revenues of NT$23 billion ($759 million) operating revenue of NT$23 billion and operating cash flow of NT$14 billion ($462 million).[43] [44]



Key Lessons Learned:

- Conservative approach to ridership expectation is recommended
- It is possible to generate positive cash flow within the first year of operations
- Using existing technology reduces risk and expedites system operability

> *"By looking back at the history of the transportation developments in Taiwan … we realized that building any form of transportation system, which always have [sic] the immediate and long-term impacts on its regional development, an efficient and safe transportation [system] would definitely change the habit, attitude and lifestyle of the society."*
>
> —Taiwan High-Speed Rail Corporation

[38] https://www.cia.gov/library/publications/the-world-factbook/geos/tw.html; http://www.demographia.com/db-worldua.pdf

[39] http://en.wikipedia.org/wiki/Taiwan_High_Speed_Rail (citing initial ridership estimates)

[40] Id.

[41] Id.

[42] Id.

[43] http://en.wikipedia.org/wiki/Taiwan_High_Speed_Rail#cite_note-FinRep2009-121 citing 2009 Financial Report";http://www.thsrc.com.tw/download/tc/file/01/thsrc_f_98_full.pdf. Retrieved 2010-09-18; USD to NT exchange rate of .03

[44] Urban area population from Demographia World Urban Areas Population & Projections, 2011; Urban areas with less than 1 million were omitted from bubble graph: Hsinchu (650,000), Miaoli (560,802), Chiayi(549,000)

United Kingdom High-Speed Rail

Overview:

Channel Tunnel Rail Link ("CTRL"), also referred to as High Speed 1 ("HS1") runs from central London (St. Pancras Station) to the United Kingdom ("UK") portal of the Channel Tunnel. The UK Government is currently planning an extension to the north of England, High Speed 2("HS2"). In 1996, HS1 was awarded to London and Continental Railways ("LCR") to be pursued as a privately financed project on a design, build, finance and maintain basis. However, following a rescue restructuring of LCR completed in 2009, the rights to operate the infrastructure assets were sold to HS1 Limited ("HS1 Ltd") in 2010.

Key Facts:

Date Opened for Service: September 2003 (section 1); November, 2007 (section 2)
Route Length (miles): 70
Under Construction: 0
Major Cities Served: London, Ashford
Total Capital Cost ($US): $9.3 billion (£ 5.8 bn)
Construction Cost per Mile: $140 million
Infrastructure Owner: LCR, a company wholly owned by the UK Government.
Infrastructure Operator: HS1 Ltd. (owned jointly by Borealis Infrastructure and Ontario Teachers' Pension Plan)
Train Operator: Eurostar, high speed service; Southeastern, domestic service
Annual Ridership: 9.2 million[45]
Commercial Speed: up to 186 mph

Governance:

Eurostar, the train operator became an independent business entity on September 1, 2010 and is owned by three shareholders: French National Railway Corporation (55%), National Railway Company of Belgium (5%) and LCR (40%).

[45] International Lessons for U.S. Policy Makers citing UIC High-Speed Rail (2009)

Following a sale process completed in 2010, HS1 Ltd. became the infrastructure operator and holds the concession to operate, manage and maintain the high-speed railway infrastructure until December 2040. HS1 Ltd. paid the UK government approximately £ 2.1 billion ($3.4 bn) to acquire operating rights. Network Rail is a contractor to HS1 Ltd. for maintaining and operating the railway infrastructure and three stations, St. Pancras International, Stratford International and Ebbsfleet International. Eurostar maintains and operates Ashford International Station.

The UK Government, via its ownership of LCR, owns the infrastructure of the railway and the freehold to the associated land.

Key Operators/HSR Brand

Source: www.eurostar.com; en.wikipedia.org/wiki/Eurostar

Source: http://www.southeasternrailway.co.uk

Source: en.wikipedia.org/wiki/Eurostar

Map of HSR System

Underlying Funding and / or Financing Sources for Capital Costs:

HS1 was originally planned to be constructed in a single phase. In 1998, however, overly optimistic ridership projections caused LCR to have financial difficulties. Thus, the project was divided into two sections. Section 1, which cost £1.9 bn ($3 bn) to build, was completed in 2003. Section 2, which cost £3.9 bn ($6.2 bn) to build, was completed in 2007. LCR's insolvency in 2009, forced the UK government to take control of LCR.

HS1 Funding Structure:

- Central Government Debt
  - Section 1: £2.65 billion ($4.3 bn)[46] (69%)
  - Section 2: £1.25 billion ($1.9 bn) (42%)
- Central Government Grants
  - Section 1: £ 0.7million ($1.1bn) (18%)
- Section 2: £1.2 billion ($2.6 bn)(58%)
- Third Party Finance
  - Section 1: £0.49 million[47] ($.78 bn) (13%)

[46] Includes initial operating Eurostar losses; GBP to USD exchange rate of 1.6

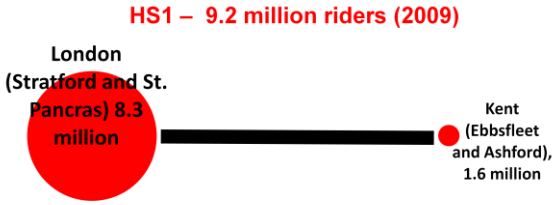
[47] This figure is a combination of debt and equity used to finance enabling work for first two years of development.

Population Served/Ridership/Revenue:

The UK population of 63 million[48] now has access to domestic high-speed train service from London to Kent. International passengers travel to Paris in just over two hours and to Brussels in less than two hours. Domestic passengers also save on travel time. A trip from central London to Ashford is now only 37 minutes, down from 84 minutes. Additionally, international services account for approximately 40% of Eurostar's capacity. Southeastern offers domestic services under the integrated Kent franchise.

Since HS1 opened in 2003 ridership steadily increased. Revenue also increased from £675 million ($1.1 bn) in 2009 to £760 million ($1.2 bn) in 2010.[49]

[50]



Key Lessons Learned:

- Proper timing of risk transfer to private sector is imperative for development of complex infrastructure assets. The original plan to let a concession for the initial line supported by full revenue risk failed due to

[48] https://www.cia.gov/library/publications/the-world-factbook/geos/uk.html

[49] http://www.bbc.co.uk/news/world-south-asia-12188996

[50] Urban area population from Demographia World Urban Areas Population & Projections, 2011

overoptimistic revenue assumptions. This led to a full Government restructuring and subsequent financing package

- Adequate capitalization of private sector parties is essential to withstand downside risks
- Public contributions to funding the system can be partially recovered through a long-term concession with private sector after completion of assets

"The use of the high-speed route by both international and domestic traffic has created technical boundaries, interfaces, and interdependencies to manage, and this is achieved through contractual relationships with a large number of stakeholders, including regulators, customers, operators, suppliers, and other entities."

—High Speed 1 Ltd.