European Parliament

Briefing

RESEARCH FOR TRAN COMMITTEE – THE JAPANESE TRANSPORT SYSTEM

1. OVERVIEW

Japan's population was 127 million in 2014. It has being declining since its peak of 128.1 million in 2008[1]. It is also ageing[2] and concentrated in the main metropolitan areas[3]. The country's economy is equally in a grey area. It has been stagnating since the early 1990s, and the situation worsened with the 2007-2008 financial crisis and the 2011 Fukushima disaster. Overall, GDP at current prices decreased by 5.3% between 2000 and 2013[1], while other Asian nations were booming. Nevertheless, the country remains the third largest economy, after the US and China. It enjoys a very high standard of living, and it is characterised by a remarkable scientific and technological development.

This particular context necessarily influences the transport system in a particular way. The domestic transport demand is on a downward trend - which is unique among developed countries: between 1990 and 2014, the number of passenger-kilometres (pkm[4]) within Japan decreased by about 6%; the number of tonne-kilometre (tkm[5]) by 24%[1]. The modal split is also peculiar in Japan because of the paramount importance of (high quality) passenger rail and waterborne freight - this dependence on maritime transport being more and more a cause for concern in the context of growing tensions with China.

The current government's stimulus policy (the "Japan Revitalisation Strategy") also impacts the transport system. Historically highly protected markets are opening up to competition, in particular with respect to air transport. Besides, public investment in transport infrastructure is on the increase after twenty years of decline[6], notably to rebuild the Fukushima area[7].

The government also intervenes to improve the competitiveness of business, including through direct subsidies. This is the case in some ports, for instance, or to set up a "logistics strategy" for the whole Asian area. Public funding also aims at facilitating research and development of new technologies, in particular in the fields of automation and alternative energy sources.

In this context, the EU and Japan have being negotiating a Free Trade Agreement since March 2013 and it turns out that some of the stumbling-blocks relate to the transport sector, namely:

- The access to public procurement in Japan's railways and urban transport, which is currently almost impossible since there is neither standard nor certification for these products - while Japanese products can penetrate EU market once certified as complying with EU standards.

1 Statistics Japan; Japan Statistical yearbook 2016, Chapter 13.
2 In 2014, life expectancy at birth was 86.8 years for women and 80.5 years for men - a world record for both genders.
3 Statistics Japan; Statistical Handbook of Japan (2016), Chapter 2.
4 A passenger-kilometre (pkm) is equivalent to the movement of one passenger over one kilometre.
5 A tonne-kilometre (tkm) is equivalent to the movement of one tonne of goods over one kilometre.
6 Traditionally, Japan is by far the OECD country that devotes the smallest share of its GDP in transport infrastructure (1.1% in 2013, i.e. circa 48 billion euros). Source: International Transport Forum, Statistics Brief July 2015.
7 Ministry of Land, Infrastructure, Transport and Tourism, White Paper on land, infrastructure, transport and tourism in Japan, 2014.

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- The access to Japan's automotive and transport equipment market, which is hampered by the lack of clear standards and the related cost of certification, as well as some tax measures. In return for (further) concessions, Japan demands duty free access for its cars (currently at 10% ad valorem[8]).

- The imbalance in access to ports, since the movement of empty containers between ports in a Member State, and the movement of international goods between ports situated in different Member States are free within the EU but, respectively, very limited and prohibited for foreign operators in Japan.

2. RAIL TRANSPORT

2005	2013	2014	*Modal share 2014*
Rail passenger volume, in billion pkm(*)			
391	**414**	**414**	***33.8%***
Rail freight volume, in billion tkm			
23	**21**	**21**	***5%***

(*) Figures include transport by tram and metro.
Sources: Statistical handbook of Japan, 2016; Japan Statistical yearbook 2016

The dense and efficient Japanese rail network is about 27 000 km long (of which circa 20 000 km electrified). It is a convenient means of transportation for passengers (33.8% by volume in 2014), yet it is hardly used for transporting freight (5% by volume in the same year - mainly petroleum products, lime, stone and cement). It is worth mentioning that the emergence of cheap overnight buses and low-cost airlines has resulted in the disappearance of the once popular night trains. Mid-2016, the *Sunrise Seto/Izumo* is the country's last surviving regular night service. Nevertheless, rail passenger volume is growing slightly (+6% from 2005 to 2014), in contrast to the overall stagnant trend.

The Japan Railway Construction, Transport and Technology Agency (JRTT) builds and leases the infrastructure to rail operators. Japan Railways[9] (JR) rent and operate about 70% of the network. The remaining 30% is rented and operated by a great number of other railways, especially in and around metropolitan areas. In most of the cities, passengers can easily switch company/transport mode (train/metro/bus) thanks to "IC Cards" - a nationwide system of prepaid/rechargeable cards used to pay fares on urban transport (and also to make payments in some stores).

The Shinkansen Network

A network of high speed train lines connect Tokyo to most of the major cities. This network, which is currently about 2 800 km long, is expanding continuously: the line between Shin-Aomori and Shin-Hakodate-Hokuto (*Hokkaido Shinkansen*) opened in March 2016, and several new sections are currently being built. Construction costs are borne by the national government (2/3) and the local governments concerned (1/3). Besides, a "MAGLEV"-type system[10] is planned to start operating in 2027 between Tokyo and Nagoya (300 km) at a maximum speed of 550 km/h.

Shinkansen (新幹線) are operated by Japan Railways and run up to 320 km/h. Actually, most Shinkansen lines are served by different categories of train, ranging from the fastest ones that stop only at major stations to the slowest ones that stop at every station. The service is much renowned for its remarkable punctuality (the average delay per trip is within one minute, including weather-related delays), comfort and safety (there has been no fatal accident since first operation in 1964). Interestingly, the trains are fitted with a system that detects earthquakes at an early

8 EU import tariffs range from 10% on finished passenger cars to 22% on larger-sized trucks.

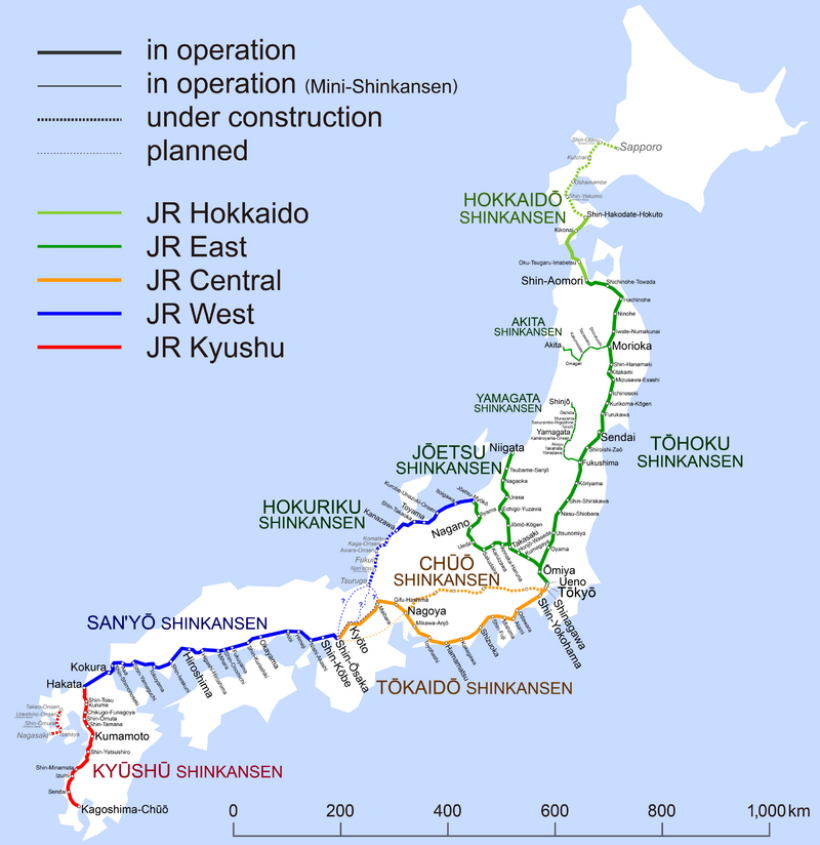
9 Japan Railways (JR) succeeded the incumbent public operator which was dismantled and partly privatised in 1987. JR is organised into six regional passenger railway companies (three of them being fully privatised) and one nationwide freight railway company. The government is envisaging the complete privatisation of JR.

10 "MAGLEV" stands for magnetic levitation.

stage and immediately stops them. In fiscal year (FY) 2014[11], more than 20% of rail passenger volume was carried on Shinkansen (i.e. 91 billion pkm).

It is worth mentioning that the Shinkansen lines constitute a dedicated network, separated from the conventional one by a different gauge. Contrary to TGV or ICE in Europe, the Japanese high speed trains (except the *Akita* and *Yamagata Shinkansen*) cannot run on the conventional network[12]. This results in much higher infrastructure costs than those found in Europe. This also contributes to the remarkable frequency[13] and punctuality of Shinkansen services.

Map of Shinkansen network in March 2016*



* Except Hakata-Minami (8.5 km long) and Gala-Yuzawa (1.8 km) lines, which are branch lines providing Shinkansen services but not classified as Shinkansen lines. Source: Hisagi (氷鷺)

Railway equipment industry

In fiscal year 2013, the domestic market absorbed 80% by value of railway equipment industry production. However, exports are increasing fast (+10.7% by value over FY2012) whether it is for vehicles, vehicle parts (such as power generators and bogies) and signal protection devices (such as automatic train control devices and electrical interlocking devices). Japanese manufacturers are present in all world markets, by responding to invitations to tender[14] or by setting up production and service sites abroad, like in the US and the UK. This situation is not without problems since access to the Japanese market for railway equipment is closed by means of "technical barriers", as previously discussed.

[11] The Japanese fiscal year runs from 1 April to 31 March. Fiscal Year 2014 therefore runs from 01.04.2014 to 31.03.2015. Most, but not all, of the statistics about Japan refer to fiscal year. For the sake of clarity, this briefing does not necessarily distinguishes fiscal year from calendar year.

[12] Work is underway to develop trains capable of operating on both Shinkansen and conventional networks.

[13] For instance, the *Tokaido Shinkansen* line between Tokyo and Osaka carries up to 13 trains per hour in each direction, with 16 coaches each.

[14] As shown by current competition between Japan and China for the Kuala Lumpur-Singapore high-speed link, a project of around 14 billion euros.

3. MARITIME TRANSPORT

2005	2013	2014	*Modal share 2014*
Seaborne domestic passenger traffic by volume, in billion pkm			
4	**3.3**	**2.9**	***0.2%***
Seaborne domestic freight traffic by volume, in billion tkm			
212	**185**	**183**	***44%***
Seaborne international freight (Import + Export + Transit), in billion tons			
0.78	**1.03**	**1.04**	***99.9%***

Sources: Statistical handbook of Japan, 2016; Japan Statistical yearbook 2016

Maritime transport is vital to the Japanese archipelago. Almost the entire country's international trade utilise the seaway (1 035.2 million tons in 2014, i.e. 99.9% of the total international freight volume[15]). Seaborne domestic freight transport (short sea shipping) is also key to the national economy with a share of 44% by volume in the same year. Moreover, although accounting only for about 0.2% of domestic passengers by volume, shipping plays a significant role in regional transportation thanks to an extensive network of ferry routes which connect a large number of small islands.

Domestic shipping, however, is declining in line with the general trend in the country: the volume of passengers and the volume of freight decreased by respectively 28% and 14% between 2005 and 2014. The government strives to improve the competitiveness of the sector through, notably, the development (by JRTT[16]) of more comfortable/more energy-efficient ships, and the renewal of the fleet by means of tax incentives.

Seaborne international freight is also a matter of concern since the number of Japanese flagged vessels and seafarers has collapsed in the last decades[17]. This is now seen as a threat to the security of supply, especially in the context of the Chinese expansion. Since 2008, the government has being striving to reverse that trend through tax incentives and a significant effort to recruit and train seafarers. It seems that their efforts are starting to pay off.

Ports

Remarkably, there is no Japanese port at the top of global rankings. This is because the traffic is spread over more than 90 important harbour facilities along the entire country's coastline.

Top 5 Japanese ports and world ranking in 2014					
Cargo traffic, in million freight tons			**Container traffic, in million TEUs**		
Port	**Volume**	**World rank**	**Port**	**Volume**	**World rank**
Nagoya	208	16	**Tokyo**	5	28
Chiba	163	23	**Yokohama**	2.8	52
Yokohama	117	31	**Nagoya**	2.7	53
Kitakyushu	100	37	**Kobe**	2.6	56
Kobe	92	42	**Osaka**	2	73

Source: American Association of Port Authorities (2014)

This scattering seems to no longer match the needs of the country. To strengthen national trade capacity, and to respond to the development of competing Asian ports, Japan is setting up a "core port-network" where new

[15] While interestingly seaborne international passenger transport is almost non-existent.

[16] Despite its name, the Japan Railway Construction, Transport and Technology Agency is active in both rail and maritime transport.

[17] The three major Japanese maritime transport firms (Nippon Yusen; Mitsui OSK Lines and Kawasaki Kisen) operate mainly under foreign flags. There were 159 Japanese flagged deep-sea vessels in 2013, to be compared with the peak of 1 580 vessels in 1972. Over the same period, the number of Japanese deep-sea seafarers dropped from about 57 000 to about 2 300.

facilities are built to accommodate larger vessels and services are upgraded. With this end in view, the law was amended in 2014 to allow national public investment into companies managing international container strategic ports, and to facilitate mergers between these companies. For instance, in October 2014, the operator of Hanshin Port incorporated "Kobe-Osaka International Port Corporation", and the government invested in the latter.

Shipbuilding industry

Japanese shipbuilding industry is of prime importance. In 2014, it accounted for 20.4% by volume of the world's new shipbuilding (third behind China and South Korea (35% each), but far ahead the EU which accounted for 3%)[7]. The sector, however, faces a double threat: the current reduction in global demand for maritime transport (and the related fleet cuts), and the increasing competition from China and South Korea. Since 2013, public support is therefore granted to the industry to develop next-generation marine technology, relating not only to transportation but also to the exploitation of marine resources in the broad sense, such as renewable marine energy sources.

4. AIR TRANSPORT

2005	2013	2014	*Modal share 2014*
Domestic air transport volume, passengers in billion pkm			
83	**84**	**87**	***7.1%***
Domestic air transport volume, freight in billion tkm			
0.9	**1**	**1**	***0.2%***

Sources: Statistical handbook of Japan, 2016; Japan Statistical yearbook 2016

The Japanese government intends to use air transport as a driver for economic growth, in order to boost business and tourism. Aviation shall in particular contribute to the goal of "20 million foreign visitors per year"[18]. This means, notably, increasing capacity at major international airports, and at some secondary airport, by improving airport operation efficiency and by building new infrastructure[19]. This also means modernising the Air Traffic Management System.

The development of low cost carriers (LCCs) is also in the plan. The government has set the objective of a LCCs market share of 14% for domestic passengers and 17% for international passengers by 2020. Various measures have been adopted to this end, such as the lowering of landing fees in fiscal years 2013 and 2014. It is true that LCCs market share is still marginal, particularly when compared to the situation in other developed countries. This is due to the fact that (domestic) air transport in Japan has always been highly regulated. The two legacy carriers, Japan Airlines (JAL) and All Nippon Airways (ANA), together still hold about 50% of the domestic market and operate 200 domestic routes, while the four major LCCs together operate only 37 domestic routes (as well as 12 international routes). At the other end of the chain, the authorities also wish to develop business aviation which is also still marginal in the country (in 2014, only 54 business jets have been registered in Japan, to be compared with 19 000 in the US in the same year).

International agreements

Within the general strategy of opening of the economy, 27 "Open Skies"-type agreements have been concluded by Japan, accounting for about 94% by volume of passenger flying to/from the country[7]. Discussions are ongoing to conclude such an agreement with the Association of Southeast Asian Nations (ASEAN). It should be noted that Japan does not intend to conclude an aviation agreement with the EU (five million passengers flew between the

[18] White Paper on land, infrastructure, transport and tourism in Japan, 2014, Chapter 6.3. This target has almost been reached: in 2015, 19.7 million foreigners visited the country (+47% on 2014). Both this number and annual growth are the highest ever recorded.

[19] Such is the case, for instance, at Tokyo International Airport (Haneda; 69.5 million passenger in FY2013) where runways have been expanded and new terminals built, and which is now about to add 50% capacity by modifying approach routes (i.e. by letting aircraft fly over central Tokyo).

two parties in 2015). The country questions the usefulness of the European approach, and does not even recognise "the EU clause" (while, in practice, not refusing EU designation). Conversely, Japanese authorities are very supportive of a bilateral aviation safety agreement (BASA) with the EU. In March 2016, the Council gave its green light to the launch of the related negotiations.

All in all, the strategy of liberalising international air services seems to work. The number of international passengers at Japanese airports increased by 10% between 2005 and 2012 (at 60.7 million). Over the same period, the number of domestic passengers decreased by 10% in the aftermath of the economic downturn and the great 2011 earthquake.

Aircraft industry[20]

The Japanese aircraft industry is still modest in size compared to that of major aeronautical countries, and its trade balance is in deficit because of the purchase of aircraft by the country's airlines. However, the sector is growing steadily, in parallel with its exports of (civilian and military) aircraft parts and appliances, and the development of its cooperation with the world's leading manufacturers. For instance, the country's firms supply about 35% of the content of the Boeing 787; Airbus has some twenty Japanese suppliers, and the Japan Aero Engines Corporation (JAEC) is participating in the development of the PW1100G-JM engine, together with Pratt & Whitney and MTU Aero Engines Holding AG. More visibly, Mitsubishi is about to market the 92-seat MRJ90, the first airliner produced in the country in more than 50 years.

5. ROAD TRANSPORT

In line with the general trend in the country, road transport is declining: from 2005 to 2015, the volume of road passenger dropped by 23% and the volume of freight by 37%. This decline reflects the economic difficulties, at least with regard to goods, and the ageing population. It is also attributable to increasing urbanisation and the high level of service in the (urban) public transport system. In spite of that, the motorisation rate is rather high (472 cars per 1 000 inhabitants in 2013[21]) and the automotive industry is a world leader.

Volume

2005	2013	2014	*Modal share 2014*
Road passenger volume, in billion pkm			
933	**733**[22]	**721**	***58.9%***
Road freight volume, in billion tkm			
334	**214**	**210**	***50.6%***

Sources: Statistical handbook of Japan, 2016; Japan Statistical yearbook 2016

Change in road passenger volume by means of transport, 2005-2014		
Taxis and limousine hires	**Passenger cars**	**Buses and coaches**[23]
- 36%	**- 24%**	**- 10%**

Sources: Statistical handbook of Japan, 2016; Japan Statistical yearbook 2016

[20] Sources: The Society of Japanese Aerospace Companies, Japanese Aerospace Industry 2015; Maine International Trade Center, Aerospace/Aviation Industry Opportunities in Japan & China (2015).

[21] Japan Automobile Manufacturers Association, The motor industry of Japan 2015.

[22] In this briefing, road passenger volume for the years 2013 and 2014 (and the related modal share) is estimated since, from 2010, the Statistics Bureau of Japan no longer reports on private motorised trips. The estimation is based on observation of previous years which result in the following assumption: the volume of private road trips (by car and light motor vehicles) is about 95 times higher than the volume of business road trips (by bus, taxi and limousine hire).

[23] Chartered coaches, which were deregulated in 2000, do a little better than those operating scheduled services.

Road network

Japan road network is about 1 220 000 km long		
Motorways 8 400 km	National highways 55 000 km	Secondary and urban roads 1 153 000 km

Source: Japan statistical yearbook 2016

The motorways are built, maintained and operated by six companies. They are subject to tolls which are automatically levied through the standardised nationwide Electronic Toll Collection (ETC) system. The ETC is also used to pay for parking, ferry boarding and other similar uses.

Motorisation

89 million road motor vehicles in use at the end of 2014				
Passenger cars	Freight vehicles	Buses	Special purpose vehicles	Two-wheeled
60.7	14.6	0.23	1.7	12

Source: Japan Automobile Manufacturers Association

Decarbonisation

Since 2009, tax incentives have been introduced to promote the use of "cleaner" road vehicles. In addition, the 2013 "Japan Revitalisation Strategy" set the objective of 50 to 70% of new cars driven by non-conventional engines by 2030 (which includes hybrid; plug-in hybrid; electric; fuel cell; clean diesel, and other new-energy vehicles) [24]. In 2014, about 5.15 million such vehicles were in circulation - representing an increase of 400% since 2009, but only 6.7% of the (four-wheeled) roads motor vehicles currently in use in the country[22].

Road safety

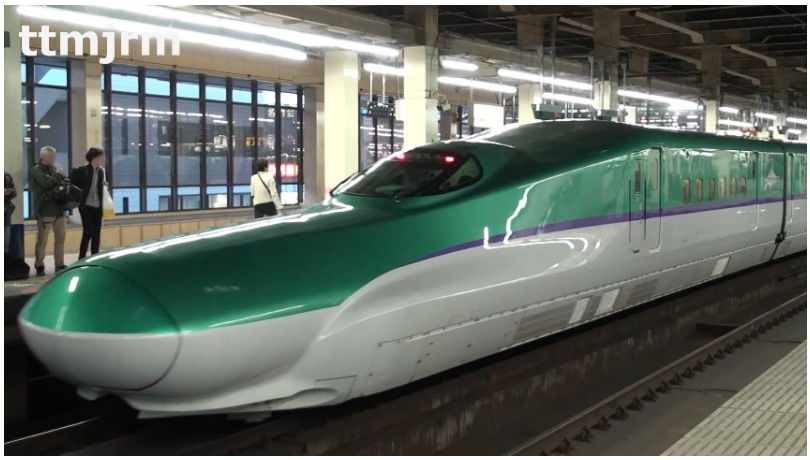
The number of road fatalities has steadily declined over the past quarter of a century, falling to 4 113 in 2014, i.e. 32 fatalities per million inhabitant[25]. This is the lowest rate of all OECD countries (in 2014, this rate was 51 in the EU-28 and 102 in the US). However, pedestrians, especially the older ones, account for a larger proportion of fatalities in Japan than in other OECD countries[26].

Automotive industry

Japan is the world's second largest automobiles producer (behind China), and the automotive industry is one of the country's major industrial sectors. In 2014, the domestic motor vehicle production reached 9.77 million units (+1.5% on 2013), of which 8.28 million cars. The country is the largest exporter of motor vehicles, just ahead of Germany and France[27]. In addition, Japanese manufacturers largely operate overseas: in 2014, they have produced 17.5 million cars abroad, of which 1.4 million in the EU[28] and 3.8 million in the US.

It is worth mentioning that Mitsubishi Motors, the country's sixth biggest automaker by volume, is currently involved in a "Volkswagen-type" scandal of emissions data falsification. Weakened, it could be purchased by Renault/Nissan.

[24] Ministry of Economy, Trade and Industry, Japan's Initiatives for the diffusion of Next-Generation Vehicles (2014).
[25] 711 400 people were injured in road accidents in the same year.
[26] Ministry of Land, Infrastructure, Transport and Tourism, Roads in Japan (2015); European Commission, EU Transport in figures (2016).
[27] In 2013, Japan exported 4.675 million cars and commercial vehicles, Germany 4.405 million and France 4.373 million (Source: Japan Automobile Manufacturers Association, The motor industry of Japan 2015).
[28] Japanese automakers operate 17 production facilities across 10 Member States, of which 4 in the UK.



The Shinkansen E5 Series (Source: YouTube - Rail Note)

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