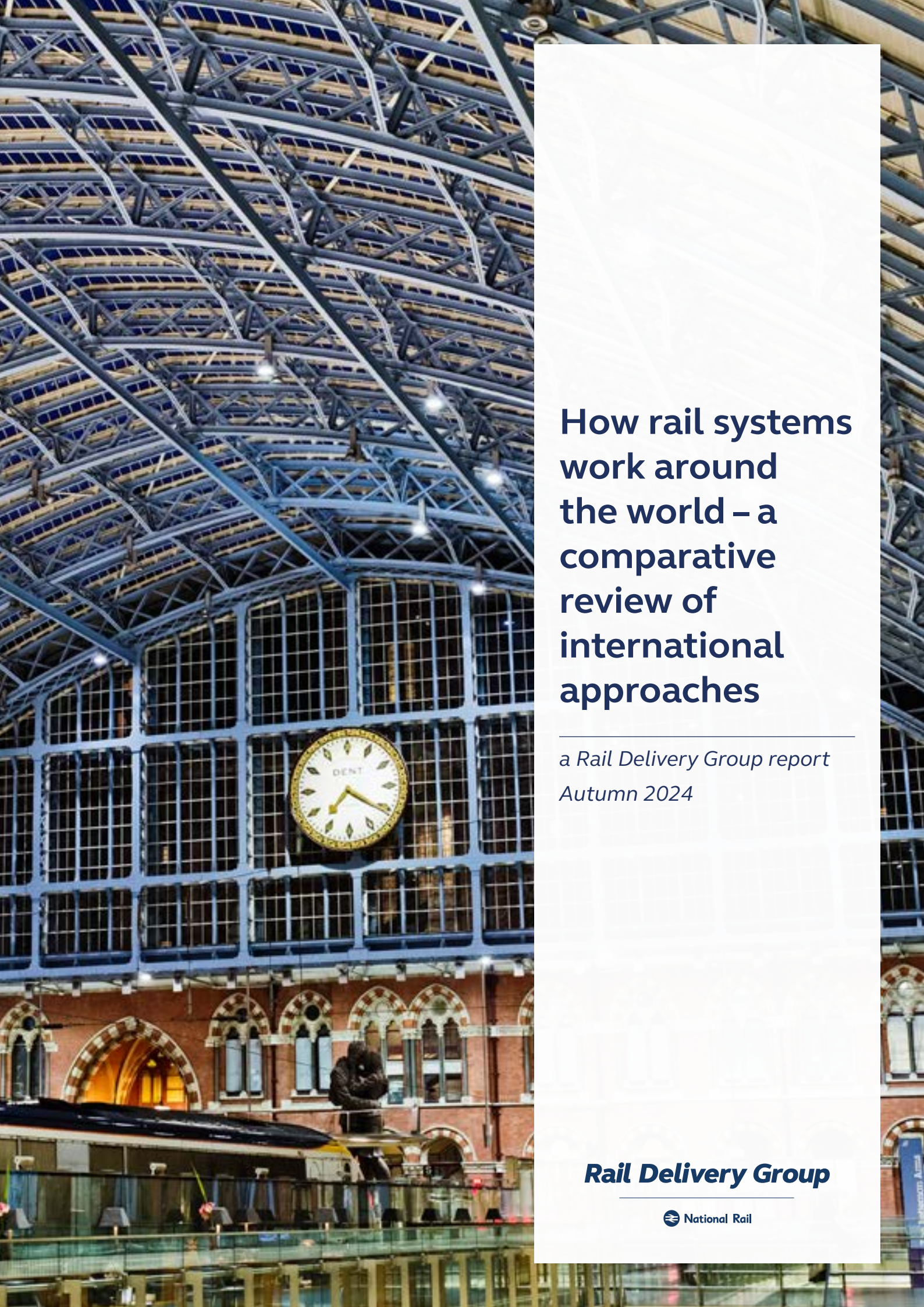


How rail systems work around the world – a comparative review of international approaches

a Rail Delivery Group report

Autumn 2024

Rail Delivery Group

National Rail

Contents

Purpose

This report has been prepared for Rail Delivery Group by Vectura Advisory. The purpose of this work is to set out the different organisation and management models for the rail sector in comparator countries, understand the reasons for the approach adopted, and the practical implications on each sector model.

Five select countries have been reviewed as part of this work. Four European countries – France, Germany, Spain and Sweden. Additionally, Japan has been included as a non-European comparator. These countries have been chosen on the basis of their size and relevance to the UK, and the different models of their respective rail sectors and approach to market opening and tendering.

This research follows a specific structure, replicated in each country review. This includes an overview the studied national rail regime, detail of its key sector actors, a comparative analysis in contrast with our domestic rail model and a review of several key components within the reviewed rail sector model, including:

- Tender modelling (PSO - Public Service Obligation)
- Open access (commercial) modelling
- Devolution to regions
- Role of Authority as a specifier
- Funding model
- Rolling stock funding and ownership
- Service facilities (depots) model
- Separation between IM and RU
- Safety record
- Ticketing and Fares

It is intended that this work can inform discussions on future approaches to be considered in the UK, and can assist in identifying relevant approaches and best practice. While these five countries provide a representative sample for review, there are different approaches and models that have been implemented in other countries within Europe and beyond.

This report was conceived during the previous Conservative government, however all references to a “GBR” or “Great British Railways” aim to consider any future model which will integrate track and train together.

The information shared in the report has largely been taken from publicly available sources. It has been supplemented by in-market knowledge of the report author and from discussions with in-market experts during the production of this work. The contents of this report (including all values) were completed in March 2024.

Definitions to key terms used within this document can be found in the Glossary chapter of this document, this includes explanation of the EU railway packages referenced within this document.

Overview

Overview

The framework for the organisation of rail networks, in Europe, is primarily determined by EU regulations, including the requirements for the separation between the Infrastructure Manager and Railway Undertakings, access provisions, obligations for market opening and tendering provisions for Public Service Obligation (PSO) services.

The application of these regulations however varies considerably by country – reflecting interpretation, characteristics of the respective networks, and political organisations and priorities.

Therefore, there is not a single model, and each country has developed its own approach. For example, the model in Japan differs significantly, both in structural organisation, and as a consequence of the network characteristics and usage.

Each nation's approach portrays different strengths and weaknesses. Any view on overall effectiveness needs to consider the respective models overall, rather than necessarily taking an individual component in isolation.

Nevertheless, we can draw some high-level conclusions and comparisons:

- **There is separation between the Infrastructure Manager and Railway Undertaking across all observed European countries. However, it is observed that in France and Germany the main Railway Undertaking and the Infrastructure Manager come under the same holding group, whereas in Spain and Sweden the two organisations are completely separate.**
- **In its design, the vertically integrated model seen in Japan is not comparable to European networks, with key contextual differences to consider such as financial arrangements.**
- **There is a very clear distinction between the definition of commercial and PSO passenger services in the observed European countries. Commercial services are delivered through an open access model, even where the long-distance network has remained an effective national monopoly.**
- **The concession model is the norm for PSO services. PSO services are clearly defined, and relate primarily to regional and urban services. The UK model of specifying and tendering long-distance services is not the norm elsewhere.**
- **There is generally a higher level of devolution to regions within a country for the specification, procurement and management of PSO services. This reflects the popularity of decentralised government models in other countries compared to the UK. There are even regional variations in the contracting models, and therefore not a single, standardised contract model across each country.**
- **There is a clear focus on the responsibility for the specifying authority to determine the services which are to be provided, which also have associated quality standards. Bidders for PSO services deliver to these specifications. This establishes clearer responsibility between the specifying authority and the Railway Undertaking which delivers the service.**
- **The Japanese model has a very limited role for government, with no role in specifying services.**
- **There are different approaches observed for rolling stock and service facilities, but fair and equal access is a critical factor in market opening and competition.**
- **There is generally greater multi-modal integrated ticketing at a regional or city level than is seen in the UK, with the exception of London. Regional authorities are generally responsible for revenue risk in PSO concession.**
- **Long-distance ticket pricing tends to be market-led, reflecting the commercial nature of the services. Comparably, ticketing for long-distance services does not appear to as regulated in the UK.**

However, it is important to note the supporting detail behind these high-level findings and summary, and the detail is critical to understanding respective models and their effectiveness.

Comparative Metrics

The table that follows shows comparative metrics of the rail sectors of the different countries covered by this report.

The range of comparative metrics selected provide a representative set of metrics which help contextualise the respective rail systems, their size and relative performance. They cover:

- Country size and economy, and size of rail network
- Utilisation of network and volume of traffic
- Network expenditure
- Punctuality by type of service
- Passenger revenue, and ratio of PSO and commercial services
- Safety

The data is taken from the most recently published or attainable, at the point of writing. In some instances, earlier data sets have been used to provide comparative analysis or where the impact of the COVID-19 has distorted the most recently published data. Where earlier data has been used, this is clearly stated in the accompanying source notes, which are set out below the comparative metric table.

Comparative data for European countries sourced from several publications and datasets from the EU and pan-European agencies. By contrast, data for Japan is more limited and is consequently more difficult to provide, as it is either not published in an official form, or the basis of the dataset is not comparable to the European data sets. Accordingly, where comparable data is not available, data for Japan has not been included to avoid misleading comparisons.

The European statistics are predominantly taken from the following publications.

The annual **Market Monitoring Report** produced by **IRG Rail,** the Independent Rail Regulators report. The 11th edition was published in April 2023. UK data is cited in this report, the ORR are a member of IRG Rail. The current and historic reports can be found at:

https://irg-rail.eu/irg/documents/market-monitoring/383,2023.html

The **Rail Market Monitoring (RMMS) report** is published annually by the **European Commission.** The 8th edition was published in September 2023. UK data is no longer reported following Brexit, however UK data is included up to the 7th edition. Where RMMS data has been used, in some instances the most recent data from the 8th report has been used for EU countries, with 7th edition data used for the UK. In other instances, e.g. passenger numbers and revenue data, the 7th edition has been used to avoid distortions arising from reduced demand during the COVID-19 pandemic. The data set is clearly stated in the accompanying source data table. The current and historic reports can be found at:

https://transport.ec.europa.eu/transport-modes/rail/market/rail-market-monitoring-rmms_en

Comparative Metrics

This report also cites data from the **Statistical Pocketbook**. This is published annually by the **European Commission,** providing a summary of EU transport statistical metrics across different transport modes. The most recent edition was published in September 2023. UK data is no longer reported following Brexit, and UK data was last included in the 2021 edition. The current and historic reports can be found at:

https://transport.ec.europa.eu/facts-funding/studies-data/eu-transport-figures-statistical-pocketbook/statistical-pocketbook-2023_en

Safety metrics have been taken from the **Report on Railway Safety and Interoperability in the EU** published by the **European Union Agency for Railways (ERA)** in May 2022. UK data is included in this report. The source data is only shown in graphical representation in the report, so the data shown below has been read off the published graphs. The report can be found at:

https://www.era.europa.eu/content/railway-safety-and-interoperability-2022-report_en

These European data sources have been utilised for comparisons with our domestic rail regime, as the definitions used (for example performance reporting) in UK-derived publications vary from the comparative reports produced. Therefore, to ensure comparability the UK data has been drawn from the RMMS and IRG Rail reports.

Accordingly, the table data should be used for **comparative** purposes, as the UK values may differ from published data from DfT, Network Rail, ORR and other industry sources.

Japanese data, where provided in this report, has been taken from several sources. Where the data is provided the data source is clearly referenced.

Where metrics on Japan have been included in EU publications, these have been prioritised to ensure comparability of data.

Network metrics are predominantly taken from a report prepared for the **European Parliament Trans Committee – The Japanese Transport System.** The report was published in October 2016.

https://www.europarl.europa.eu/RegData/etudes/BRIE/2016/585900/IPOL_BRI(2016)585900_EN.pdf

Data on passenger km and freight tonnage have been taken from the most recent **Japan Statistical Yearbook 2024,** published by Statistics Japan, a division of the Ministry of Internal Affairs and Tourism.

https://www.stat.go.jp/english/data/nenkan/73nenkan/index.html

Comparative metrics of the countries reviewed and the UK

	Source	UK	France (FR)	Germany (DE)	Spain (ES)	Sweden (SE)	Japan (JP)
Population (million)	1	67.35 m	67.9 m	83.2 m	47.4 m	10.45 m	125.7 m
GDP (GBP billion)	2	£2,488 b	£2,138 b	£3,078 b	£1,031 b	£462 b	£3,570 b
GDP per capita (GBP ,000s)	3	£36.9 k	£31.5 k	£36.9 k	£21.8 k	£44.0 k	£28.4 k
Rail route length (route miles)	4	10,140	17,218	24,474	9,704	6,781	16,780
Route length by country size (route miles per 100 km^2)	5	11.05	3.14	6.84	5.02	1.67	-
Route length by population density (route miles per 10,000 inhabitants)	6	1.51	2.55	2.94	2.05	6.49	-
Percentage of electrified network (route miles)	7	38%	60%	54%	65%	75%	74%
Length of High-Speed rail network (miles)	8	70	1,699	976	2,254	534	1,741
Network density train per day per route/km	9	77	36	61	23	30	-
Passenger train km (million t/ km pa)	10	558 m	375 m	852 m	168 m	127 m	-
Passenger km (million km pa)	11	69,148 m	95,950 m	102,900 m	27,272 m	14,617 m	435,063 m
Rail passenger transport modal share (% passenger-km by land)	12	4.9%	9.4%	6.4%	5.2%	7.4%	33.8%

	Source	UK	France (FR)	Germany (DE)	Spain (ES)	Sweden (SE)	Japan (JP)
Freight tonnage pa	13	33,141 m	33,771 m	128,700 m	10,459 m	22,717 m	18,042 m
Rail freight transport modal share (% tonne-km by land)	14	8.7%	10.3%	18.6%	4.1%	28.8%	5%
Infrastructure expenditure – maintenance and renewal (GBP billion)	15	4.35 b	£4.44 b	£5.64 b	£0.59 b	£0.68 b	-
Maintenance and renewals as percentage of all infrastructure expenditure	16	58%	82%	63%	27%	35%	-
Punctuality of long distance and high-speed passenger services (RMMS)	17	67%	76%	71%	89%	72%	-
Punctuality of regional and local passenger services (RMMS)	18	86%	90%	88%	92%	89%	-
Punctuality of domestic freight services (RMMS)	19	93%	71%	65%	90%	77%	-
Passenger revenue (GBP million)	20	£11,214 m	£12,299 m	£13,402 m	£2,905 m	£1,068 m	£353,382 m
Percentage of PSO services (train/km)	21	99%	72%	83%	70%	58%	-
Percentage of non-PSO services [commercial / open access] (train/km)	22	1%	28%	17%	30%	42%	100%
Safety: Railway passenger fatality rates (2010-2020) per billion train/km	23	0.01	0.03	0.025	0.43	0.015	0
Safety: Level crossing accident rates per million train/km (2018-2020)	24	0.01	0.04	0.03	0.02	0.03	-

France

Country overview

Introduction and key characteristics

France has the second largest rail network in Europe with c. 17,000 route miles. It was the first country in Europe to develop high-speed rail, and now has the second largest high-speed network in Europe at c. 1,700 route miles. Paris is the dominant rail city, and the rail network, both high-speed and conventional, is predominantly a radial network centred on Paris. Regional and cross-country services are more limited.

Ridership and train occupancy rates vary significantly from one line to another, but are generally low compared to comparable European countries (90% of train journeys cover 27% of the network).

Investment has been concentrated onto the TGV high-speed network at the expense of regional lines, and a backlog of investment in these routes now exists. Services on rural routes have been reduced in recent years, and in some cases withdrawn.

To date, the French passenger market has not been opened to competition and the incumbent Railway Undertaking SNCF Voyageurs remains dominant, maintaining a near monopoly on both commercial and PSO services. There are early developments that may change this position.

The rail freight market has been opened for competition for several years, with SNCF through their rail freight subsidiaries maintaining a dominant market position. SNCF Fret, the main rail freight business of SNCF Group, is in the process of being restructured and parts of the business divested following a European Commission inquiry into illegal state aid.

SNCF remains a single business, retaining a dominant position across all parts of the French rail sector. It is structured into separate Infrastructure Manager and Railway Undertaking divisions, which are managed under a single holding group.

The Infrastructure Manager is SNCF Réseau. It is responsible for providing access to the rail infrastructure; including allocating capacity and setting infrastructure fees; managing network traffic; maintaining and renovating infrastructure; and expanding and developing the network.

Long distance services are provided by SNCF Voyageurs, predominantly under a commercial open access model. These include the TGV services on the high-speed network and international services operated under the Eurostar brand, both to the UK and the former Thalys network to Belgium, Germany and the Netherlands.

Currently SNCF Voyageurs maintain a near monopoly of commercial high-speed services, however several start-up Railway Undertakings have announced plans to enter and compete within the current market.

PSO services are the responsibility of the 13 regions and are predominantly operated by SNCF Voyageurs under direct awards. A small number of regions have started competitively tendering PSO services. To date, Transdev have won one ccompetitively tendered contract, whilst SNCF Voyageurs have been successful in all other competitive tenders.

Comparative metrics

Population (million)	67.9 m	67.35 m
GDP (GBP billion)	£2,138 b	£2,488 b
GDP per capita (GBP ,000s)	£31.5 k	£36.9 k
Rail route length (route miles)	17,218	10,140
Route length by country size (route miles per 100 km^2)	3.14	11.05
Route length by population density (route miles per 10,000 inhabitants)	2.55	1.51
Percentage of electrified network (route miles)	60%	38%
Length of High-Speed rail network (miles)	1,699	70
Network density train per day per route/km	36	77
Passenger train km (million t/km pa)	375 m	558 m
Passenger km (million km pa)	95,950 m	69,148 m
Rail passenger transport modal share (% passenger-km by land)	9.4%	4.9%
Freight tonnage pa	33,771 m	33,141 m
Rail freight transport modal share (% tonne-km by land)	10.3%	8.7%
Infrastructure expenditure – maintenance and renewal (GBP billion)	£4.44 b	£4.35 b
Maintenance and renewals as percentage of all infrastructure expenditure	82%	58%
Punctuality of long distance and high-speed passenger services (RMMS)	76%	67%
Punctuality of regional and local passenger services (RMMS)	90%	86%
Punctuality of domestic freight services (RMMS)	71%	93%
Passenger revenue (GBP million)	£12,299 m	£11,214 m
Percentage of PSO services (train/km)	72%	99%
Percentage of non-PSO services [commercial / open access] (train/km)	28%	1%
Safety: Railway passenger fatality rates (2010-2020) per billion train/km	0.03	0.01
Safety: Level crossing accident rates per million train/km (2018-2020)	0.04	0.01

The data sources for the table above are referenced in the “Comparative metrics source references” section of this report.

Key rail sector organisations

National Transport Ministry: Oversees overall transport policies and regulations

Direction générale des infrastructures, des transports et des mobilités (DGITM)[1]: A directorate within the Ministry of Ecological Transition and Territorial Cohesion which manages the practical implementation and maintenance of transport infrastructure and services. This includes the planning of major transport infrastructure development projects, and the oversight and responsibility for SNCF. DGITM also has responsibilities as funder for Intercity regional PSO services and in the allocation of regional funding.

La direction des transports ferroviaires et fluviaux et des ports (DTFFP): The Rail, Inland Waterway and Ports Directorate (a directorate within the DGITM) draws up and implements policy guidelines for rail, inland waterway and, in the Ile-de-France region, public passenger transport, as well as policy guidelines for mass freight transport, with the aim of developing modal shift.

Regions: TER (Transport Express Regional) regional and suburban services are the responsibility of, and funded by, the 13 regional authorities. Each region enters into separate PSO contracts for the provision of services. In most cases this remains direct award with SNCF Voyageurs. There is a progressive opening of PSO contracts to competitive tender but single direct award PSO for region remains the norm.

SNCF Group[2]: The holding company for all SNCF group companies. It is 100% owned by the French state. It is structured into six main divisions.

- SNCF Réseau – the Infrastructure Manager for France.
- SNCF Gares & Connexions – responsible for railway stations in France.
- SNCF Voyageurs – the passenger Railway Undertaking
- Rail Logistics Europe – the freight Railway Undertaking.
- Geodis – freight logistics.
- Keolis – public transport operator across different transport modes including light rail and bus in France and internationally.

[1] Direction générale des infrastructures, des transports et des mobilités (DGITM) | Ministère de la Transition Écologique et de la Cohésion des Territoires (ecologie.gouv.fr)
[2] Get to know SNCF Group (groupe-sncf.com/en/group/about-us)

France

SNCF Réseau: The Infrastructure Manager for rail in France. It is responsible for providing access to the rail infrastructure, including allocating capacity and setting infrastructure fees; managing network traffic; maintaining and renovating infrastructure; and expanding and developing the network. It is 100% owned by SNCF Group.

SNCF Gares & Connexions: Responsible for the management and operation of all railway stations on the French rail network. It publishes and charges regulated access fees to Railway Undertakings for use of stations and their facilities.

SNCF Voyageurs: The passenger Railway Undertaking. It is 100% owned by SNCF Group. It provides both PSO and commercial services organised through four main divisions:

- TGV-INTERCITÉS – long-distance services including TGV services operated under the Inoui and Ouigo brands, Intercités services on the conventional network, Eurostar international services, (including the former Thalys services now operated under the Eurostar brand), and international cross border services.
- TER - regional and cross-country services
- Transilien - commuter rail services in Paris region
- SNCF Connect – on-line ticketing platform and France's leading e-commerce site.

Rail Logistics Europe: the freight Railway Undertaking, which operates both rail freight and multimodal freight transport, in both France and internationally. It operates under the divisions of SNCF Fret, VIIA, Captrain, Naviland Cargo and Forwardis.

- SNCF Fret, the main rail freight division in France, is currently being structured and split following an investigation into illegal state aid, with parts of the business being divested.

Autorité de Régulation des Transports (ART)[3]: The French rail regulator, whose remit includes the economic regulation of airports, motorway, rail, and coach transport sectors. Their responsibilities include ensuring fair access to the network and facilities, approving regulated charges for access to the network and facilities, promotion of market opening, and monitoring rail sector financial and operational performance.

Railway Undertakings (tendered): PSO services are predominantly operated under direct award from the regions to SNCF Voyageurs, which remains the dominant Railway Undertaking, retaining a 100% market share. Starting in 2021, the first competitively tendered service was awarded by Region Sud. Transdev won one of the tendered packages, starting operation in 2025. No other tendered services have been awarded to any Railway Undertaking other than SNCF Voyageurs. In addition to Transdev, a number of other Railway Undertakings have submitted bids including Arriva, Trenitalia and Regioneo.

Railway Undertakings (commercial): SNCF Voyageurs provide commercial services linking Paris with the major cities across France. These are primarily TGV services on high-speed lines and include some long distance services on the conventional network and some cross border services too. SNCF also operate Eurostar services, including the Thalys services, which are part of the Eurostar brand. These are operated under open access contract provisions. SNCF Voyageurs currently retain a near monopoly, except for a small number of open access services operated by Renfe and Trenitalia. Several other Railway Undertakings have stated their intention to enter the open access market including Kevin Speed and Le Train.[4]

Renfe: The Spanish Railway Undertaking. Since 2023, it has been operating open access services between Barcelona and Lyon, and between Madrid and Marseille. Previously, these were operated in partnership with SNCF. Renfe have stated their intention to also operate between Lyon and Paris.

Trenitalia: The Italian Railway Undertaking. Operates Milan and Turin to Paris under open access arrangements. Trenitalia have stated their intention to increase the number of services they operate.

Kevin Speed[5]: Start-up planned open access operator. Has recently signed a track access framework agreement with SNCF Réseau, and plans to launch its first services under the Ilisto brand by the end of 2028. It intends to operate services between Paris and Lille, Strasbourg and Lyon.

Le Train[6]: Start-up planned open access operator, with routes from Bordeaux to Angoulême, Nantes, Rennes and Arcachon. Currently starting operational mobilisation but unclear whether will start services with second-hand rolling stock or with new build Talgo sets.

[3] Page d'accueil - Autorité de régulation des transports (anciennement Arafer), Construire une régulation performante au service des usagers et de la mobilité (autorite-transports.fr)

[4] Since this report was drafted a new start up business, Proxima, has announced plans to launch open access high-speed services between Bordeaux, Nantes, Rennes, Angers and Paris, with a fleet of new build Alstom horizon trainsets. It is intended that passenger services would commence in 2028.

[5] About (kevin-rail.com)

[6] Le Train - Le Train n'a pas fini d'améliorer la vie des français. (letrainvoyage.fr)

Key differences to UK model, and why these differences matter

The UK and France are similarly-sized countries by population and GDP, however France has a larger rail sector. The French network length is c. 18,000 route miles compared to the UK at c. 10,000. This differential is reflected in route length by population density at 2.55 route miles per 10,000 inhabitants, compared to 1.51 route miles in the UK. However, the UK network is nearly four times the density of France's according to country size, reflecting the need to consider geographical realities.

In terms of network utilisation, the UK's utilisation measured by trains per day per route km is over twice that of France, and passenger train km is again higher in the UK at 558m train km per annum, compared to 375m in France. However, in network usage the number of passenger km is significantly higher than the UK with c. 96 billion in France compared to c. 69 billion in the UK.

These metrics however do not fully convey other differences, with France having a comprehensive high-speed network with high passenger volumes and distances travelled, high passenger volumes in the Paris region, but a relatively low density and underutilised rural network.

Both countries have radial networks centred on the capital cities, with relatively limited and underutilised cross-country routes. This is especially pronounced in France.

The operating model for the rail sectors are very different.

In France SNCF dominate the rail sector, providing both nearly all passenger services, also being the Infrastructure Manager. France's sector has not been significantly liberalised, with only limited services being tendered, however the long-distance sector is less regulated than the UK and operated on open access commercial principles.

The model for PSO services is very different.

- There is a clear distinction between PSO and Commercial services. Responsibility for PSO services is predominantly with the regions in France, there is devolved responsibility for service specification, tender and contract model, and funding. The regions are the Competent Authority. A limited number of long-distance services are the responsibility of the national transport ministry. In France, 72% of services by train km are designated as PSO, compared to 99% in the UK.
- The majority of PSO services remain operated under direct awards between the respective region and SNCF Voyageurs and have not been competitively tendered.
- Six regions have, to date, embarked on programmes to competitively tender PSO services. Only a limited number of tenders have been concluded. Of the competitively tendered PSO contracts, only one contract has been awarded to a Railway Undertaking other than SNCF Voyageurs.
- There is no single procurement or specfication model for PSO services in France. Each region has developed its approach separately, and contract requirements and outputs reflect these differences.
- Revenue risk in nearly all cases remains with SNCF Voyageurs. Grand Est is the only region which has transferred revenue risk to the authority.
- The lack of market opening and successful awards to parties other than SNCF Voyageurs is a mixture of some regions not wishing to go down the competitive tendering model and preferring to continue with direct awards, and the market dominance of SNCF when services have been tendered, including control and ownership of rolling stock, service facilities and staff.

Long-distance services are operated on a commercial basis, under an open access model, albeit as an effective national monopoly by SNCF Voyageurs. We highlight the following important differences between the French and UK models:

- Unlike the UK, long-distance services are operated on a commercial basis, and are not tendered or licenced. SNCF Voyageurs continues to operate nearly all long-distance services, running a commercial network across France, predominantly focused on the high-speed network.
- Long-distance commercial services are not specified at a national or regional level. The timetable, service frequency, customer offer and branding are the responsibility of the Railway Undertaking (operator).
- The Railway Undertaking takes full revenue risk.
- At the current time there is very limited direct competition, with Renfe and Trenitalia providing limited on-rail competition. Several start-ups have announced plans to introduce competing services, which will introduce a level of competition for commercial services.

Freight services are provided on a commercial basis in both countries, with multiple operators providing services. SNCF Rail Logistics Europe remains the dominant provider.

Both countries have established operational separation between the Infrastructure Manager and Railway Undertakings, but in France SNCF remains responsible for both the infrastructure and train operations. SNCF remains an integrated business, with responsibility for the infrastructure and also operating rail services through its respective operating divisions. The degree of separation between the different businesses remains a point of debate.

Railway Undertakings access the network through access agreements, and access should be provided on an equal non-discriminatory basis.

There is no established third-party passenger rolling stock funding or ownership model in France. SNCF Voyageurs continue to own all rolling stock, and therefore the rolling stock is not made available to competitors in the instances where services have been tendered. This compares to the UK model where rolling stock control is separated from the ownership of the Railway Undertaking and therefore control and ownership of rolling stock does not frustrate the tendering of services.

Likewise in France, ownership of service facilities is with the ownership of SNCF Voyageurs, the Railway Undertaking, not SNCF Réseau, the Infrastructure Manager. SNCF Voyageurs also undertake the maintenance in the service facilities they control. This compares to the UK model where service facility ownership is separated from the ownership of the Railway Undertaking and is only leased by the Infrastructure Manager (Network Rail) for the duration of the operating contract. Therefore, control and ownership of service facilities does not impact the tendering of services.

France

Key components of sector model

Tender model (PSO)

PSO TER regional and suburban services have since 2017 been the responsibility of, and are funded by, the 13 regional authorities. The funding for regional passenger rail mostly comes from central government. The transfer of responsibility for regional PSO services was accompanied by the transfer of existing funds, but no additional funds were provided at that time.

Until recently, each region had a separate direct award with SNCF Voyageurs for the provision of PSO services in the respective regions.

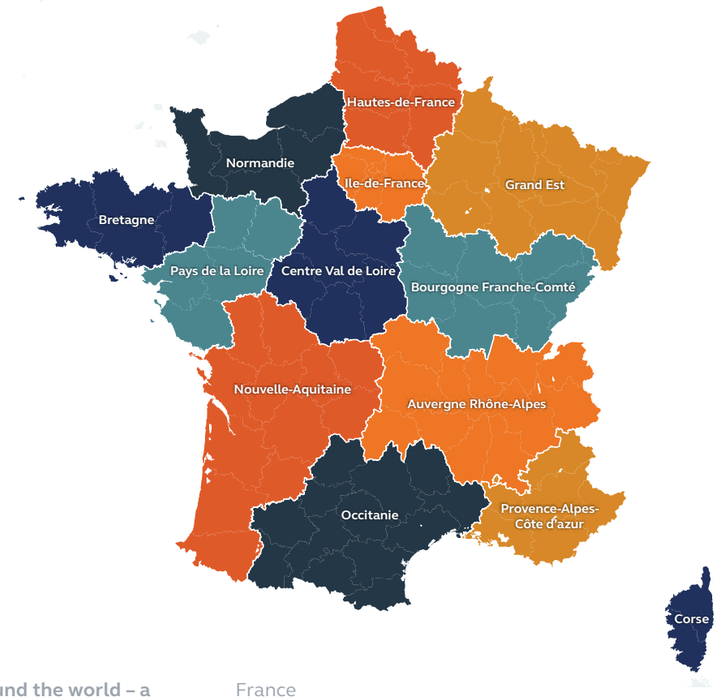
Single Direct Awards for a region remain the norm, with a number of the regions choosing to enter into new direct award contracts for PSO services in advance of the end of 2023 deadline for competitive tendering of PSO services required under the 4th Railway Package.

For example, in 2023, Region Occitanie signed a 10-year direct award with SNCF Voyagers for the operation of all PSO services in that region. This contract also illustrates the inter-relationship between the different divisions within the SNCF Group, as the Occitanie also states the contract involves the wider SNCF Group including SNCF Réseau and SNCF Gares & Connexions.

Regional TER and Intercitiés services that are also designated PSO are the responsibility of both the Ministry of Transport (DGITM) and the regions. Intercitiés PSO services include long-distance lines which broadly parallel high-speed routes and cross-country routes.

	Long distance			Regional and urban	
Type of services	High Speed: TGV	LD: Thello, Intercitiés	Interregional: Intercitiés	Transilien	TER and local services
Designation	Commercial Open Access	Commercial Open Access	PSO	PSO	PSO
Awarding Authority	None. Regulated by ART		DGITM	Ile de France (Paris region)	Regions

Several regions have progressed the competitive tendering of PSO services. The level of interest in progressing tendering appears to be linked to political control in the respective region and satisfaction with current service quality and price.



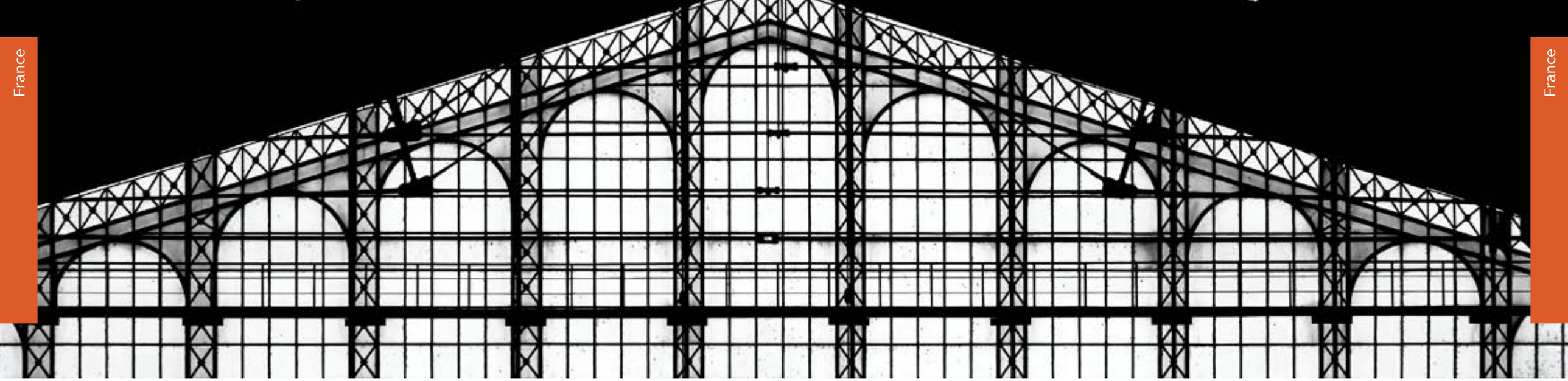
Regions that have progressed tendering include:

- Region Sud (Provence Alps Côtes d'Azur PACA) – The first region to introduce competitive tendering, and the only region to date to have awarded a PSO operating contract to a Railway Undertaking other than SNCF Voyageurs. In November 2021, as part of the award Travsdev was awarded the contract to operate the Marseille Nice line starting in 2025. As part of the award Transdev is procuring 16 eight-car Alstom Omneo EMU, which will be transferred to the region at the end of the contract. SNCF Voyageurs have been awarded the other competitively tendered PSO contract. It should be noted that the contract Transdev won required the bidder to procure new rolling stock, thereby reducing SNCF Voyageur's advantage.
- The Grand Est Region has expressed interest in competitive PSO tendering, but has recently concluded a 10 year agreement with SNCF Voyageurs for the development of local and regional rail services in and around Strasbourg, including modernisation of the TER rolling stock fleet and the acquisition of new trains, as well as increases in service frequency. It is stated that over the contract period Grand Est plans to open up services progressively to competition.
- The Pays de la Loire region has introduced competitive tendering for its PSO services, and has to date awarded its first contract covering services around Nantes and the Sud Loire local network. SNCF Voyageurs was awarded the contract with the region stating it had received five bids, and that SNCF Voyageurs had submitted the highest ranked technical bid. The new contract is also stated to reduce costs by 25% compared to the previous direct award.
- The Hauts-de-France region has competitively tendered the Etoile d'Amiens routes, which again was awarded to SNCF Voyageurs. They have recently announced plans for the tendering of routes in northern France, including from Calais, Maubeuge, Saint-Quentin, Laon, and Beauvais to Paris.
- Auvergne-Rhône-Alpes, which includes the French TER network, has announced it will tender services on the basis of five geographical lots: Auvergne; routes radiating from Chambéry and Grenoble; routes in Savoie and cross-border services; routes radiating from Lyon; and, long-distance regional services. Additionally, there will be a "functional" lot for the management of customer services including passenger information and ticket sales. These services would be provided on behalf of the operators of all five lots.
- Ile de France, the French capital region, have also commenced competitive tendering of PSO services on the Transilien network. Once again, to date only SNCF Voyageurs have been successful.
- The DGITM planned to tender the cross country Intercitiés routes from Bordeaux to Lyon and Nantes in 2019. The tender process was not completed as only SNCF Voyageurs remained as a bidder, with other bidders stating they were unable to submit a competitive bid.

Revenue risk generally remains with SNCF Voyageurs, but the recent Grand Est contract transfers revenue risk to the region.

SNCF Voyageurs continues to own all rolling stock used on PSO services, as well as the service facilities where they are maintained. This established a high in-built incumbent advantage.

France



France

Open access (commercial) model

High-speed TGV services, and some long-distance services, are provided under a commercial open access model. However, currently SNCF Voyageurs maintain an effective monopoly, with only very limited competing services.

Services frequencies and routes are specified by SNCF Voyageurs, along with the customer offer. SNCF Voyageurs take full revenue and cost risk. DGITM and the regions do not have a role in specifying these services.

SNCF Voyageurs are granted access through a track access agreement with SNCF Réseau. Services are overseen and regulated by the regulator ART.

This is consistent with the provisions of EU Regulation 1370, 4th Railway Package, where services should only be publicly procured and designated PSO if commercial services are not viable.

SNCF Voyageurs operate a comprehensive commercial network[7]. This includes:

- TGV services on the high-speed lines, operated under the Inoui and Ouigo brands.
- Intercitiés services from Paris to Limoges, Clermont-Ferrand and central France, where there is no parallel high-speed line.
- Eurostar services from Paris to London, and the former Thalys services, now also branded Eurostar, to Brussels, Amsterdam and Cologne.
- Cross border international services, operated in partnership with other state-owned operators, for example SNCF and DB have a 50:50 Joint Venture for French-German services.

[7] Source: SNCF's rail network groupe-sncf.com/en/group/about-us/companies/sncf-reseau/network-maps

While SNCF Voyageurs currently operate a near monopoly, a number of other Railway Undertakings have established competitor open access services or are in the process of developing proposals.

- Renfe, the Spanish Railway Undertaking, has since 2023 been operating open access services between Barcelona and Lyon, and between Madrid and Marseille. The two routes had previously been operated by Renfe in co-operation with SNCF since 2013. However, these services were withdrawn in December 2021, after SNCF launched services under its Ouigo brand in Spain. As a result, Renfe decided to establish its own French subsidiary, in order to relaunch the two international services as a commercial operation under European open access rules. Renfe have stated their intention to also operate between Lyon and Paris.
- Trenitalia, the Italian Railway Undertaking, operates between Milan and Turin to Paris under open access arrangements. Trenitalia have stated their intention to increase the number of services they operate.
- Kevin Speed, a start-up planned open access operator. It has recently signed a track access framework agreement with SNCF Réseau, and plans to launch its first services under the Ilisto brand by the end of 2028. It intends to operate services between Paris and Lille, Strasbourg and Lyon.
- Le Train, start-up planned open access operator, with routes from Bordeaux to Angoulême, Nantes, Rennes and Arcachon. Currently starting operational mobilisation but unclear whether will start services with second-hand rolling stock or with new build Talgo sets.
- A number of parties have stated they are developing plans to provide competition to Eurostar (both to UK and on former Thalys routes). These are understood to be in early-stage development at this time.[8]

[8] Since this report was drafted a new start up business, Proxima, has announced plans to launch open access high-speed services between Bordeaux, Nantes, Rennes, Angers and Paris, with a fleet of new build Alstom horizon trainsets. It is intended that passenger services would commence in 2028.

Freight sector model

The French rail freight market is open to competition, as required under EU legislation.

The SNCF division, Rail Logistics Europe (the freight undertaking), operates both rail freight and multimodal freight transport, in both France and internationally. It operates under the sub-divisions of SNCF Fret, VIIA, Captrain, Naviland Cargo and Forwardis.

Following an investigation by the European Commission into potentially illegal state aid for the ailing rail freight operator, the Ministry of Transport announced that it would break up Fret SNCF and transfer some business to competing operators. From January 1st 2025, the state-owned operator is to be split into separate transport and maintenance arms, provisionally branded as New Fret and New Maintenance.

As part of the government's breakup process, 14 traffic flows previously handled by Fret SNCF were transferred to DB Cargo France, Europorte and Regiorail with effect from 1st January 2025. The new operators are deploying their own staff and rolling stock and have not taken over assets from the state-owned business.

Separation between IM and RU

There is separation between the Infrastructure Manager and Railway Undertakings to the extent required under EU legislation. However, SNCF remains a single business, with separate Infrastructure Manager and Railway Undertaking divisions. There is a common management board at holding group level, the Executive Committee includes the CEOs of the divisions including Voyageurs, Rail Cargo and Réseau.

The current organisation structure dates from January 2020, when the Infrastructure Manager and Railway Undertaking separate businesses were reintegrated under a common SNCF Group structure. This restructuring resulted from the "new railway pact" of 2018. This statute called for a unified, publicly owned rail transport and mobility group to be created, and restored the group as a company wholly owned by the state of France, additionally restructuring the Group's finances by transferring €35 billion in debt to the French State, with the aim of ensuring SNCF had the capacity to invest in modernising and upgrading the rail network.

SNCF Group is wholly owned by the state of France, and its governance states it may not sell its shares in the company. SNCF Group owns all of the other companies in the Group, and its governance prevents it selling its shares in SNCF Réseau and SNCF Voyageurs.

SNCF state that the governance arrangement will ensure fair, equitable treatment for all rail companies using the French network, including SNCF Réseau's responsibilities in setting track access fees and assigning train paths. However, outside these two areas, which are the responsibility of SNCF Réseau, major strategic and investment decisions will be made and approved by SNCF Group.

It is stated that the new structure creates a wall between SNCF Réseau's and the Group. SNCF Réseau's board members appointed by the parent company are required to recuse themselves from discussion of motions affecting pricing, track access fees and train paths, and are prohibited from serving simultaneously on the board of any Group rail company that does business in France. It is however noted that the structure does still ensure SNCF Group appointees are on the Board of SNCF Réseau, and the CEO of SNCF Réseau sits of the SNCF Group Executive Team.

Access to the network is overseen by the independent transport regulation authority, Autorité de Régulation des Transports (ART), which is remitted to ensure that all operators have equal access to the French rail network.

Devolution to regions

Since 2017, PSO services (with the exception of the long-distance Intercitiés) have been the responsibility of the responsibility of, and are funded by, the 13 regional authorities. The funding for regional passenger rail mostly comes from central government. The transfer of responsibility for regional PSO services was accompanied by the transfer of existing funds, but no additional funds were provided at this time.

DGITM remain responsible for the long-distance services designated PSO.

Until recently, each region had a separate direct award with SNCF Voyageurs for the provision of PSO services in the respective regions. Different regions have adopted different approaches for the contracting of PSO services.

Regions, including Grand Est, Region Sud (PACA), Hauts de France, Pays de la Loire and Auvergne-Rhône-Alpes have actively promoted competitive tendering, as has the Paris region Ile de France. However, to date only Region Sud has concluded a competitively awarded PSO contract with a party other than SNCF Voyageurs.

Other regions have chosen to enter into long term direct awards with SNCF in advance of the December 2023 deadline, whereafter PSO services were required to be competitively tendered.

The tendering and contracting model adopted by the different regions, and the obligations on the Railway Undertaking vary by region, regardless of whether they have been awarded under a direct award or competitive tender. Each region has developed its own model.

Rolling stock funding and ownership

SNCF Voyageurs owns all the rolling stock it uses on services it operates. To date, no third-party ownership model or leasing model has developed for passenger rolling stock.

There is an established leasing market in the freight sector. SNCF Fret previously sold its locomotives to Akiem.

The new Open Access entrants have been required to source their own rolling stock. Renfe and Trenitalia have utilised rolling stock from their existing fleets in Spain and Italy respectively.

The start-up Railway Undertakings will need to procure new rolling stock before the start of operations. Le Train has announced it has selected Talgo to supply 10 Avril S106 high speed trainsets for its planned services from Bordeaux to Angoulême, Nantes, Rennes and Arcachon. Kevin Speed have commenced procurement processes but have not publicly announced the supplier to date.

It is understood that the three start-up prospective open access Railway Undertakings are planning to utilise a third-party leasing model, but details have not been publicly announced.

The situation for PSO rolling stock is more complex.

France

SNCF Voyageurs continues to own and maintain all the rolling stock it uses on PSO services. Therefore, this rolling stock is not immediately available to other bidders when PSO services have been competitively tendered. It is significant that the only PSO concession awarded to a party other than SNCF Voyageurs involved the procurement and funding of new rolling stock, and also the service facility to maintain these trains.

However, the regions have funded much of the investment in new rolling stock in recent years, providing it to SNCF Voyageurs, who then own it. There is an intent for the regional rolling stock fleets to be transferred from SNCF Voyageurs ownership to the respective regions, who would then own the rolling stock, and be responsible for its allocation to operating contracts and the fleets long term asset management. This has not yet occurred. It is understood that the complexity of this transfer and condition liabilities have ensured this process has not been progressed.

The Transdev-procured rolling stock used to operate the Marseille-Nice services will transfer to the region at the end of the operating contact.

Hauts-de-France have advised bidders for the upcoming tender for services from Calais, Maubeuge, Saint-Quentin, Laon, and Beauvais to Paris that the region will make the necessary rolling stock available to bidders, including investment in any additional rolling stock needed.

The recent direct awards by Grand Est and Auvergne-Rhône-Alpes have provisions for the transfer of the existing SNCF rolling stock during the term of the operating contract. Regional leadership of Auvergne-Rhône-Alpes have stated that in preparation for putting regional operating contracts out to tender, they will assume full ownership of the existing TER rolling stock fleet, and in the future, the region is looking at options including the region placing its own new train orders, operators investing in the fleet and rolling stock leasing.

Several third-party lessors have stated their intention to enter the French market including Akiem, Alpha Trains and Rock Rail. To date, no contracts for procurement and ownership of rolling stock have been signed.

Service facilities (depots) model

Service facilities are controlled by SNCF Voyageurs in an integrated model. Service facilities are owned by SNCF Voyageurs, not SNCF Réseau.

SNCF Voyageurs therefore:

- Own the service facilities
- Own the rolling stock
- Undertake the maintenance on the rolling stock

This has raised issues for third-parties seeking access to service facilities, including bidders for PSO concessions and open access operators. For example, it is understood that Trenitalia wish to increase the frequency on the Milan/Turin route to Paris but have been unable to secure the necessary access to service facilities in the Paris region to support this service expansion.

The regulator, ART, require SNCF Voyageurs to publish price lists for access to service facilities and undertaking third-party maintenance. This approach however has not, to date, established availability and pricing that is perceived to be competitive and open. ART recently commissioned a benchmarking study to review arrangements in other European countries to understand how arrangements for third-party access have been implemented to support them in their work.

The Transdev rolling stock procurement for the Marseille Nice services also includes the construction of a new service facility, which will transfer to the region at the end of the operating contact.

The recent direct awards by Grand Est and Auvergne-Rhône-Alpes have provisions for the transfer of the current SNCF rolling stock maintenance facilities during the term of the operating contract to ensure equal access to all bidders in future tenders. These tenders have not yet taken place.

Ticketing

Ticketing is primarily undertaken by SNCF Voyageurs. Station ticket offices are operated by operating divisions, and SNCF Connect (a division of SNCF Voyageurs) provides on-line ticketing. SNCF Connect describes itself as France's leading e-commerce site.

SNCF Voyageurs remain responsible for sales revenue, with the exception of the recently entered new PSO contract in Grand Est, which transfers revenue risk to the regions.

Currently, there is no separate national ticketing system outside the SNCF rail ticketing structure. A national ticketing plan is under development focused on regional PSOs, which has common governance across all regions.

There are a large number of individual ticketing schemes, including multi-modal schemes. These are all at departmental and individual commune levels.

Germany

Country overview

Introduction and key characteristics

Germany has the largest rail network in Europe, with c. 24,500 route miles. Its population at 83.2 million is also the largest in Europe. Its population is predominantly urban, but dispersed over a large number of population centres. No single city dominates. The largest cities of Berlin, Hamburg, Munich and Cologne have a population of over 1 million, but a further 29 cities have a population of over 250,000.

This is reflected in its rail system which provides a network of cross-country routes linking the major cities, rather than a radial network centred on the capital city seen in many other countries. The population distribution across a large number of cities and urban conurbations is also reflected in the regional passenger networks, with large “S-Bahn” networks serving the major cities.

Germany provides a liberalised rail market, with established competitive tendering of PSO passenger services, a commercial long-distance passenger market operated under open access provisions, and a fully liberalised freight market with multiple competing operators.

However, Deutsche Bahn (DB) continues to maintain a dominant position, retaining around two thirds of regional PSO services, and maintaining a near monopoly for commercial long-distance services. It remains a single business, with separate Infrastructure Manager and Railway Undertaking businesses.

The Infrastructure Manager for Germany is InfraGO, part of the DB Group. It was established in January 2024 following the merger of DB Netz (track and infrastructure) and DB Stations and Service into a single entity. InfraGO’s remit is to operate the railway infrastructure as a commercial enterprise with consideration of public welfare goals and the common good, the GO in InfraGO standing for gemeinwohlorientiert, (orientated towards the common good).

Long-distance “inter-city” services are operated by DB Fernverkehr, while regional and S-Bahn services are largely operated by DB Regio. The two passenger Railway Undertaking divisions are managed as separate businesses, albeit within the overall DB group.

Germany is a federal country, with responsibility for regional transport with the 16 Federal state(s). The Federal state(s) are responsible for tendering passenger rail concessions, which is undertaken by Public Transport Authorities (PTAs). The German constitution provides that the Federal Government must allocate a proportion of federal tax proceeds to the Federal state(s) for fund public transportation (Art 106a), and the amount of federal subsidies (Regionalisierungsmittel) to be allocated to each Federal state(s) for a five-year period. This funding must be used for regional rail services.

The PTAs are responsible for the service specification. Concessions are typically for a single route or series of routes, and each concession is accordingly much smaller than UK operating contracts.

There are over 65 separate passenger railway operators, running c. 735 million train/km per annum. DB Regio operates c. 61%, with 8 other operators combined with DB accounting for c.92% of all tendered train km operated.

Comparative metrics

Population (million)	83.2 m	67.35 m
GDP (GBP billion)	£3,078 b	£2,488 b
GDP per capita (GBP ,000s)	£36.9 k	£36.9 k
Rail route length (route miles)	24,474	10,140
Route length by country size (route miles per 100 km^2)	6.84	11.05
Route length by population density (route miles per 10,000 inhabitants)	2.94	1.51
Percentage of electrified network (route miles)	54%	38%
Length of High-Speed rail network (miles)	976	70
Network density train per day per route/km	61	77
Passenger train km (million t/km pa)	852 m	558 m
Passenger km (million km pa)	102,900 m	69,148 m
Rail passenger transport modal share (% passenger-km by land)	6.4%	4.9%
Freight tonnage pa	128,700 m	33,141 m
Rail freight transport modal share (% tonne-km by land)	18.6%	8.7%
Infrastructure expenditure – maintenance and renewal (GBP billion)	£5.64 b	£4.35 b
Maintenance and renewals as percentage of all infrastructure expenditure	63%	58%
Punctuality of long distance and high-speed passenger services (RMMS)	71%	67%
Punctuality of regional and local passenger services (RMMS)	88%	86%
Punctuality of domestic freight services (RMMS)	65%	93%
Passenger revenue (GBP million)	£13,402 m	£11,214 m
Percentage of PSO services (train/km)	83%	99%
Percentage of non-PSO services [commercial / open access] (train/km)	17%	1%
Safety: Railway passenger fatality rates (2010-2020) per billion train/km	0.025	0.01
Safety: Level crossing accident rates per million train/km (2018-2020)	0.03	0.01

The data sources for the table above are referenced in the “Comparative metrics source references” section of this report.

Key rail sector organisations

Federal Ministry of Digital and Transport: Overall responsibility for transport in Germany, including oversight and responsibility for DB.

Federal state(s): The 16 federal states, who are responsible for the organisation of regional rail passenger transport and the ordering of transport services. This responsibility is discharged through Public Transport Authorities (PTAs).

Public Transport Authorities (PTAs): The 27 Authorities who are responsible for the specification, procurement and monitoring of regional passenger rail transport. They are all members of the Federal Association of Local Rail Transport (Schienennahverkehr). The number of PTAs per federal state as well as the size of their area of responsibility varies considerably, between one (e.g. Bavaria or Schleswig-Holstein) and five (Saxony). The smallest PTA authority is responsible for about 2.2 million train-km, while the largest oversees more than 128 million train-km.

Schienennahverkehr (SPNV)[9]: The Federal Association of Local Rail Transport represents the 27 PTAs collectively at the federal level, sharing knowledge and expertise.

Eisenbahn-Bundesamt (EBA)[10]: The Federal Railway Authority is the supervisory, licensing and safety authority for railways and Railway Undertakings. Their responsibilities include plan approval for facilities of the federal railways, the authorisation of rolling stock and railway infrastructure, the granting of Federal funds, and enforcing of passengers’ rights. It is an independent federal authority and is subject to supervisory and legal control by the Federal Ministry for Digital and Transport.

Bundesnetzagentur (BNetzA)[11]: The Federal Network Agency (Regulator), which is the central infrastructure authority and promotes competition in the markets for energy, telecommunications, postal services and railways. It is the auditing body for the conditions on the German rail market, and ensures non-discriminatory access for all Railway Undertakings.

[9] Start - schienennahverkehr.de
[10] EBA - Startseite (bund.de)
[11] Bundesnetzagentur - Startseite

Germany

Deutsche Bahn AG[12]: The holding company for all DB group companies. It is 100% owned by the Federal government and comes under the responsibility and supervision of the Federal Ministry of Digital and Transport. The four main divisions of InfraGO, Fernverkehr, Regio and Cargo are run as separate business units. The CEO of each of these business units sits on the DB AG management board.

DB InfraGO[13]: The Infrastructure Manager for Germany. It was established in January 2024 following the merger of DB Netz (track and infrastructure) and DB Stations and Service into a single entity. InfraGO's remit is to operate the railway infrastructure as a commercial enterprise with consideration of public welfare goals and the common good, the GO in InfraGO standing for gemeinwohlorientiert, (orientated towards the common good). It is 100% owned by DB AG.

DB Fernverkehr: The Railway Undertaking division that operates long-distance intercity services across Germany, including cross-border services. Long-distance services are operated under a commercial open access model. Fernverkehr retains a near monopoly of long—distance services. It is 100% owned by DB AG.

DB Regio: The Railway Undertaking division that operates regional and S-Bahn services under contract to the PTAs. The majority of these services have been competitively tendered, but Regio retains a number of directly awarded contracts. It is 100% owned by DB AG.

DB Cargo: The Railway Undertaking division that operates freight services in Germany and internationally. It is 100% owned by DB AG.

DB Netz: The former Infrastructure Manager business unit. Since January 2024 it has been the track division (Geschäftsbereich Fahrweg) of InfraGO.

DB Stations and Service: The former business unit which owned and managed stations. Since January 2024 it has been the stations division (Geschäftsbereich Personenbahnhöfe) of InfraGO.

DB Energy: A division within InfraGO which manages the power distribution network. It is an independent energy manager providing traction power and fuels on a non-discriminatory basis to all Railway Undertakings, and also to customers from industry, trade and the services sector.

[12] DB Konzern (deutschebahn.com)
[13] DB InfraGO: Eisenbahninfrastruktur der Zukunft in Deutschland

DB Vertrieb[14]: Responsible for distribution and ticket sales for the passenger transport services of DB and other transport operators. It operates seven sales channels: internet/mobile (including bahn.de), DB ticket machines, DB Travel Centres, DB Agencies, the ticket subscription centre, the telephone travel service and ticket sales on board trains. It is financed through commissions that are determined by service agreements with its business partners.

bahn.de[15]: The ticketing portal for DB, and the dominant sales channel for on-line ticketing in Germany, operating under the DB brand. It also operates under the bahn.com URL and provides a portal for pan-Europe ticket sales too.

Railway Undertakings (tendered): There are over 65 separate Railway Undertakings who operate tendered passenger services, though some of these share common parents. In addition to DB Regio, these include: Transdev; Netinera; Abellio (in the process of exiting the market); B-Nex; HLB; National Express; Eurobahn; and ÖBB (previously Go-Ahead). The majority of tendered services have been competitively tendered, though DB Regio continue to operate some contracts under direct awards.

Railway Undertakings (commercial): DB Fernverkehr provides commercial services linking the main cities across Germany in a comprehensive system wide network, with services also extending cross-border to neighbouring countries. These are operated under open access contract provisions. DB Fernverkehr retains c. 96% market share for commercial services. Limited competition is provided by the open access operator FlixTrain, who operate across five routes, with typically two or three departures per day on each route. Cross border services are also provided by other national operators and open access operators e.g. Westbahn to Munich.

Mofair[16]: An association of private passenger rail operators which promotes transparent and fair market access in Germany. The aim of the association is to create a high-quality public transport market under fair framework conditions, lobbying for continued opening of the rail market and ensuring non-discriminatory access to rail infrastructure.

[14] DB Vertrieb: professional sales management for passenger transport (deutschebahn.com)
[15] www.bahn.de
[16] Home - Mofair e.V.

Key differences to UK model, and why these differences matter

Both the UK and Germany have extensive, heavily utilised rail networks, however Germany shows greater rail use. At c.24,500 miles the German rail network has two and half times the length of the UK's network, and comparing route length by population density Germany has around twice the density of the UK.

Both countries have a high network density, Germany recording 61 trains per day per route km, compared to the UK at 77. The larger network size and population is reflected in the higher passenger train km and passenger km between the two countries, but not to a huge extent. This reflected in rail having 6.4% passenger transport modal share in Germany, compared to 4.9% in the UK.

The comparative figures for rail freight show a significant difference with Germany recording c. four times freight tonnage per annum, and the rail freight modal market share is 18.6% compared to 8.7% in the UK.

Another key difference between the two countries is the shape of the network. The UK has primarily a radial network focused on core routes from London, with relatively few cross-country routes. Germany by contrast has a network linking across the country the main cities and urban conurbations, without the radial pattern seen in the UK.

Both countries have liberalised rail sectors, but the models adopted have some significant differences. These are reflected in both the sector structure and the continuing dominance of DB across the sector.

In both countries all PSO services are competitively tendered. We highlight the following important differences between the German and UK tender models.

- Germany has a clear distinction between PSO and commercial services. Only services designated as PSO are tendered, these represent urban and regional services. Long-distance intercity services are operated on a commercial basis, under an open access model. PSO services represent 83% of operated passenger train/km, compared to over 99% in the UK.
- All PSO services are tendered in Germany by the regional Public Transport Authorities. The PTAs are the Competent Authority. Services are therefore specified and procured at a regional level.
- There is no role for the national Federal Ministry of Digital and Transport in specifying or procuring services. The role of the Federal Ministry of Digital and Transport is limited to the distribution of federal funds to the Federal state(s) (regions).
- There is no single model for procured PSO services in Germany. Each PTA has developed its own model, albeit with similarities between different PTAs, and different models also exist within the same PTA area. The association of PTAs, Schienennahverkehr, provides a coordinating role and sharing of best practice.
- PSO services are predominantly tendered as concessions. Responsibility for service specification, customer offer and quality, branding and service development are all the responsibility of the PTAs. In most cases the PTA also takes revenue risk. The Railway Undertaking (operator) is essentially therefore a delivery agent only.
- DB Regio have retained a dominant market position, despite competitive tendering being in place for over 25 years. There are several factors, with the most prominent being access to rolling stock, service facilities and qualified staff.
- Rolling stock ownership has been retained by DB, and has not been transferred to third-party ownership. Therefore, for concessions where the existing rolling stock can be redeployed, DB has a huge advantage as the incumbent. PTAs have sought to address that through a number of different models linked to the funding of new trains, with most new rolling stock procured under a third-party ownership model.
- Previously, there was no automatic TUPE (Transfer of undertakings) of staff to the new operator, meaning new entrants were required to recruit and train operational staff, including drivers. This situation is changing for some contracts but is still not automatic in all cases.

Germany

Long-distance services are operated on a commercial basis, under an open access model. We highlight the following important differences between the German and UK models.

- Unlike the UK, long-distance services are operated on a commercial basis, and are not tendered or licenced.
- Inter-City (commercial) services are not specified at a national or regional level. The timetable, service frequency, customer offer and branding are the responsibility of the Railway Undertaking (operator).
- The Railway Undertaking takes full revenue risk.
- DB Fernverkehr continues to operate nearly all long-distance services, running a commercial network across Germany. These services have not been tendered or licenced as commercial services.
- DB and its brand remain the "national" railway company. While a commercial network, DB work closely with the Federal Ministry and Federal state(s) in developing the network, and therefore there is a relatively high level of informal specification.
- There is very limited direct competition, with FlixTrain providing services on a limited number of routes and low frequencies.

Freight services are provided on a commercial basis in both countries, with multiple operators providing services. DB Cargo remains a dominant provider.

Both countries have established operational separation between the Infrastructure Manager and Railway Undertakings, but in Germany DB remains responsible for both the infrastructure and train operations – albeit through separate divisions.

There is a similarity between the two countries' responsibility for infrastructure development and delivery, with the Federal Ministry of Digital and Transport producing its infrastructure plan and providing funding, with DB InfraGO responsible for the delivery of upgrades and investment. Likewise both countries infrastructure managers' governance is through the respective transport ministries.

Railway Undertakings gain entry to the network through access agreements, and access should be provided on an equal non-discriminatory basis.

There are some important differences:

- DB remains an integrated business, with responsibility for the infrastructure and operating rail services through its respective operating divisions. The degree of separation between the different businesses remains a point of debate.
- Responsibility for service development at a regional level lies with the Federal state(s) and the PTAs. There is no intention to integrate service specification and the Competent Authority responsibility into InfraGO or other DB entities.
- Planning at a national level, and for long-distance services, is separated from regional planning. This is a reflection of the sector model adopted, which incorporates the federal structure of German governance.

Devolution to the Federal state(s) and their PTAs is an integral part of the German sector model. Federal funds are allocated to regional passenger transport, but the decision on how the funds are spent, service specification and tender model are fully devolved. The level of devolution in Germany is akin to the responsibilities accorded to Scotland, Wales and London in the UK. The devolved model applies across all of Germany, not just to specific regions.

Key components of sector model

Tender model (PSO)

Germany has a competitively tendered model for PSO services. The German railway reform and liberalisation commenced in 1994, which established the responsibility for regional passenger services with the Federal state(s), the introduction of the current structure of PTAs, and the first tendered contract was entered into in 1998.

The 16 Federal state(s) are responsible passenger rail transport as defined in the General Railway Act ("AEG") as a "transport service whose main purpose is to cover the transport needs of urban, suburban and regional transport" and covers in the "majority of cases a train covering up to a total distance of 50 kilometres, or a total travel time of up to one hour" (§2 para. 12 AEG). The German constitution provides that the Federal Government must allocate a proportion of federal tax proceeds to the Federal state(s) for funding public transportation (Art 106a), and the amount of federal subsidies (Regionalisierungsmittel) to be allocated to each Federal state(s) for a five-year period. This funding must be used for regional rail services.

Passenger rail operating contracts are tendered, which is undertaken by Public Transport Authorities. There are 27 Public Transport Authorities[17]. They are all members of the Federal Association of Local Rail Transport (Schienennahverkehr). The number of PTAs per federal state as well as the size of their area of responsibility varies considerably, between one (e.g. Bavaria or Schleswig-Holstein) and five (Saxony). The smallest PTA authority is responsible for about 2.2 million train-km, while the largest oversees more than 128 million train-km.

All services under the responsibility of the Federal state(s) and PTAs are designated PSO. These include the major city S-Bahn networks and the regional networks.

Operating contracts have historically been let both as Gross Contracts, with no revenue risk to the Railway Undertaking, and Net Contracts, where the Railway Undertaking takes revenue risk. There remain a number of Net Contracts in operation, but post-Covid nearly all contracts have been tendered as Gross Contracts, and existing Net Contracts have mostly been renegotiated to reflect the impact of Covid on fare box revenue and passenger numbers.

There is no single tendering model. Each PTA undertakes a procurement in a different manner and with a different model, though there are a number of similar approaches. While competitive tendering is the norm, there remain several direct awards, including for the large S-Bahn networks.

Operating contracts are generally let as concessions.

[17] Source: https://www.schienennahverkehr.de/ueber-uns/unsere-mitglieder/

Noting the different models in existence, generally the PTA is responsible for:

- The service specification – the timetable and capacity to be provided;
- The type of rolling stock to be operated i.e. new or used rolling stock, and specific requirements for the rolling stock. There are a number of different models for rolling stock procurement and ownership, these are as described in the subsequent section;
- Brand – PTAs are increasingly moving to a common brand for the services they procure, which are applied across all services in a region, for example Baden Württemberg have introduced the "Drei Löwen" brand for all new tendered services, replacing operator specific brands;
- Customer offer – the PTA defines the quality standards that are to be delivered, including performance and satisfaction targets, and requirements relating to the on-board offer;
- Ticketing offer – the PTA defines the available tickets and pricing, which form part of an integrated tariff across the region. These are as described in the subsequent section.

The Railway Undertaking is generally responsible for:

- Drivers and on-board staffing;
- Revenue protection on-board;
- Ticket sales at stations, generally via TVMs (ticket machines);
- Depending on the model, rolling stock procurement and leasing - in other instances this is specified by the PTA;
- Rolling stock maintenance, unless the rolling stock has been procured with an associated OEM (Original Equipment Manufacturer) maintenance contract;
- Meeting service quality and performance standards – these normally have bonus / malus incentive regimes associated with them.

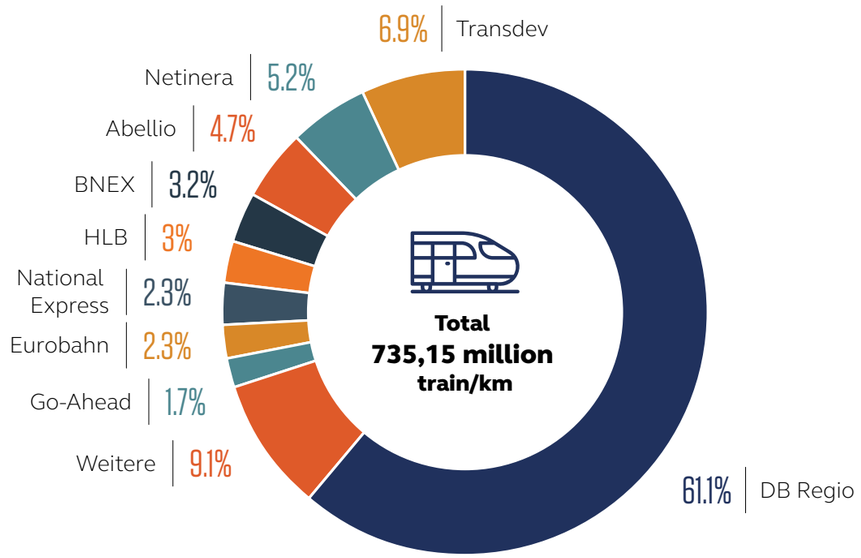
The pricing model varies by concession, but generally the Railway Undertaking receives:

- Fixed fee per train/km operated. This fixed amount may vary depending on whether trains are operated in multiple or other defined criteria, but the amount is fixed (per train/km) when the contract is entered into. The fee is generally not received if the service is not operated;
- The PTA can flex the level of train/km operated within defined bands. The amount per train/km is not adjusted. This creates an upside/downside risk for the operator;
- Service Quality and Performance Incentive and Malus regime. The operators can earn bonuses for meeting and exceeding service quality and performance contractual levels, and are financially penalised if they drop below the target level;
- Compensation for delays caused by the Infrastructure Manager are not automatically compensated (there is not a Schedule 8 direct equivalent) and normally sustained poor performance is needed to trigger compensation.

Germany

The size of operating contracts varies significantly, and are typically for a single route or series of routes, and each concession is accordingly much smaller than UK operating contracts. There is no standard contract size, but most fall in the range between two and 10 million train/km per annum. There are a number of "micro" concessions for isolated routes or where bespoke rolling stock is required, and the large Munich and Berlin S-Bahn networks compare in scale to UK sized contracts.

There are over 65 separate passenger railway operators, running c. 735 million train/km per annum[18]. DB Regio operates c. 61%, with 8 other operators combined with DB accounting for c.92% of all tendered train km operated.



[18] Source BSN: 2022 Market Share in the SPNV market based on contracted train kilometres

The main Railway Undertakings are:

- DB Regio – a division of DB AG
- Transdev – a subsidiary the French Transdev Group, which runs both regional passenger rail as well as bus operations across Germany
- Netinera – a subsidiary of ItalianFS Group
- Abellio – they exited most of their contracts under direction from the Dutch parent, but continue to operate certain concessions as management contracts;
- BeNEX – owned by PPP/Amber, an infrastructure fund. Together with Netinera they own ODEG, on certain concessions
- Eurobahn – the former Keolis Germany business, currently being restructured and is currently up for sale
- HLB – owned by the Hesse state and focused on that region
- Arverio – owned by ÖBB, who purchased the business from Go-Ahead in October 2023
- National Express – only active in North-Rhine- Westphalia

Regional passenger rail is primarily financed from two sources – fare revenue and public subsidies.

Fare revenue predominantly comes from regional transport association tickets, with some being allocation of national tickets. A recent development is the introduction of the Deutschlandtarifverbund ticket offering monthly travel across Germany on regional services for €49.

Public subsidies: Since the transfer of responsibility for regional rail passenger transport from the federal government to the states, the states are also entitled to the financial resources necessary for the fulfilment of their responsibilities. Funds known as regionalisation funds, have been distributed to the states since 1996 on the basis of the Regionalisation Act (RegG) and are adjusted annually. For their part, the states provide the bodies they set up under the Regional Transport Act (PTAs) with the corresponding financial resources. These regionalisation funds are used to finance both the SPNV operation and the charges for the use of the rail infrastructure.

After it had become apparent over the years that the user charges for the railways and stations had risen considerably more than the regionalisation funds and that, in addition, there was too little money available for the significantly expanded timetable offers, the federal government ensured that the funding was significantly increased nationwide with the revision of the RegG. To this end, the funds were increased from 7.4 billion euros (2015) to 8.2 billion euros (2016). By linking the increase in infrastructure utilisation fees to the rate of the regionalisation funds, it ensures that the infrastructure utilisation fees no longer rise at a greater rate than the regionalisation funds.

With the amendment of the law, the allocation between the states was also adjusted. This resulted in the Eastern federal states, in particular, not experiencing a financial improvement until the end of the term in 2031, despite the significant increase in funds nationwide compared to the previous level.

Prior to the introduction of the Deutschlandtarifverbund ticket, and recent increases in costs, fare box revenue accounted for approximately 50% of the total of regional passenger rail. It is anticipated that the increase in public subsidies and the impact of the Deutschlandtarifverbund ticket has reduced the proportion of costs covered by fares revenue.

Germany

Open access (commercial) model

- Long distance services are provided under a commercial open access model.
- DB Fernverkehr operate a commercial network which provides regular, mostly clockface, departures linking the main German cities. It is a network of cross-country routes, rather than a radial network centred on the capital city seen in many other countries, which reflects the distribution of several large centres of population, rather than a single dominant city.
- DB Fernverkehr maintain a 96% market share for long-distance services in Germany. They are provided on a commercial basis under an access agreement entered into with DB InfraGO. Therefore, from a contractual perspective, the intercity network is provided on an open access basis, albeit one that is essentially operated as a national monopoly. Services frequencies and routes are specified by DB Fernverkher, along with the customer offer. DB Fernverkehr take full revenue and cost risk. The Federal Ministry of Digital and Transport and the PTAs do not have a role in specifying these services.
- This is consistent with the provisions of EU Regulation 1370, 4th Railway Package, where services should only be publicly procured and designated PSO if commercial services are not viable.
- It is however arguable the extent that DB Fernverkehr genuinely determines the service pattern and frequency, and the extent that the network is designed and developed in conjunction with the Federal Ministry of Digital and Transport and the Federal state(s).
- DB Fernverkehr operate the network with a fleet which includes over 400 ICE (Intercity Express) trains, which are electric intercity train sets built between 1989 and 2024. These are all owned by DB Fernverkehr.
- There is an ongoing discussion regarding the establishment of the “Deutschlandtakt”[19] which aims to establish a regular interval timetable across Germany, coordinating long-distance, regional and freight services into standard train paths. The implementation target was 2030, however this will not be achieved due to infrastructure constraints and conflicting priorities of different parties. It is also unclear to what extent the introduction of the Deutschlandtakt is compatible with the requirements of 1370, and its constraint on future open access operator aspirations for passenger and freight services.

[19] Deutschlandtakt

- Limited competition is provided by the Open Access Flix Train, who operate across five routes, with typically two or three departures a day on each route. Their services are typically slower and use older rolling stock, but offer an alternative to price sensitive passengers.[20]
- Cross-border services are also provided by other national operators and open access operators e.g. Westbahn to Munich.
- The open access market is open to any licenced operator who can obtain the necessary track access agreements from DB InfraGO and can access the necessary rolling stock. It is noted that infrastructure capacity is limited, and the dominance of the DB Fernverkehr network makes establishing competing operators challenging.

[20] Since this report was drafted, Flix have announced plans to increase the number of routes they operate in Germany.

Freight sector model

» The rail freight market is liberalised with multiple freight Railway Undertakings providing services, especially on intermodal services from the North Sea ports.

» There is an established leasing market with several established lessors providing locomotives and wagons to Railway Undertakings, including Akiem, Alpha, NorthRail, Railpool and Beacon.

» DB continue to maintain a large market share, in particular on the non-intermodal flows, through their DB Cargo subsidiary. However, in their most recent results, DB Group reported that in the previous 12 months DB Cargo's tonnage fell by 11% and tonne-km dropped by nearly 12%.

Separation between IM and RU

» There is separation between the Infrastructure Manager and Railway Undertakings to the extent required under EU legislation. However, DB remains a single business, with separate Infrastructure Manager and Railway Undertaking divisions. There is a common management board at holding group level, which includes members from both the Infrastructure Manager business and the Railway Undertakings divisions.

» The Infrastructure Manager is DB InfraGO which was established at the start of 2024, encompassing the former DB Netz and DB Stations and Service business units. DB InfraGO establishes a single infrastructure business. In part this reflected concerns over the performance of DB Netz and its management of the infrastructure, and the remit the new business has been given - to operate the railway infrastructure as a commercial enterprise with consideration of public welfare goals and the common good, the GO in InfraGO standing for gemeinwohlorientiert, (orientated towards the common good).

» DB InfraGO provides the rail tracks and stabling facilities for the trains and controls the operation of local, long-distance, and freight traffic. It however does not own service facilities (rolling stock maintenance depots). Service facilities are owned and managed by the Railway Undertaking businesses within DB.

» It is recognised that the German rail network infrastructure is outdated in many areas, has suffered from underinvestment for many years, and renewal and upgrade has now become urgent. It is expected this work will lead to ongoing rail traffic disruptions, particularly on the long-distance passenger lines. The Federal Ministry of Transport publishes the "Bundesverkehrswegeplan" (Federal Transport Infrastructure Plan) outlining the railway lines construction / modernisation projects that receive formal funding support until the year 2030.

» To finance DB's rail network, the federal government allocates substantial funds each year through the performance and financing agreement. A total of 86.2 billion euros will be invested by 2029.

» Non-DB Railway Undertakings and trade association, e.g. Mofair, have publicly called for greater separation between the different DB business units, and greater financial transparency of cost and overhead allocation.

» At the current time, there are no plans to further separate the Infrastructure Manager and Railway Undertaking into separate holding companies.

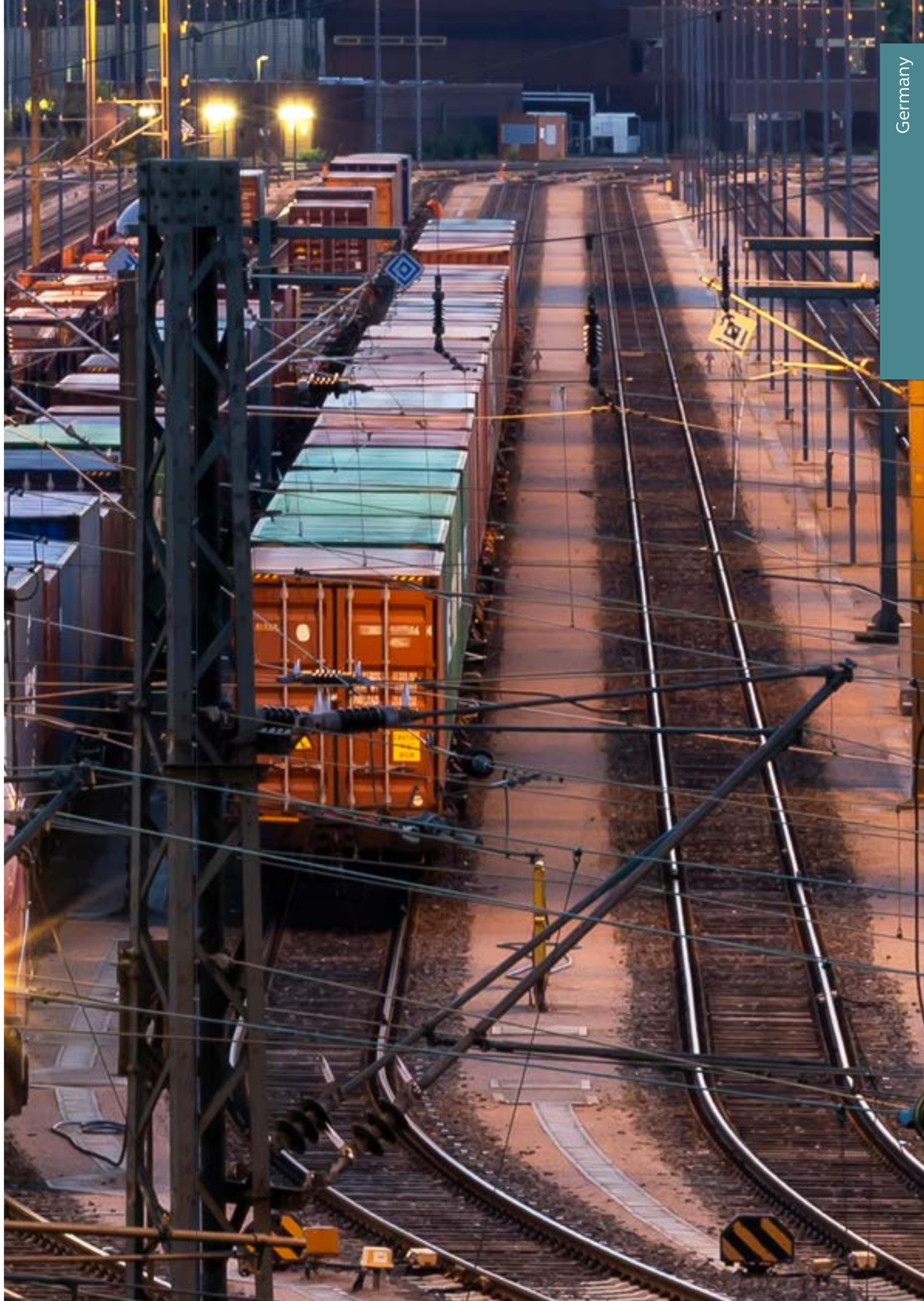
Devolution to regions

» Responsibility for regional passenger rail (PSO services) is fully devolved to the Federal state(s) (regions).

» The framework governing the definition of regional passenger services and responsibilities, funding arrangements, and how the Federal state(s) discharge their obligations through Public Transport Authorities has been described in the PSO model section.

» It is important to note that each of the 16 Federal state(s) and their 27 PTAs adopt their own approach towards tender and contract models. Therefore, while there are a number of similar models, there is not a single German model. This reflects the full devolution to the Federal state(s), and they have responsibility for delivery.

» The Federal Ministry for Digital and Transport does not define how the available federal subsidies (Regionalisierungsmittel) allocated to each Federal state(s) are spent, beyond requiring that they must be used for regional rail services.



Germany

Germany

Rolling stock funding and ownership

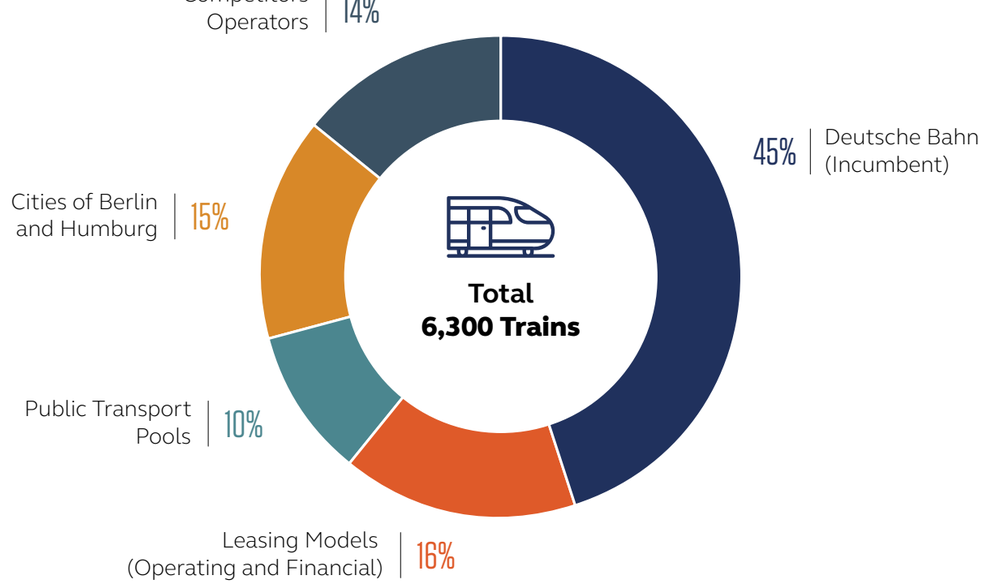
The introduction of tendering for PSO services, and the transfer of responsibility for service provision to the Federal state(s) and PTAs, was not accompanied by any transfer of rolling stock from DB to a third-party. Accordingly, there has been no transfer of rolling stock owned by DB, and DB Regio own the majority of rolling stock they use on PSO services.

As a consequence, the PTAs have focused on addressing access to rolling stock to ensure fair competition for operating contracts. The ownership of rolling stock is a key factor for DB Regio retaining c. two thirds market share for PSO services. This has resulted in a number of different models being developed, with different PTAs adopting different approaches. These include:

- Operating leases – a third-party ROSCO leases trains for the operating contract term only and takes the re-lease risk at the end of the contract term.
- PTA vehicle pool – the establishment of a PTA owned ROSCO, and the requirement of the Railway Undertaking to use these vehicles on an operating contract. This model is prevalent in the LNVG PTA area.
- Vehicle Financing by the PTA or State – where rolling stock is owned by a third-party, but the funding is supported by the PTA, including long-term use guarantee, e.g. VRR, NVBW.
- Vehicle service model – e.g. RRX (Rhine-Ruhr Express) where the PTA underwrites a long-term procurement and maintenance model, typically provided by OEMs (Original Equipment Manufacturers), for vehicle availability.
- Re-use guarantee or capital guarantee – where the PTA offers a guarantee that the rolling stock will be used on the services in the next contract period, thereby enabling funding to be considered over at least two contract terms, e.g. BEG.

The ownership models and ownership structure for German regional rail is illustrated below.

Ownership Structure German Regional Rail[21]



- DB Fernverkehr own all the rolling stock used on the long-distance services, which includes over 400 ICE trains.
- There is no established large scale leasing market for intercity train sets, with only a very limited market in refurbished second-hand coaches. FlixTrain operate their services using leased refurbished second-hand rolling stock, which offers a noticeable difference in customer environment to the modern ICE fleet.
- Access to rolling stock is identified as a key factor limiting potential new open access operators entering the market.

[21] Source: SCI Verkehr 2022

Service facilities (depots) model

Service facilities are generally owned by the Railway Undertaking divisions of DB i.e. DB Regio and DB Fernverkehr, rather than by the Infrastructure Manager DB InfraGO. DB Regio and DB Fernverkehr operate an integrated model where the Railway Undertaking undertakes the maintenance on rolling stock in the service facilities they control. DB Regio and DB Fernvekehr are responsible for:

- Ownership of all service facilities.
- Investment in service facilities.
- Rolling stock maintenance.
- Management and operation of the service facilities.

A number of different maintenance models apply where non-DB Railway Undertakings operate PSO contracts. These include contracting with DB, in-house maintenance or contracting with a third-party, including OEMs.

While PTAs have actively considered rolling stock funding and ownership models, to date, relatively few PTAs have considered the impact on access to service facilities specifically, and structured requirements to address this issue directly.

Regulatory provisions are in place to ensure fair access to service facilities, and third-party operators can apply for access to service facilities. However, concerns have been raised that non-DB Railway Undertakings have not always been able to access DB-owned service facilities and obtain maintenance at equitable and economic costs. The Bundesnetzagentur until 2022 required the publication of regulated prices for maintenance activities, but this requirement has now been removed.

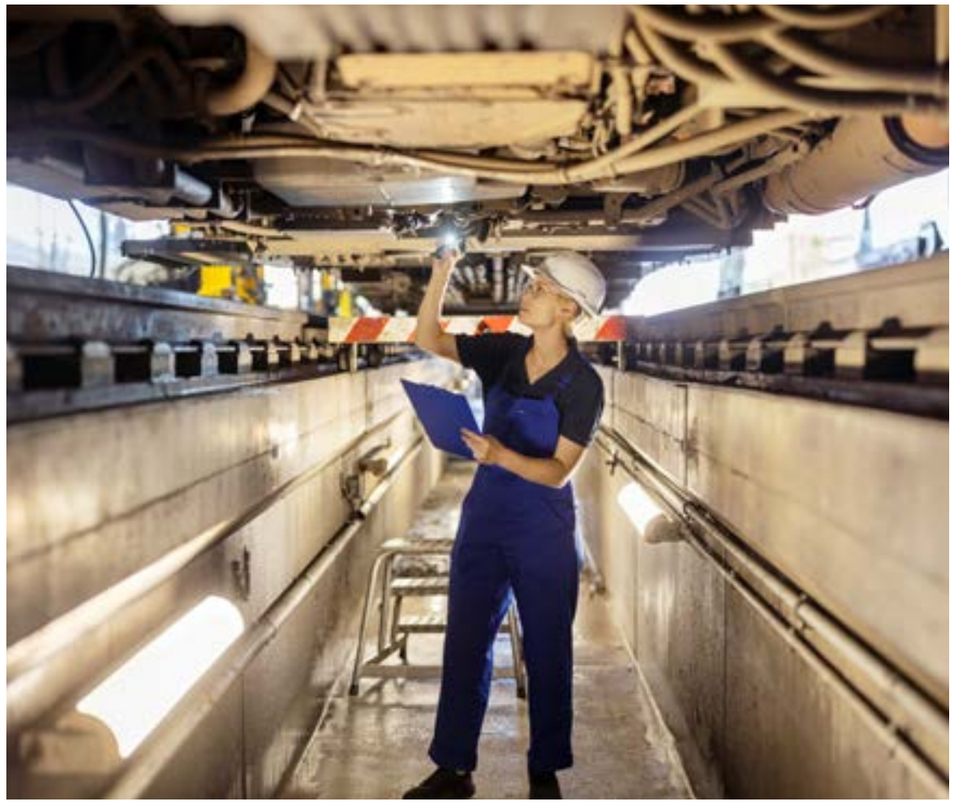
As a consequence of the dominance of DB, and associated with investment in new rolling stock, there has been investment in new service facilities by third parties as part of tenders for operating contracts.

A variety of ownership models for service facilities are now in place. These include:

- DB InfraGO: the Infrastructure Manager, who owns network sidings used for stabling, and some dedicated stabling facilities. It does not own service facilities used for maintenance activities;
- DB Fernverkehr and DB Regio who own and manage most of the legacy service facilities. Ownership of service facilities is therefore concentrated with the operating divisions of DB, not the Infrastructure Manager;
- Railway Undertakings which have invested in new facilities, as part of their operation of PSO contracts, e.g. Transdev in Augsburg, Netinera in Schwandorf;
- OEMs which have invested as part of new train procurements where they also have associated long-term maintenance contracts e.g. Siemens in Dortmund, Stadler in Herne, CAF in Gelsenkirchen;
- Third-party maintenance providers, which enact maintenance services to Railway Undertakings in their own facilities e.g. Eucorail in Augsburg, Railmaint in Delitzsch, Saxony.
- There is generally a separation between service facilities used for PSO services and those used by DB Fernverkehr for long distance services. This is a potentially limiting factor for any future potential competitor open access operator, as they may be dependent on accessing the DB Fernverkehr service facilities, as service facilities used for PSO services are, in most cases, unlikely to be suitable – primarily due to the longer train lengths used for long-distance services and the design and layout of service facilities.

Ticketing

- Ticket structures and fares for regional fares are set through transport associations. For individual cities the transport association will set the level of fares according to the regulations of the respective association. Outside of transport associations, the Deutschlandtarifverbund-GmbH, in which both operators and PTAs are shareholders, decides on the level of fares.
- Within the framework of tenders for transport services, the distribution, i.e. the sale of tickets, has, in most cases, been entrusted to the Railway Undertaking that also provides the transport. They either handle the distribution service themselves or subcontract a third party, such as Transdev Vertrieb or DB Vertrieb, to manage it. In recent years, some public transport authorities have begun to separately contract out the distribution services, thus segregating distribution from operation.
- Long-distance tickets are predominantly sold as point to point tickets with pricing set by DB. Yield management is established with dynamic pricing for advance purchase tickets.
- National ticketing is primarily managed by DB through their DB Vertrieb division. It is responsible for distribution and ticket sales for the passenger transport services of DB and other transport operators. It operates seven sales channels: internet/mobile (including bahn.de), DB ticket machines, DB Travel Centres, DB Agencies, the ticket subscription centre, the telephone travel service and ticket sales on board trains. It is financed through commissions that are determined by service agreements with its business partners.
- The dominance of DB, and in particular the dominance of bahn.de as the primary on line channel, has created challenges for aspirant operators. DB are able to decide the priority in which ticket options are shown, and indeed if competitor operators tickets are shown. For example, the newly established European Sleeper business which operates from Belgium and the Netherlands to Berlin, has raised concerns over the non-availability of its tickets from the bahn.de platform. There is not a regulated ticketing model requiring impartial ticket retailing as seen in the UK.



Spain

Country overview

Introduction and key characteristics

The Spanish rail network is not a single network, and comprises of three different track gauges. The legacy network mostly comprises of Iberian gauge (1668mm), which is wider than the international standard gauge (1435mm), c. 7,100 route miles. There are also smaller metre gauge lines, c. 750 route miles, for shorter distance regional and commuter services.

Spain has invested in a comprehensive high-speed network linking the major cities. This is the largest high-speed network in Europe (and 2nd largest in the world after China) at c. 2,200 route miles, and is built to the international standard gauge. The network is continuing to be expanded with recent new lines to Murcia and Burgos both opening, and ongoing plans for further expansion.

The rail network generally is designed on radial routes from Madrid, both new high-speed lines and conventional lines. Madrid and Barcelona have comprehensive suburban commuter networks, Cercanías, with smaller networks in other cities.

The Spanish high-speed network is arguably the most liberalised in Europe with direct on-rail competition between three operators, who provide commercial services under an open access model, while regional and urban PSO services continue to remain operated under direct award contracts, with no market opening or competitive tendering.

The current organisation structure dates from 2014 when ADIF, the Infrastructure Manager, was established as an independent business, having previously been a separate division within Renfe. ADIF is a publicly owned Infrastructure Manager. Renfe was also restructured at this time, remaining a publicly owned company, with five separate internal divisions. These included separate passenger and freight Railway Undertakings, but also the separation of rolling stock ownership into a separate division, and likewise maintenance services into a separate division.

Renfe Viajeros, the passenger Railway Undertaking division, operates nearly all regional and urban rail services. Limited services are operated by separate regionally-owned Railway Undertakings in the autonomous regions of Catalonia and Basque. These are provided under directly awarded PSO contracts, and to date there are no definite plans for the competitive tendering of these services as required under Regulation 13770, 4th Rail Package.

Services on the high-speed lines are provided on a commercial open access model, with Railway Undertakings being granted access rights by ADIF. The liberalisation of the high-speed lines began in 2019 when ADIF ran a competition for three packages of guaranteed access rights on the main high-speed corridors to Barcelona, Andalusia, and Valencia.

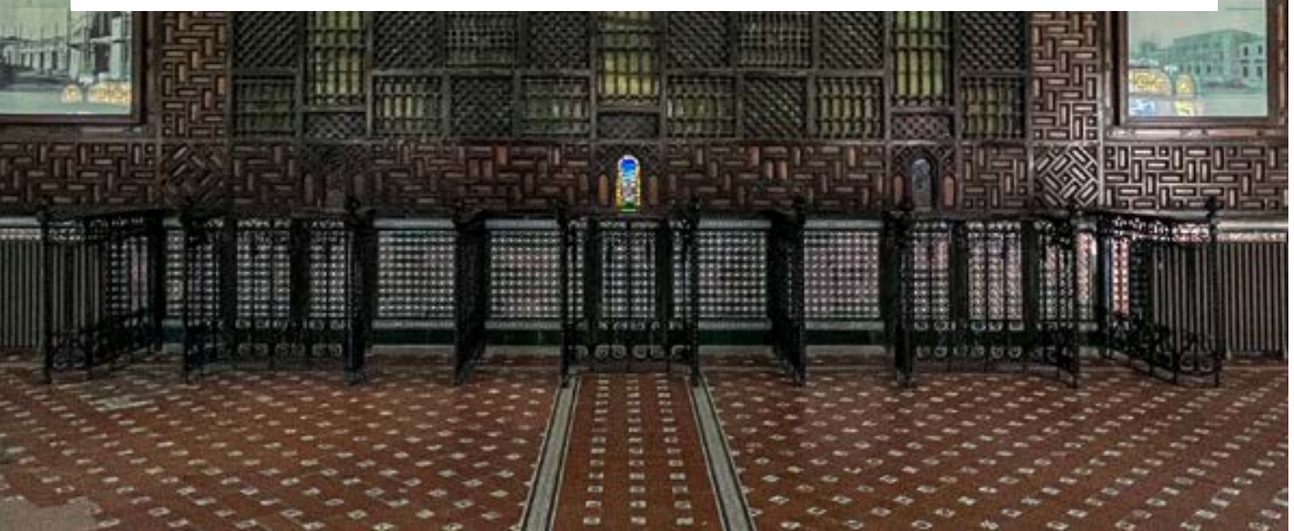
The market opening model was to bundle packages of guaranteed rights, thereby giving prospective competitor Railway Undertakings certainty that access rights would be available. The packages were awarded on the basis on the proposed utilisation of these rights by the bidders.

Renfe were awarded the largest package, which broadly corresponded with their previous rights, while new entrants Iryo and Ouigo were awarded the other packages. The consequence of this approach is a quantum increase in the number of trains being operated on these routes, and a corresponding increase in passenger numbers.

Comparative metrics

Population (million)	47.4 m	67.35 m
GDP (GBP billion)	£1,031 b	£2,488 b
GDP per capita (GBP ,000s)	£21.8 k	£36.9 k
Rail route length (route miles)	9,704	10,140
Route length by country size (route miles per 100 km^2)	5.02	11.05
Route length by population density (route miles per 10,000 inhabitants)	2.05	1.51
Percentage of electrified network (route miles)	65%	38%
Length of High-Speed rail network (miles)	2,254	70
Network density train per day per route/km	23	77
Passenger train km (million t/km pa)	168 m	558 m
Passenger km (million km pa)	27,272 m	69,148 m
Rail passenger transport modal share (% passenger-km by land)	5.2%	4.9%
Freight tonnage pa	10,459 m	33,141 m
Rail freight transport modal share (% tonne-km by land)	4.1%	8.7%
Infrastructure expenditure – maintenance and renewal (GBP billion)	£0.59 b	£4.35 b
Maintenance and renewals as percentage of all infrastructure expenditure	27%	58%
Punctuality of long distance and high-speed passenger services (RMMS)	89%	67%
Punctuality of regional and local passenger services (RMMS)	92%	86%
Punctuality of domestic freight services (RMMS)	90%	93%
Passenger revenue (GBP million)	£2,905 m	£11,214 m
Percentage of PSO services (train/km)	70%	99%
Percentage of non-PSO services [commercial / open access] (train/km)	30%	1%
Safety: Railway passenger fatality rates (2010-2020) per billion train/km	0.43	0.01
Safety: Level crossing accident rates per million train/km (2018-2020)	0.02	0.01

The data sources for the table above are referenced in the “Comparative metrics source references” section of this report.



Key rail sector organisations

Ministerio de Fomento: The Ministry for Development is responsible for managing the administration of the whole rail sector. According to the Spanish Law 39/2003 of 17th November on the rail sector (the Rail Sector Act, “RSA”), its major responsibilities are: Strategic planning of the rail sector (both in terms of infrastructure and in terms of service offering); General rail system organization and regulation (especially everything related to the security and interoperability of the rail system, as well as the relations between the agents of the sector); and the set of objectives and the supervision of the rail state-owned entities ADIF and Renfe, as well as, its financing system.

Administrador de Infraestructuras Ferroviarias (ADIF)[22]: ADIF is the Infrastructure Manager responsible for the management of the Red Ferroviaria de Interés General (RFIG) (General Interest Rail Network) which includes the Iberian gauge network and the narrow gauge (metre gauge) lines, including tracks, signalling and stations. The High-Speed network forms part of the RFIG but is managed separately.

ADIF Alta Velocidad: A separate division within ADIF, and is the Infrastructure Manager for the high-speed lines in Spain, also responsible for the construction of new high-speed lines. ADIF has also been responsible for the management of the market opening on the high-speed lines through sales of packages of access rights.

[22] Home - Adif https://www.adif.es/en/inicio

Spain

Comisión Nacional de los Mercados y la Competencia (CNMC)[23]: The National Markets and Competition Commission (CNMC) is the body that promotes and ensures the proper operation of all markets in the interest of consumers and corporations. It is a public body with its own legal personality. It is independent from the Government and subject to parliamentary oversight. It went into operation on 7 October 2013. Its remit covers rail, aviation, energy, telecommunications, media and postal service. Its rail remit includes: ensuring equal market access conditions for all the operators; the adjustment to the legislation of the track access charges and other charges, avoiding discriminatory treatments; resolving conflicts between ADIF and rail companies, including the application of the Criteria of the Network Statement and the procedure for the award of track access capacity; and to advise and to inform the Ministry of Development and the Regional Authorities about the rail transport matters, specially about those affecting the development of an open and competitive rail market.

Renfe Operadora[24]: A state owned Railway Undertaking and holding company for operating divisions. The current structure dates from January 2014, as provided for in Spanish RD-Law 22/2012 of 20 July. The aim of the structure was to prepare the company to compete in a liberalised market and ensure competitor operators could access new services. The company is divided into five divisions, each division is 100% owned by Renfe Operadora. Each division is a separate legal entity with separate accounting.

- Renfe Viajeros, S.A. (Renfe Passengers)
- Renfe Mercancías, S.A. (Renfe Freight)
- Renfe Ingeniería y Mantenimiento, S.A. (Renfe Engineering and Maintenance)
- Renfe Alquiler de Material Ferroviario, S.A. (Renfe Rolling Stock Hire)
- Renfe Proyectos Internacionales, S.A. (Renfe International Projects)

Renfe Viajeros: The passenger Railway Undertaking business. It provides both PSO services and commercial high-speed services, under the brands of Cercanías (commuter), Media Distancia (mid-distance), Alta Velocidad (high-speed) and Larga Distancia (Long Distance).

Renfe Mercancias: The freight Railway Undertaking business, providing rail freight services in Spain.

[23] What is the CNMC? | CNMC
[24] Renfe Group

Renfe Alquiler de Material Ferroviaro: Established to own rolling stock, but also to make rolling stock available to lease to other Railway Undertakings.

Renfe Ingeniería y Mantenimiento: Undertakes maintenance and overhauls on rolling stock.

Iryo[25]: Railway Undertaking providing services on high-speed network since 2022 in competition to Renfe. Iryo was awarded package B of access rights sold by ADIF in 2019. It is owned jointly by Trenitalia and Globalvia. It operates a fleet of Hitachi ETR1000 trains built for these services.

Ouigo España: Subsidiary of SNCF, Railway Undertaking providing services on the high-speed network since 2021 in competition to Renfe. Ouigo España was awarded package C of access rights sold by ADIF in 2019. It operates a fleet of second-hand SNCF TGVs.

Ferrocarrils de la Generalitat de Catalunya (FGC)[26]: Railway Undertaking that operates services in the autonomous region of Catalonia.

Euskotren[27]: Railway Undertaking that operates services in the autonomous Basque region.

Agencia Estatal de Seguridad Ferroviaria (AESF): AESF is the state agency for railway safety. It was established in 2015 as a public agency as regulated in Law 28/2006, of 18 July. Its remit includes responsibility for ensuring traffic safety on the RFIG and the approval and monitoring of the safety certificates of the Railway Companies and the safety authorizations of the Infrastructure Manager.

Cercanías: The suburban commuter networks for the major cities in Spain.

[25] We are iryo | iryo
[26] Web dels Ferrocarrils de la Generalitat de Catalunya - FGC
[27] home | Euskotren

Key differences to UK model, and why these differences matter

Spain and the UK have comparable sized rail networks by route mileage, and in both countries the passenger transport modal share is similar, but the characteristics of the two differ markedly. Passenger usage in Spain at c. 168m passenger train km per annum is around a third of the UK level, and passenger km per annum at 27 billion is under half the UK level. This is reflected in network density, where with the Spanish train density c. a third of the UK level.

The Spanish high-speed network is the largest in Europe at c. 2,200 route miles, comprising nearly 25% of the total route mileage. Therefore, there are very different patterns of services provided in Spain compared to the UK, with a large an extensive high-speed network operating on mostly dedicated new built lines with relatively low frequency and low utilisation of the rest of the network, with the exception of the large commuter networks centred on Madrid and Barcelona.

The Spanish high-speed market has been opened up to competition, with on-rail competition being provided by three Railway Undertakings, representing arguably the most competitively opened long-distance rail market in Europe, with only Italy having comparable competition. In contrast, PSO services continue to be provided by the state-owned incumbent with no competitive tendering of services.

There are key differences between the models seen in the two countries.

Spain

While PSO tendering is the norm in the UK, there has been no competitive tendering of PSO services in Spain.

- Spain has a clear distinction between PSO and Commercial services. Urban, regional and some long-distance services are designated as PSOs. Services on the high-speed lines, and some long-distance services are operated as commercial services, under an open access model. PSO services represent 70% of operated passenger train/km, compared to 99% in the UK.
- Renfe Viajeros operates all PSO passenger rail services under a single direct award. The current direct award runs until 2028. No decision has been taken on implementing competitive tendering of PSO services as required under the 4th Railway Package.
- Renfe was restructured in 2014, and the separation into different divisions was in part designed to facilitate market opening and competitive tendering.
- The Competent Authority in Spain is the Ministry for Development, which specifies the services and quality requirements. There is very limited specification from regional authorities. Therefore, Spain and the UK both have a single central government authority specifier.
- Revenue risk for PSO services remains with the Railway Undertaking. The PSO compensation is determined by operating costs less revenue and any performance penalties. This approach is akin to the previous UK franchise model.
- Rolling stock ownership in Spain remains with the Railway Undertaking, and there is not a third-party ownership or leasing model. It is however owned through a separate division, the extent that it could be made available to bidders in competitive tendering has not been tested.

Long-distance services are operated on a commercial basis, under an open access model. We highlight the following important differences between the Spanish and UK models.

- Services are not specified by the Ministry for Development or by regional authorities. The customer offer, brand and pricing are the responsibility of the Railway Undertaking (operator), who also takes full revenue risk.
- Competition has been introduced on three of the high-speed routes through providing packages of guaranteed access rights, and the Infrastructure Manager ADIF AV, in conjunction with the competition authority CNMC, undertook a competition for these rights, and the award criteria considered how the respective bidders would use the rights.
- Therefore, in Spain there is a fully commercial and competitive high-speed market, but the access rights granted have been pre-agreed to stimulate the introduction of competition.
- The legacy Railway Undertaking, Renfe, continues to operate the majority of the commercial network, with on-rail competition of the three routes where access rights have been tendered and remaining as a monopoly provider on other corridors.
- Therefore, up to three operators provide commercial services (in direct competition with each other), on the main high-speed corridors to Barcelona, Andalusia, and Valencia. Since the introduction of competition, there has been strong growth in passenger numbers and reduction in average fares.

Freight services are provided on a commercial basis in both countries, with multiple operators providing services. Renfe Mercancías have maintained a dominant market position.

Both countries have full separation between Railway Undertakings and the Infrastructure Manager. The Spanish Infrastructure Manager has been split into two separate businesses, one for the conventional network, and a separate entity to manage the high-speed network.

To some extent this is consistent with the UK model where HS1 is separately owned from the rest of the UK network. The construction of new high-speed lines is with ADIF AV, unlike in the UK where a new entity was established to develop HS2. ADIF AV has the experience of both construction and operation of high-speed lines.

There is relatively limited devolution to regional authorities in Spain, and the national Ministry for Development is the primary specifier and funder. There are ongoing discussions regarding future devolution to the autonomous regions of Catalonia and Basque.

Spain

Key components of sector model

Tender model (PSO)

To date there has been no competitive tendering of PSO services in Spain.

Renfe Viajeros operates nearly all regional and urban rail services. Limited services are operated by regionally owned separate Railway Undertakings in the autonomous regions of Catalonia and Basque. These are provided under direct award PSO contracts, and to date there are no definite plans for the competitive tendering of these services as required under Regulation 1370, 4th Rail Package.

The services subject to PSO owned by the General State Administration are governed by a public service contract signed on 18th December 2018, with a duration of 10 years and extendable for an additional 5 years.

The underpinning structure dates from Act 39/2003 of 17 November on the Railway Sector which came into force on 1st January 2005. As well as establishing the separation of the Infrastructure Manager (ADIF) and the Railway Undertaking (Renfe) it also established access provisions to other Railway Undertakings which held the necessary licenses to apply for access.

It also established the basis that the government may declare services as PSO, and it envisaged a gradual opening of the market. The Rail Sector Act states that temporarily and until a private operator obtains a license under the rules above, PSO services will be provided by Renfe under the framework of a Contract-Program.

The majority of services apart from those on high-speed lines are currently termed PSO, and receive subsidy either from the national or regional government. These include regional and inter-regional services, the Cercanías commuter services and the services operating on the metre gauge lines. Certain long-distance services on the Iberian gauge, where parallel high-speed lines have not been constructed, also operate without subsidy.

Renfe operate all services, except for some Cercanías commuter services and metre gauge lines in the autonomous regions: FGC in Catalonia, SFM in the Balearic Islands and Euskotren in the Basque region. It has recently been announced that a number of other Renfe routes in the Basque region will also transfer.

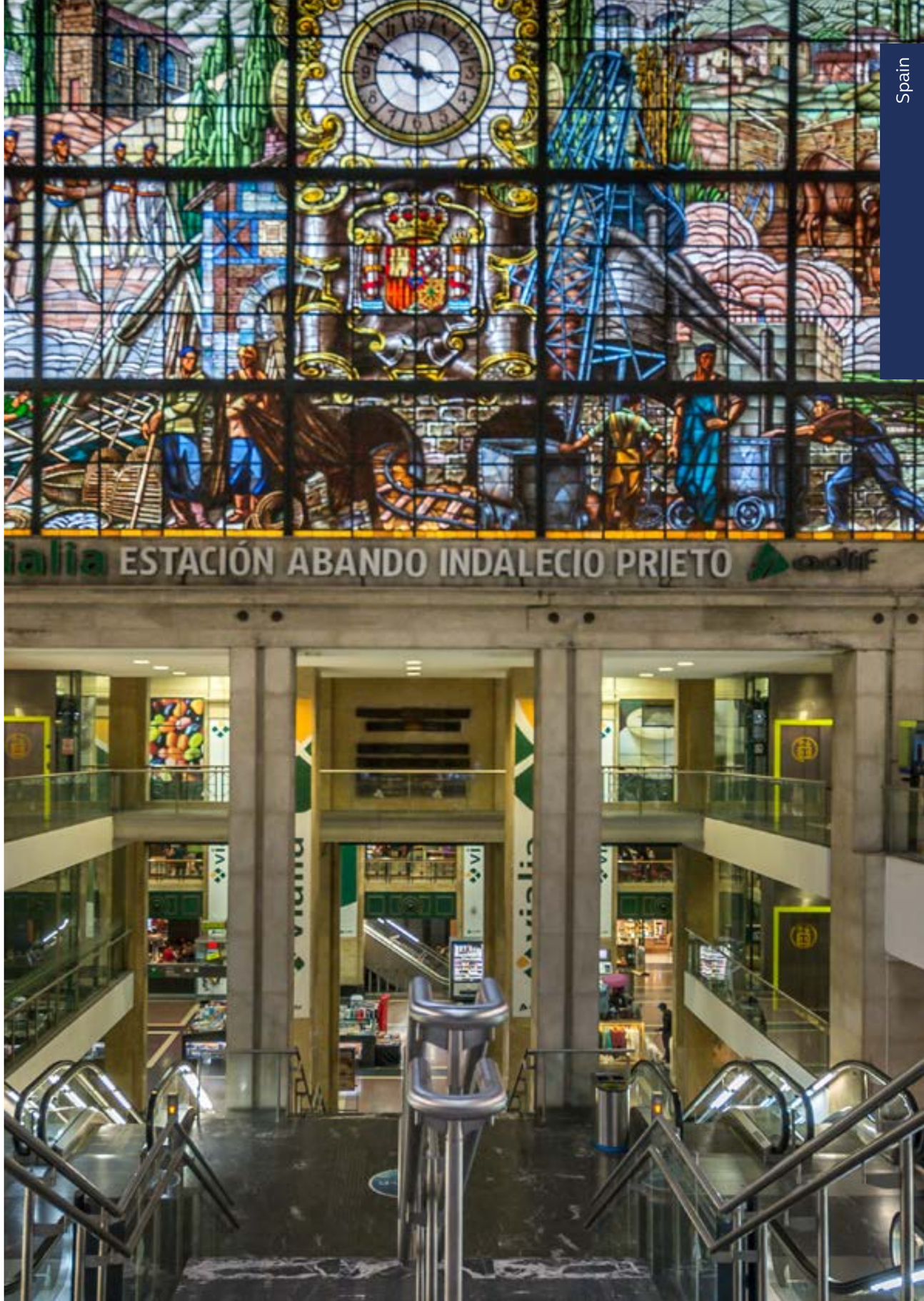
The existing PSO contract between the state and Renfe details:

- the services included, specifying routes and frequency.
- the rolling stock which is expected to be used in the service.
- the quality commitments required, which will impact on the calculation of the compensation.
- The contract is subordinated to the effective allocation of infrastructure capacity by ADIF.
- Applicable rates to the sale of tickets for services can be subject to special review by the Government Commission for Economic Affairs.
- It states the compensation calculation procedure, based on total costs for the provision of the service less ticket sales income and penalties for not meeting service quality standards.

There are also additional contracts with certain regions e.g. Catalonia, whereby the regional authority can amend the requirements in the national PSO contract with regard to service quality standards and ticketing provisions.

Whilst there is a regulatory structure which would enable competitive tendering of PSO services to be implemented is in place, to date there are no firm plans for its introduction. The existing PSO contract extends until December 2028, with the option of a contract extension for a further five years.

It has been suggested that wider political tensions between the central government and the autonomous regions may have contributed to a reluctance to move to a competitive tender model for PSO concessions, as this could have prompted a further transfer of powers from central government to the regions. Recent government announcements, including the agreed future transfer of services from Renfe to Euskotren, may indicate a change in position.



Spain

Open access (commercial) model

Long distance passenger services, including on all the high-speed routes, are provided under a commercial model under open access provisions. Prior to 2019, Renfe operated a monopoly on long-distance services in Spain. Though the underpinning regulatory framework for competition was in place, no new entrants had established unlike in the freight sector.

A decision was taken to offer packages of paths on the high-speed network to open the network up to competition.

The process was led by the Infrastructure Manager for high-speed routes ADIF Alta Velocidad (ADIF AV) who in 2019 invited bidders to apply for paths on the high-speed network. While the process was managed and assessed by ADIF AV, the CNMC (National Commission on Markets and Competition) also had an important role in overseeing the process.

Three packages of access rights were offered, each package having a defined number of paths on each of the Madrid Barcelona, Madrid Valencia/Alicante and Madrid Seville/Malaga corridors. Package A was comparable to the existing service offering, with packages B and C smaller in size. In total the three packages represented an approximate 65% uplift in train paths on the high-speed network. Successful bidders were guaranteed the necessary access rights to operate the respective packages.

Other high-speed routes were not included in these three packages.

In addition to the promotion of competition, there were two underlying reasons leading to the decision to offer the quantum of increased access rights in packages.

Firstly, the perceived underutilisation of the high-speed network. A capital cost of over €40 billion has been invested in developing the largest high-speed network by route length in Europe, however compared to other countries, especially France and Germany, the network utilisation is low. Analysis by Fundación de Estudios de Economia Aplicada (FEDEA) in 2015 estimated just under 12,000 passengers per kilometre of high-speed rail in Spain, compared with 61,400 passengers in France and 158,121 passengers per kilometre in Japan. Consequently, increasing the utilisation of the network, both in absolute terms and delivering modal shift was an important policy objective.

Secondly, and arguably more importantly, there was a priority requirement to increase the level of income received by ADIF AV from access charges to greater than 50%. This would ensure the debt associated with the investment in the high-speed network, which currently sits on ADIF AV balance sheet remains off the governments balance sheet. The continued investment in the high-speed network with new routes under construction including the Galicia corridor and the Mediterranean corridor along the west coast of Spain was putting the balance sheet ratios under further strain.

Six parties applied for paths, with the winning bidders announced in November 2019. The successful bidders were:

- Renfe Viajeros (state incumbent) - Package A;
- IRYO (a joint venture between Air Nostrum and Trenitalia) - (package B);
- Ouigo (SNCF) - Package C.

The award criteria was based on level of capacity requested, and in the event that multiple bidders applied for all the available capacity then a quality evaluation was applied. This quality score gave credit for the period of operation, i.e. giving an advantage to an earlier introduction into service. ADIF AV confirmed that the bidders applied for all the available capacity in each package, and therefore the quality criteria would be applied to decide the award of each package.

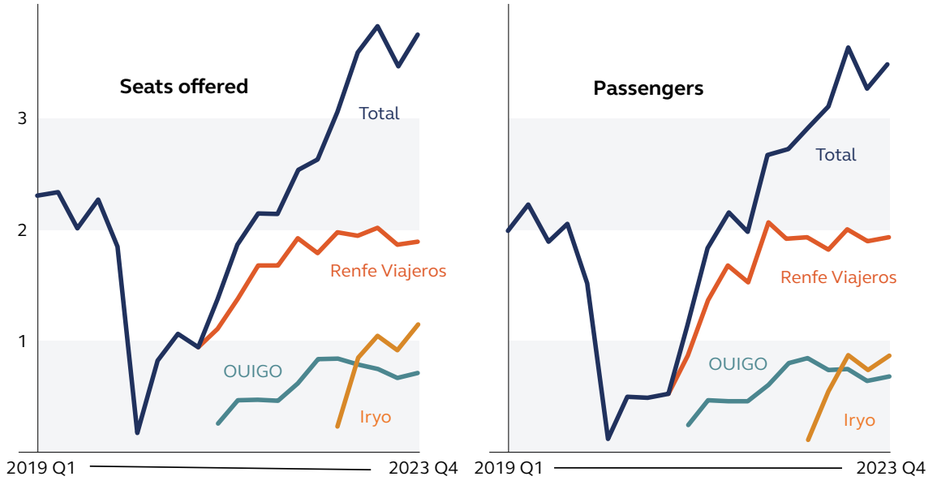
All three successful bidders had access to rolling stock. Renfe as incumbent, IRYO through its partnership with Trenitalia, and Ouigo as a subsidiary of SNCF. The availability of rolling stock was the critical differentiator between the parties with those parties without access to rolling stock at a disadvantage. An unsuccessful bidder stated that their proposal for Package C was unsuccessful because they proposed introducing the start of services one year later than Ouigo, as SNCF could prove rolling stock earlier. This was the main differentiator between the two bidders as the financial offer and quantum of services were similar.

Iryo commenced services in 2022. Since contract award, Trenitalia have increased their shareholding and are now the majority shareholder, and Globalvia are also a shareholder. It procured a fleet of 20 Hitachi ETR1000 trains which were built for the operation of its services. The construction period for the rolling stock reflects the time from contract award to start of operation.

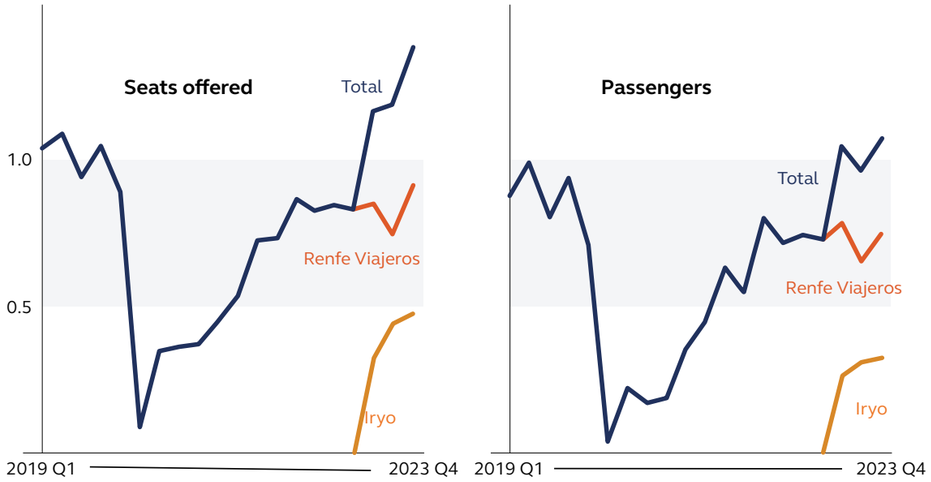
Ouigo España commenced services earlier in 2021 using a fleet of second-hand SNCF TGVs.

The introduction of competition has resulted in a step change in capacity and passengers, as illustrated on data published by CNMC. The Madrid-Barcelona and Madrid-Seville capacity and passenger figures can be seen below:

Madrid Barcelona, CNMC 2023 Q4 Market Report[28]



Madrid Seville, CNMC 2023 Q4 Market Report[29]



It can be observed that the total passenger numbers are now in excess of the pre-Covid ridership, with market growth especially strong on the Madrid Barcelona corridor.

[28] 5232747.pdf (cnmc.es)
[29] 5232747.pdf (cnmc.es)

Freight sector model

Consistent with EU requirements, the national and international rail freight market was opened to competition from the start of 2015.

Renfe Mercancías have retained a market share of c. 80%.

The Spanish network forms part of the Trans-European Transport Network (TEN-T), and the Atlantic and Mediterranean corridors include Spain. It is noted that full inter-operability along the length of the corridor is not possible due to the gauge change requirements at the Spanish-French border, as well as other infrastructure constraints.

Despite the Iberian gauge constraint, a number of leasing businesses have invested in freight assets in Spain, including locomotives.

Separation between IM and RU

There is full separation between the Infrastructure Manager and Railway Undertakings.

ADIF is the Infrastructure Manager responsible for the management of the Red Ferroviaria de Interés General (RFIG) (General Interest Rail Network) which includes the Iberian gauge network and the narrow gauge (metre gauge) lines, including tracks, signalling and stations. The High-Speed network forms part of the RFIG but is managed separately.

ADIF was created by Law No 39/2003 of 17 December, on the Railway Sector. The articles of incorporation of ADIF were established by Royal Decree 2395/2004 of 30 December of 2004. Its activity started the 1st January 2005.

ADIF is a state-owned company, with management autonomy within the limits established by its legislation and it is under the remit of the Ministry of Development.

In 2014, the previous separate division within ADIF Alta Velocidad was split into a separate company. Therefore there are two separate Infrastructure Managers, with the responsibility of ADIF Alta Velocidad limited to the high-speed lines, and ADIF responsible for all other infrastructure under the RFIG.

ADIF Alta Velocidad is also responsible for managing the construction of new high-speed lines, and their ongoing ownership and management.

Service facilities however do not form part of the infrastructure responsibilities of ADIF. Renfe continue to own and manage service facilities (maintenance depots) through its Ingeniería y Mantenimiento division. Responsibility for stabling siding can be with either ADIF or Renfe Ingeniería y Mantenimiento depending on the location.

Access to the infrastructure is through access agreements between the Railway Undertaking and the relevant ADIF company.

Renfe Operadora, is the state-owned Railway Undertaking and holding company for the operating divisions. The current structure dates from January 2014, as provided for in RD-Law 22/2012 of 20 July. The aim of the structure was to prepare the company to compete in a liberalised market, and ensure competitor operators could access new services. The company is divided into five divisions. Each division is 100% owned by Renfe Operadora. Each division is a separate legal entity with separate accounting.

This division into separate companies establishes a level of separation and transparency between the passenger (Viajeros) and freight (Mercancias) divisions that provide rail services and the Ingeniería y Mantenimiento division which owns the service facilities, and provides maintenance services to the operating divisions, as well as providing access to third parties to access the facilities.

Renfe Operadora remains a state-owned business, and also comes under the remit of the Ministry of Development. It is however managerially and legally fully separate from ADIF, noting that the oversight of both businesses comes under the Ministry for Development.

It should be noted that the bidding process for the high-speed packages was managed and evaluated by ADIF Alta Velocidad, the Infrastructure Manager. The process was undertaken with close involvement of CNMC, and under the direction of the Ministry of Development. As part of the process ADIF AV guaranteed packages of access rights would be available to the successful bidder for each package.

Spain

Devolution to regions

The provision of passenger rail services remains mostly with the national government, and the role of the regions is relatively limited.

The PSO contract with Renfe is with the Ministry of Development, and the level of specification input from the regions is limited. Funding comes from the Ministry of Development.

The metre gauge lines in the autonomous regions of the Basque and Catalonia are part of the RFIG, owned and maintained by ADIF, but the services are managed by the respective regions.

It has been suggested that wider political tensions between the central government and the autonomous regions may have contributed to a reluctance to move to a competitive tender model for PSO concessions, as this could have prompted a further transfer of powers from central government to the regions. The recent government announcement in December 2023 by national Transport Minister Óscar Puente that he was open to all the autonomous communities taking over responsibility for suburban rail operations suggests a change in position.

Renfe continues to operate suburban and regional routes in Catalonia under the national PSO contract, however there are outline plans for a gradual transition over 15 years to an operating entity owned jointly by the Spanish state and the Generalitat (Catalonia Regional Government), which will hold a majority stake (provisionally named Rodalies de Catalunya).

More recently, the Spanish government announced that management of all suburban services in the Basque region would be transferred from national operator Renfe to the autonomous regional government. This announcement was accompanied by an accompanying transfer of funding for these services.

Rolling stock funding and ownership

All passenger rolling stock is owned by the respective Railway Undertaking i.e. Renfe own the rolling stock used on the high-speed services they operate under Package A and other high-speed routes, as well as all Iberian gauge rolling stock, and Iryo and Ouigo own the rolling stock they use for their competitor services on the high-speed routes.

The Renfe rolling stock is owned through the Renfe Alquiler de Material Ferroviaro division, which makes the passenger rolling stock available to Renfe Viajeros, and freight rolling stock to Renfe Mercancías. Renfe Alquiler de Material Ferroviaro also has a remit to make spare rolling stock available to third-party Railway Undertakings who wish to lease it. The initial intention for opening the high-speed market to competition was that some of the existing high-speed rolling stock would be designated as available to new market entrants, and Renfe Alquiler de Material Ferroviaro would act as a ROSCO, serving all Railway Undertakings. This principle is still in place, but in reality, the third-party leasing model has only applied to limited number of freight assets.

Existing or spare high-speed rolling stock was not made available to bidders for the high-speed packages, and therefore the successful new operators were required to source the rolling stock to deliver the services. Iryo purchased new built ETR1000 sets from Hitachi, while Ouigo are using second-hand TGV sets from SNCF. It is notable that the two successful parties were able to access rolling stock via their respective parents (Trenitalia and SNCF), and this was a factor in their successful bids.

Arrangements for the provision of rolling stock in the event of future competitive PSO tenders have not been defined. All rolling stock used currently on PSO services is owned by Renfe Alquiler de Material Ferroviaro.

Service facilities (depots) model

Service facilities are all owned and managed by Renfe Fabricación y Mantenimiento.

Service facility sites can be partially leased, through regulated offers, to third parties, who undertake maintenance at the respective sites. These arrangements have ensured that the high-speed market opening has been successfully introduced and access to service facilities has not acted as a constraint.

These arrangements only concern the open-access high-speed and freight services at the moment.

All service facilities are available to all operators, via access agreements. Through regulated agreements on accessing third parties' facilities, the incumbent operator's service facilities have been made available to the new operators.

The new entrant operators, Iryo and Ouigo predominantly use the Cerro Negro Alta Velocidad service facility in Madrid. Renfe have moved some of their previous activity away from this facility to create capacity for the new entrants, which has given rise to significant operational inconveniences and an increase in costs. Iryo and Ouigo have both centred their train maintenance in Madrid, with facilities at route ends e.g. Valencia and Sevilla only being used for overnight servicing. Around 12% of the capacity of high-speed service facilities has been assigned to new operators.

Stabling facilities at service facilities may be controlled by Renfe Fabricación y Mantenimiento or by ADIF. In most cases the stabling facilities form part of Renfe Fabricación y Mantenimiento facility, however in order to facilitate the liberalisation process and the organisation of the operation, an agreement was signed between Renfe Fabricación y Mantenimiento and ADIF so that the stabling tracks at the high-speed service facilities were managed by ADIF and offered to all railway operators.

The description of these facilities is included in the Network Declaration describing the workshops and their equipment. Despite capacity challenges, it is understood both the incumbent operator and new entrants have found agreements and collaborative ways of working to overcome capacity difficulties.

Maintenance activities can be undertaken by third parties autonomously within the maintenance facility. Prior to market opening, Renfe was already sub-contracting full or partial maintenance of their fleet to Original Equipment Manufacturers, Alstom or Hitachi for example, using Renfe Fabricación y Mantenimiento maintenance facilities and stabling locations.

Service facility access and prices are regulated by the government entity CNMC (Comisión Nacional de los Mercados y la Competencia), based in ex ante competences allocated by RECAST Directive to regulatory bodies. Renfe Fabricación y Mantenimiento determines these regulated prices. In accordance with Article 31.7 of the RECAST and Article 101 of Spanish national regulation, these charges shall not exceed the cost of providing it, plus a reasonable profit. All information is transparently shared and published. CNMC role and involvement is predominantly related to fair service facility access, and the resolution of potential conflicts (capacity issues for example).

As regulated prices are averaged to a one single price per activity using financial analytical distribution, regulated prices calculation is not fully transparent. Operators have not challenged these prices (as these prices are deemed fair), it appears that no precise and physically measured data are used for these prices' calculations.

Spain

Ticketing

There are established multi-modal ticketing systems in place for the major Spanish conurbations, including Madrid and Barcelona. These are administered by the regional transport authority e.g. Consorcio Transports Madrid. Tickets are valid on Cercanías services operated by Renfe, as well as buses and metro services. They are not valid on high-speed trains or Renfe Operadora regional trains.

Long-distance tickets are predominantly sold as point to point tickets with pricing set by the operator. Tickets are not inter-available between operators. Yield management is established with dynamic pricing for advance purchase tickets. The introduction of competition on the high-speed routes has reduced the average ticket yield, reflecting competition between operators.

In response to a recent investigation by the European Commission, following concerns that Renfe might have abused its dominant position in the Spanish railway ticketing market by its apparent refusal to provide rival ticketing platforms with comprehensive information and real-time data on its services might be hindering their ability to compete with Renfe's online distribution platform, Renfe committed to grant third-party ticketing platforms access to its data by the end of February 2024. In addition, the commitments include a non-circumvention clause whereby Renfe commits not to use any unfair, unreasonable or discriminatory technical or commercial measures that would impede or hamper access to and distribution of its content and real-time data. The legally-binding commitments will remain in force for an indefinite period and implementation will be monitored by a trustee appointed by Renfe, who will report to the European Commission for a period of 10 years.

Sweden

Country overview

Introduction and key characteristics

Sweden has arguably the most liberalised rail market in Europe, with a fully tendered PSO passenger market, commercial long-distance sector operated on open access principles, and a competitive freight sector. There is clear separation between Railway Undertakings and the Infrastructure Manager.

It is the largest of the Nordic countries, with a population of c. 10 million. The capital Stockholm has a population of c. 1m, with 2.4 million people within the greater Stockholm region. There are two other major cities, Gothenburg on the west coast, and Malmo in the south of the country. Malmo is connected to Copenhagen via the Öresunds bridge, which provides a road and rail connection to Denmark.

The liberalisation of the rail sector dates from 2001, when the state-owned incumbent operator SJ was broken up into a number of different component companies, including a separate Infrastructure Manager, the transfer of stations, service facilities and rolling stock maintenance into separate businesses, and the separation of the freight business.

The current model still adheres to the 2001 Transport Act. This enshrines the role of regional Public Transport Authorities who are responsible for the regulation of local, suburban and regional transport by all forms of public transport. All public service obligations must be defined from a public transport provision programme, and all public service obligations must be competitively procured. Exclusive rights are not allowed.

SJ, the state-owned Railway Undertaking, activities are limited to the provision of passenger rail services, which are operated under competitively tendered PSO contracts, and a commercial long-distance network, centred on linking the three main cities of Sweden, with some cross-border extensions to Oslo and Copenhagen. SJ also remains responsible for many ticketing activities.

Trafikverket, the Swedish Transport Administration, is an integrated agency that combines the function of long-term planning, the Infrastructure Manager, and the procurement of inter-regional public transport. Its responsibilities cover rail, road, maritime and aviation.

Sweden is organised into 21 counties (regions), each of whom have established a Public Transport Authority, who are the Competent Authority for the procurement of regional rail transport services. These are all operated under a concession model.

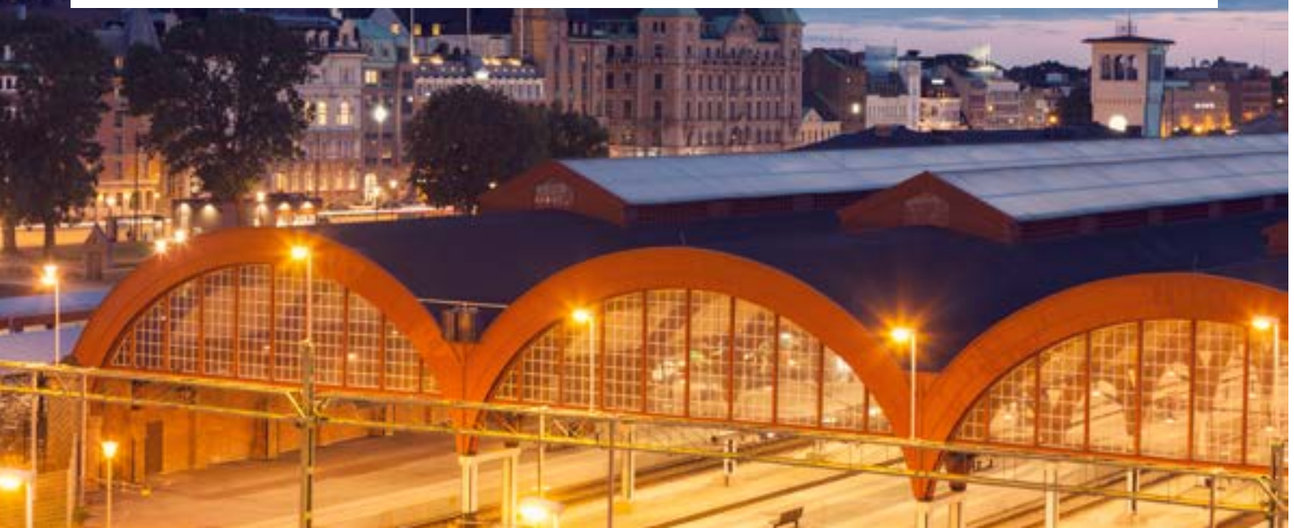
There are 12 separate concessions, which provide c. 220 million passenger journeys pa.

Passenger rail services are provided by four operating groups – SJ, Vy (Norwegian railways), VR (Finland railways, who purchased the Arriva Sweden business in 2022) and Transdev. The Stockholm metro, which is separate to the national network, has recently been awarded to a Go-Ahead / Comfort Delgro joint venture. MTR previously operated rail services but is exiting the market having not retained contracts when they were retendered.

Comparative metrics

Population (million)	10.45 m	67.35 m
GDP (GBP billion)	£462 b	£2,488 b
GDP per capita (GBP ,000s)	£44.0 k	£36.9 k
Rail route length (route miles)	6,781	10,140
Route length by country size (route miles per 100 km^2)	1.67	11.05
Route length by population density (route miles per 10,000 inhabitants)	6.49	1.51
Percentage of electrified network (route miles)	75%	38%
Length of High-Speed rail network (miles)	534	70
Network density train per day per route/km	30	77
Passenger train km (million t/km pa)	127 m	558 m
Passenger km (million km pa)	14,617 m	69,148 m
Rail passenger transport modal share (% passenger-km by land)	7.4%	4.9%
Freight tonnage pa	22,717 m	33,141 m
Rail freight transport modal share (% tonne-km by land)	28.8%	8.7%
Infrastructure expenditure – maintenance and renewal (GBP billion)	£0.68 b	£4.35 b
Maintenance and renewals as percentage of all infrastructure expenditure	35%	58%
Punctuality of long distance and high-speed passenger services (RMMS)	72%	67%
Punctuality of regional and local passenger services (RMMS)	89%	86%
Punctuality of domestic freight services (RMMS)	77%	93%
Passenger revenue (GBP million)	£1,068 m	£11,214 m
Percentage of PSO services (train/km)	58%	99%
Percentage of non-PSO services [commercial / open access] (train/km)	42%	1%
Safety: Railway passenger fatality rates (2010-2020) per billion train/km	0.015	0.01
Safety: Level crossing accident rates per million train/km (2018-2020)	0.03	0.01

The data sources for the table above are referenced in the “Comparative metrics source references” section of this report.



Key rail sector organisations

Ministry of Transport: Overall responsibility for transport in Sweden, however activities are delivered through Trafikverket.

Trafikverket (Swedish Transport Administration)[30]: An integrated agency responsible for rail, road, maritime and aviation. It is responsible for the long-term planning of the transport system for road, rail, maritime and aviation. It has responsibility for the construction, operation and maintenance of state roads and railways, this includes being the Infrastructure Manager for rail. It also procures interregional public transport, for example night-train and cross-border PSO services.

Public Transport Authorities: There are 21 separate PTAs, corresponding to the 21 counties (regions) of Sweden. Responsible for regional transport strategy and planning, service specifications, procuring traffic (rail, road, ferry), regional ticketing. The PTAs extensively collaborate and work together through Svensk Kollektivtrafik[31], the Swedish Public Transport Association.

Transitio[32]: Rolling stock leasing company established by the PTAs to procure, own and undertake asset management of trains used on PSO services. It is responsible for all rolling stock used on PSO services.

[30] Our business, vision and mission - www.trafikverket.se
[31] About Us (svenskkollektivtrafik.se)
[32] AB Transitio – Kunskapspartner inom spårfordon

Sweden

SJ[33]: The state-owned Railway Undertaking. Activities are limited to the provision of passenger rail services, which are operated under competitively tendered PSO contracts, and the commercial long-distance network. It operates four regional concessions: Västtågen, SJ Nord, SL Pendeltåg and Krösatågen. It is 100% owned by the Swedish state and managed by the Ministry of Finance. It is therefore independent of the Ministry of Transport and the regional PTAs. It also operates the North rail contract in Norway.

Railway Undertakings (tendered): Four groups provide tendered passenger rail services: SJ; Vy, Norwegian railways; VR, Finland railways, who purchased the Arriva Sweden business in 2022; and, Transdev. The Stockholm metro, which is separate to the national network, has recently been awarded to a Go-Ahead / Comfort Delgro joint venture. MTR previously operated rail services but is exiting the market having not retained contracts when they were retendered.

Railway Undertakings (commercial): SJ provide commercial services linking the three main cities of Sweden, with some cross-border extensions to Oslo and Copenhagen. Competing open access services are provided between Stockholm and Gothenburg by MTR Express (in the process of being sold to VR) and Flixtrain. Snälltåget, owned by Transdev, provides open access services between Stockholm and Malmo, international services to Berlin, and seasonal trains to winter resorts.

[33] Köp resa och se tågtider på sj.se

Jernhusen[34]: Property company that owns and manages railway stations and service facilities (maintenance depots), freight terminals and undertakes urban development around stations. SJ also remains responsible for many ticketing activities. It is 100% owned by the Swedish state, and managed by the Ministry of Finance. It is therefore independent of the Ministry of Transport and the regional PTAs.

Samtrafiken[35]: The ticketing and sales association. It is owned by all regional public transport authorities as well as many of the commercial transport operators with national traffic, and has established a common ticketing platform across Sweden.

Euromaint[36]: A rolling stock maintainer, established from the former SJ maintenance business in 2001. It has been part of CAF since 2019. It provides maintenance services to Railway Undertakings, both passenger and freight. It operates in a competitive market, and other maintenance companies also undertake rolling stock maintenance under contract to Railway Undertakings.

GreenCargo[37]: The former SJ freight business, now an independent company. It remains owned by the state, through the Ministry of Finance.

Transport Styrelsen[38]: The Swedish Transport Agency Regulator.

[34] Välkommen till Jernhusen | Jernhusen
[35] Samtrafiken i Sverige AB
[36] Euromaint - Welcome to EuroMaint Rail
[37] About Us | Green Cargo
[38] Transportstyrelsen: Järnväg

Key differences to UK model, and why these differences matter

Comparative to the UK, Sweden's rail network is proportionately larger with higher usage, but comparative analysis evidences a number of key differences in scale and usage. Total route length is c. two thirds of the UK's, but route length relative to country size shows a ration of c. 10:1, reflecting much lower population density in Sweden. However, if route length is compared to population, the Swedish network is c. four times the length of the UK's.

The relative modal share of rail for passenger transport is c. 50% greater than the UK, and c. four times higher for freight. Network utilisation is however significantly lower, with the UK operating c. two and half times more trains per day per route km.

We can summarise this as evidencing a proportionately larger rail sector, but with a lower intensity of usage compared to the UK.

Both countries are characterised by a high level of market liberalisation, and represent the two earliest countries with large scale rail liberalisation and continue to retain the highest levels of liberalisation in Europe.

There are key differences in their respective models. In both countries all PSO services are competitively tendered. We highlight the following important differences between the Swedish and UK tender models.

» Sweden has a clear distinction between PSO and commercial services. Only services designated as PSO are tendered, these represent urban and regional services. Long-distance intercity services are operated on a commercial basis, under an open access model. PSO services represent 58% of operated passenger train/km, compared to over 99% in the UK.

» The Competent Authority in Sweden are the regional Passenger Transport Authorities. PSO services are tendered by the PTAs. Services are therefore specified and procured at a regional level.

» The only PSO services procured at a national level are a very small number of inter-regional services, including the night trains.

» PSO services are tendered as concessions. Responsibility for service specification, customer offer and quality, ticketing and revenue risk, branding and service development are all the responsibility of the PTAs. The Railway Undertaking (operator) is essentially a delivery agent only.

» Rolling stock ownership and procurement is also the responsibility of the PTAs, which is delivered through a ROSCO that is owned by the PTAs. The rolling stock to be leased by the operator of the PSO contract is specified and bidders must lease the specified rolling stock.

Sweden

Long-distance services are operated on a commercial basis, under an open access model. We highlight the following important differences between the Swedish and UK tender models.

» Inter-City (commercial) services are not specified at a national or regional level. The timetable, service frequency, customer offer and brand are the responsibility of the Railway Undertaking (operator).

» The operator takes full revenue risk.

» The legacy Railway Undertaking, SJ, continues to operate most of the commercial network, and these services have not been tendered or licenced as commercial services. The "national" railway company and its brand are the predominant provider of long-distance services.

» There are established competitor open access operators, primarily on the core Stockholm Gothenburg route, but also on other routes. They provide direct competition on the same flows.

Freight services are provided on a commercial basis in both countries, with multiple operators providing services.

Both countries have full separation between Railway Undertakings and the Infrastructure Manager. Where state-owned entities provide rail services (SJ) or manage service facilities (Jernhusen) these are owned through the Ministry of Finance, not the Ministry of Transport, establishing separate governance. This contrasts with the UK where DOHL is owned and overseen by the DfT.

Sweden has an integrated national agency, Trafikverket, responsible for strategy and network planning, which is also the Infrastructure Manager. There are some similarities between Trafikverket and the proposed Great British Railways, but also some important differences.

» Trafikverket integrates network planning and owning and managing the infrastructure. The strategy and planning remit is within a single body, whereas currently both Network Rail and the DfT have remits relating to strategy and network development.

» Trafikverket is an agency for all transport modes, including roads, aviation and maritime. In the UK it would be the equivalent of combining the Highways Agency and CAA, with the future GBR. There is a view in Sweden that the role and scope of Trafikverket has become too large.

» Responsibility for train service specification and procurement remains separate. The regional PTAs are the Competent Authority, with the exception of the very small number of inter-regional services where Trafikverket fulfils the Competent Authority role.

» The Swedish regions and the PTAs are responsible, by law, for regional transport plans. Delivery of the infrastructure elements, e.g. enhancements, is with the Infrastructure Manager Trafikverket. This creates split responsibilities.

Devolution of PSO rail services in Sweden is fully established, along with responsibility of all transport modes. We note some key differences with the UK model.

» The level of devolution of PSO rail services in Sweden is akin to the responsibilities accorded to Scotland, Wales and London in the UK. The devolved model applies across all of Sweden, not just to specific regions.

» Transport services are funded by the regions. Swedish regions (counties) have local tax raising powers.

Sweden

Key components of sector model

Tender model (PSO)

Sweden has a fully liberalised rail market with all PSO services competitively tendered.

Regional services are the responsibility of the regional PTAs, and provided under a tendered PSO model. There are 21 PTAs and municipal associations in Sweden, aligning to the 21 counties (regions). In addition to regional passenger rail services, PTAs are responsible for light rail, tram, metro, bus, taxis and ferries. All services are provided under a tender model, with public service obligations defined in the regional public transport plan. No exclusive rights are allowed.

The PTA is the Competent Authority for PSO regional rail contracts, there are 12 regional PSO contracts in Sweden.

Eight of the contracts are the responsibility of the PTA in whose region the majority of the services operate. Where services also operate in a neighbouring PTA, then that PTA is also involved in the tender process and service specification. A single PTA is responsible for the procurement and management of the operating contract.

Four PSO contracts (Norrtåg, Mälartåg, Öresundståg, and Tåg I Bergslagen) are managed through separate companies which are owned by a several PTAs, reflecting that these operating contracts cover a large geographical area and cover a number of different regions.

Trafikverket is responsible for certain inter-regional services, and is also a Competent Authority with regard to the procurement of these services. It is also responsible for the night train and cross-border PSO contracts. Operating contracts are let as concessions.

The PTA is responsible for:

- The service specification – timetable and capacity to be provided;
- Rolling stock – all rolling stock is owned by Transitio or by the PTA, and is made available to the operator. The operator is obliged to use the fleet specified by the PTA;
- Brand – each PTA has an established brand, which is used on trains, marketing material and ticketing. The operator must deliver the services using the PTA brand;
- Customer offer – service quality standards;
- Ticket sales and revenue risk;
- Revenue protection – RPIs are employed by the PTA, and also cover other transport modes.

The Railway Undertaking is therefore essentially a delivery agent for the PTA. It is responsible for:

- Drivers;
- On-board staff – most regional services operate as DOO, but with a second member of staff on-board;
- Meeting service quality standards
- Rolling stock maintenance – maintenance is procured from third-party suppliers.

Revenue risk is held by the PTA. The pricing model varies by concession, but generally the operator gets compensations from:

- Fixed fee per train km operated.
  - The PTA can vary the train km operated during the concession term, within defined range, and the operator compensation is amended to reflect the revised train km operated. The operator is at risk for this variation.
  - The fee is not paid for any train/km not operated.
- Service Quality and Performance Incentive and a Malus regime. The operator can earn bonuses for meeting and exceeding service quality and performance contractual levels, and is financially penalised if they drop below the target level.
- Project based additional compensation if significant changes are to be delivered during the contract term.

The size of operating contracts varies significantly. SL Pendeltåg, the Stockholm commuter network, operates 12.5 m train/km pa, carrying 125 million passengers pa. Other large contracts are Västtågen (Gothenburg), Öresundståg (southern Sweden and over the Öresunds bridge to Copenhagen), Pågatågen (Malmo), and Märlartåg (Westernern Sweden, including greater Stockholm area). By contrast, Värmlandstrafik operates 1.6 million train/km, and carries 1 million passengers pa.

Four groups provide tendered passenger rail services. SJ operate four contracts - Västtågen, SJ Nord, SL Pendeltåg and Krösatågen. Vy, which is part of Norwegian railways, operates three contracts; VR, which is part of Finland railways, operates three contracts. VR purchased the Swedish operations of Arriva in 2022; and, Transdev, which operates two concessions.

The Stockholm metro, which is separate to the national network, has recently been awarded to a Go-Ahead / Comfort Delgro joint venture. MTR previously operated rail services but is exiting the market having not retained contracts when they were retendered.

Open access (commercial) model

Long distance services are provided under a commercial open access model.

SJ operates a commercial network primarily focused on services linking the three main cities of Stockholm, Gothenburg and Malmo, with some cross-border service extensions to Copenhagen and Oslo.

Competing open access services are provided between Stockholm and Gothenburg by MTR Express (in the process of being sold to VR) and Flixtrain. Snälltåget, owned by Transdev, provides open access services between Stockholm and Malmo, international services to Berlin, and seasonal trains to winter resorts.[39]

MTR Express began operations in 2015 with a fleet of six new build Stadler Flirt units, providing up to 11 return trips a day between Stockholm and Gothenburg. This introduced direct on-rail competition between the two largest cities in Sweden. FlixTrain started operations in 2021 with up to 5 return trains a day, using refurbished rolling stock. The trains are operated by Hector Rail on behalf of Flix.

These services are operated under a commercial model and the service specification and timetable are defined by the operator. Trafikverket or the PTAs do not have a role in specifying these services.

This is consistent with the provisions of EU Regulation 1370, 4th Railway Package, where services should only be publicly procured and designated PSO if commercial services are not viable. A small number of long-distance services are designated PSO, and these services are procured by Trafikverket, for example night trains and certain cross-border services.

The open access market is open to any licenced operator who can obtain the necessary track access agreement from Trafikverket and can access the necessary rolling stock.

SJ and MTR Express own the rolling stock they use on the commercial services, while it is understood that FlixTrain leases its rolling stock.

SJ therefore provides passenger train services under two very different models. Their PSO services are operated by rolling stock provided by the PTA, and to a service specification specified by the PTA. Their commercial services are operated using rolling stock that SJ owns, specifying the service frequency and customer offer, and taking full revenue and cost risk. No public subsidy is paid.

SJ currently have on order 25 Zefiro Express 250 km/h trains from Alstom which will be used on its long-distance inter-city routes and cross-border services to Denmark and Norway, and the first train is scheduled to enter service in 2026.

Commercial services approximately comprise 10% of all passenger journeys in Sweden.

[39] Since this report was drafted, VR have completed the purchase of the business, which is now operated under the VR Resa brand.

Freight sector model

According to the Transport Styrelsen 2023 Market Report, rail freight traffic accounted for 23.3 billion tonne/km, approximately 30% of land-based tonnage km. Demand measured by train km has shown modest growth, but volume transported by tonnage has shown a small decline. Transport Styrelsen attribute this decline to a decrease in goods transported abroad.

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Indicator	2018	2019	2020	2021	2022	2022/ 2021
Train Kilometres (1000s)	36,201	35,601	35,051	36,316	37,177	+2.3%
Transported volume of goods (1000s)	69,123	68,220	69,805	72,458	70,942	-2.1%
Tonne Kilometres (1000s)	22,794	22,222	22,094	23,449	23,161	-1.2%

The sector shows a predominance towards the transport of ore, metals and products from agriculture and forestry.

This is illustrated below, showing that the five largest categories make up 87% of total freight volume. These include ores and other extractive products; products of agriculture, forestry and fishing; wood, including paper products, and metal and metal products.

Freight services are provided on a commercial open access basis, with a number of different operators.

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Green Cargo was formed from the SJ freight business in 2001 when the business was separated into different component parts. It remains a state-owned business, owned by the Ministry of Finance. It is an independent business with no ongoing connection to the current SJ business.

Other freight operators include Hector Rail, CargoNet, TÅGAB, CFL, DB Cargo.

There is an established leasing market for locomotives and wagons providing them to the freight operators. Lessors present in Sweden include Akiem, Beacon Rail, VTG.

[40/41] Source: Transport Styrelsen Market Report 2023

Sweden

Separation between IM and RU

Sweden has fully applied the separation of the Infrastructure Manager from Railway Undertakings.

The integrated state-owned SJ business was separated in 2001, including the establishment of a separate Infrastructure Manager. There is no common ownership or holding group between the state-owned rail businesses. Trafikverket, the Infrastructure Manager, comes under the responsibility of the Ministry of Transport.

Trafikverket is an integrated national agency. In addition to its role as the Infrastructure Manager, it is also responsible for strategy and network planning. In addition to rail, Trafikverket is also responsible for roads, aviation and maritime.

While Sweden continues to have state-owned Railway Undertakings (SJ and Green Cargo), they are managed separately and come come under the responsibility of the Ministry of Finance, which owns all state-owned businesses.

The Infrastructure Manager does not own stations or service facilities. These are owned by a separate company Jernhusen, which is responsible for the ownership, management, and development of these facilities. Jernhusen remains a state-owned business, again coming under the ownership of the Ministry of Finance.

Devolution to regions

The provision of regional public transport is the responsibility of the 21 counties (regions), which discharge their responsibility through their respective Public Transport Authority. The PTAs are the Competent Authority for the procurement of regional rail transport services.

The role of the PTAs is set out in the 2001 Transport Act. They are responsible for the regulation of local, suburban and regional transport by all forms of public transport. All public service obligations must be defined from a public transport provision programme, and all public service obligations must be competitively procured. Exclusive rights are not allowed.

The counties in Sweden have a high degree of autonomy and have independent powers of income tax.

There is not a “standard” model for rail concessions and each PTA has the ability to design the concession structure according to their requirements – within the framework set out in relevant EU and Swedish legislation. In practice however, the PTAs co-operate closely and Svensk Kollectivetrafik (Association of Public Transport Authorities) provides an important coordinative role.

Trafikverket, the Swedish Transport Administration, has responsibility for the national transport plan, and is also the national Infrastructure Manager. Trafikverket should take account of the public transport development plan that each region produces (and which forms the basis of the PSO specification), however the implementation of regional plans, where they involve infrastructure upgrades, requires the different organisations to work together.

Trafikverket is currently delivering a range of infrastructure upgrades to provide additional rail capacity, e.g. Uppsala four tracking, Västlänken in Gothenberg (new city centre rail tunnel), and feasibility study for new line in the Borås corridor. However, the necessity for the national agency to deliver regional schemes is a point of tension for the PTAs.

Trafikverket is an integrated agency that combines the function of long-term planning, the Infrastructure Manager, and the procurement of inter-regional public transport. Its responsibilities cover rail, road, maritime and aviation.

Rolling stock funding and ownership

All rolling stock used on regional PSO services is either owned by Transitio (a ROSCO established and owned by the PTAs to own and manage the rolling stock used on PSO services) or directly by the PTA e.g. SL in Stockholm. Rolling stock is made available to the Railway Undertaking which is awarded the operating contract.

Provision of rolling stock on commercial long-distance services is the responsibility of the Railway Undertaking, and the Railway Undertaking mostly owns the rolling stock directly. SJ continues to own the rolling stock it uses on its commercial long-distance services, with competing open access operators MTR Express (shortly to be VR), Flix Train and Snaltaget also responsible for their own rolling stock.

Service facilities (depots) model

Service facilities are owned by Jernhusen, a state-owned business which is responsible for railway stations and service facilities.

PTAs have also invested in service facilities, either through Jernhusen or directly.

Service facilities are leased to the Railway Undertaking. Service facilities used exclusively for regional PSO contracts are leased in full to the Railway Undertaking, with shared operation at larger multiuser facilities e.g. Stockholm Hagalund.

The rolling stock servicing model under contract by third party maintainers on behalf of the Railway Undertaking. The largest maintenance provider is Euromaint, which was formed originally from SJ. Other maintenance providers include Mantena.

Transitio is responsible for the asset management of the respective fleets, which are leased to Railway Undertakings as part of their operating contracts. Transito, as the vehicle owner, remains responsible for most heavy maintenance and overhauls, and contracts directly with suppliers to undertake this activity.

Service facilities are owned and managed separately to the delivery of the maintenance activity. Most service facilities are owned by Jernhusen, but some PTAs, e.g. Skånetrafiken, have invested directly in the funding and construction of new service facilities.

Service facilities are leased to the Railway Undertaking, who is responsible for undertaking the maintenance of the rolling stock by the Railway Undertaking, and the maintenance is undertaken under contract by maintenance providers. These include Euromaint, as well as other parties including Mantena and OEMs.

Jernhusen remains responsible for the management of service facilities, at larger multi-user facilities, e.g. Stockholm Hagalund, actively coordinates activities and train movements between the different parties, while its day-to-day management role is more passive at smaller facilities that are exclusively used by a single Railway Undertaking and maintainer.

Ticketing

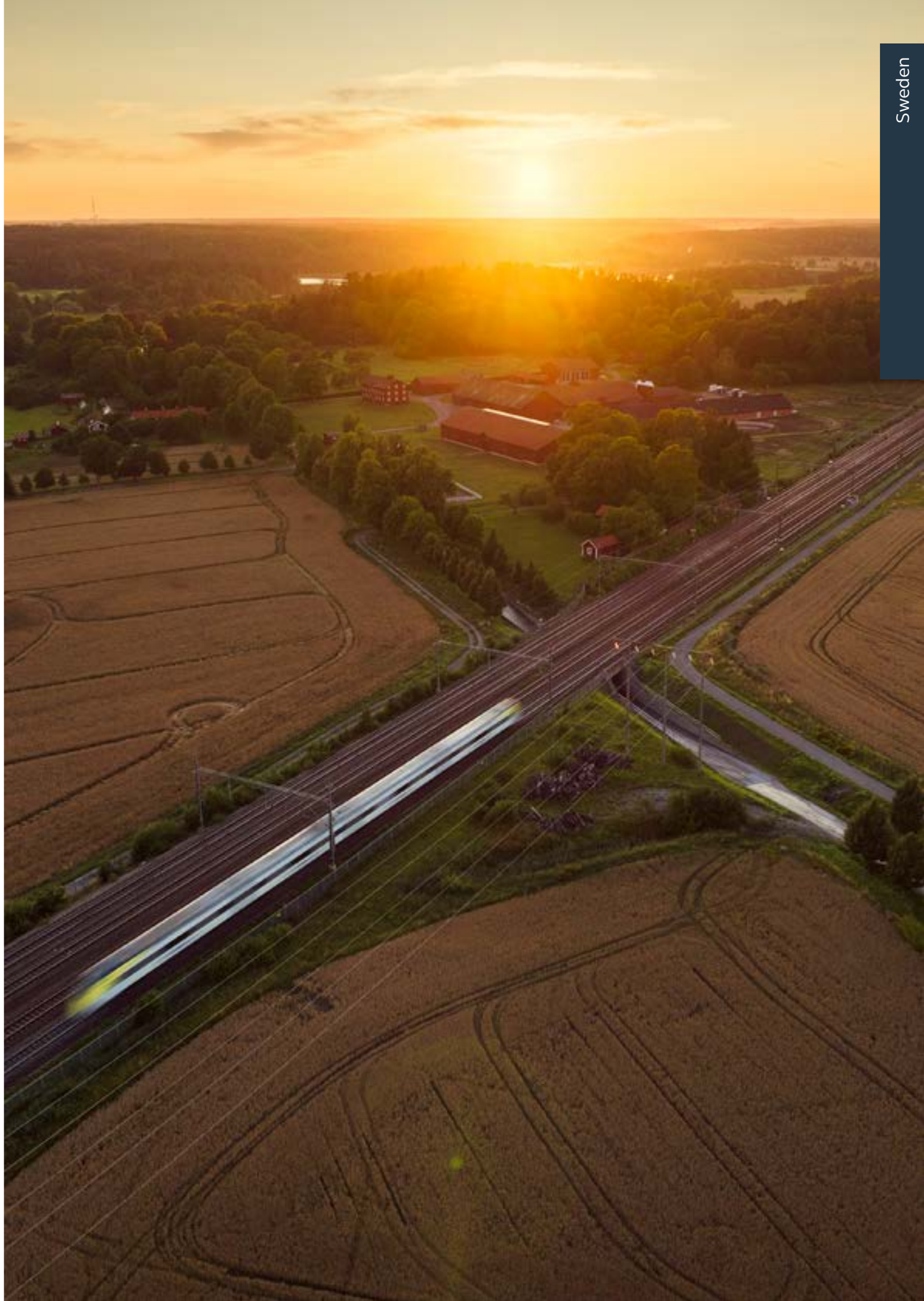
Ticketing, and associated revenue is the responsibility of the PTAs for PSO services. The PTAs are responsible for the sale of tickets, predominantly via TVMs and mobile apps. Multi-modal ticketing is the norm, with tickets valid across different transport modes.

Ticketing is coordinated by Samtrafiken, which is the national ticketing and sales association. It is owned by all regional public transport authorities as well as many of the commercial transport operators with national traffic, and has established a common ticketing platform across Sweden, including acting as a national “clearing house” between regions and setting common ticketing standards.

All PTA’s and operators (with the exception of Flix) have chosen to participate in Samtrafiken. However, it is important to note that this participation is voluntary, and is not obligated or regulated as seen in the UK.

Long-distance commercial rail service ticketing is predominantly undertaken by point-to-point pricing, with operators responsible for on-line and on-board sales.

SJ continues to operate a very small number of ticket offices at major stations such as Stockholm and Malmo.



Sweden

Japan

Country overview

Introduction and key characteristics

Japan is often cited as a good comparator for rail due to its perceived punctuality and Shinkansen services (high-speed "bullet" trains). However direct comparisons can be misleading as the rail sector needs to be put into the wider socio-economic context. Perhaps most importantly, the geography of Japan means that most cities are located along the coastlines. These dense, urban populations mean that mass transit is essential, which underpins Japan's rail usage, with rail having a modal share of c. 33%.

It's total network length compares with the larger European networks, and the Shinkansen dedicated network length is also comparable with the high-speed networks of France and Spain, however its ridership by passenger km is over four times Germany, and over six times the UK, with rail's modal share far in excess over anything observed in Europe or the UK.

Structurally, Japan's railways are organised around six separate, geographically-based, vertically integrated passenger railway businesses, and a single separate freight business. Most of the rail businesses are privately owned, and the network operates with a very low subsidy requirement.

This is in clear contrast to the UK and European models where separation between the Infrastructure and the Railway Understanding is established, with state-owned Infrastructure Managers with high funding requirements.

The current model was established in the late 1980's in response to the financial challenges and decline in passenger ridership. Reform and privatisation were undertaken to improve efficiency and reduce subsidy, and to establish a model to reduce political interference and attract private sector investment.

The passenger networks are operated on a commercial basis, and the government does not set service specifications and frequencies. Accordingly, there is not a concept of PSO services. Competition between the different companies exists due to the existence of parallel lines between the major cities.

The regionally based companies are structured around the travel patterns in the metropolitan areas, with around 95% of trips entirely undertaken within the regional boundaries.

Freight services are provided by JR Freight, which remains a state-owned business. Unlike the passenger companies it does not own the infrastructure. It does not pay access charges for use of the infrastructure, in part to mitigate losses in the business.

Punctuality data is not routinely published in comparable formats, but Japan's railways are noted for their reliability and punctuality. It is stated that the average delay on a Shinkansen service is under one minute. However, the Shinkansen operates on an entirely dedicated network, and cultural influence on performance is also very significant.

The passenger companies are mostly self-financing, driven by high passenger numbers and associated revenue, high levels of non-railway activities and income, and the writing off of the majority of historical debt when the current organisation structure was put in place.

Comparative metrics*

Population (million)	125.7 m	67.35 m
GDP (GBP billion)	£3,570 b	£2,488 b
GDP per capita (GBP ,000s)	£28.4 k	£36.9 k
Rail route length (route miles)	16,780	10,140
Route length by country size (route miles per 100 km^2)	-	11.05
Route length by population density (route miles per 10,000 inhabitants)	-	1.51
Percentage of electrified network (route miles)	74%	38%
Length of High-Speed rail network (miles)	1,741	70
Network density train per day per route/km	-	77
Passenger train km (million t/km pa)	-	558 m
Passenger km (million km pa)	435,063 m	69,148 m
Rail passenger transport modal share (% passenger-km by land)	33.8%	4.9%
Freight tonnage pa	18,042 m	33,141 m
Rail freight transport modal share (% tonne-km by land)	5%	8.7%
Infrastructure expenditure – maintenance and renewal (GBP billion)	-	£4.35 b
Maintenance and renewals as percentage of all infrastructure expenditure	-	58%
Punctuality of long distance and high-speed passenger services (RMMS)	-	67%
Punctuality of regional and local passenger services (RMMS)	-	86%
Punctuality of domestic freight services (RMMS)	-	93%
Passenger revenue (GBP million)	£353,382 m	£11,214 m
Percentage of PSO services (train/km)	-	99%
Percentage of non-PSO services [commercial / open access] (train/km)	100%	1%
Safety: Railway passenger fatality rates (2010-2020) per billion train/km	0	0.01
Safety: Level crossing accident rates per million train/km (2018-2020)	-	0.01

The data sources for the table above are referenced in the “Comparative metrics source references” section of this report.

*Data for Japan is more limited and is consequently more difficult to provide, as it is either not published in an official form, or the basis of the dataset is not comparable to the European data sets. Accordingly, where comparable data is not available, data for Japan has not been included to avoid misleading comparisons.

Key rail sector organisations

Ministry of Land, Infrastructure, Transport and Tourism: Government department with responsibility for the rail sector. It also acts as the Safety Regulator.

JR Hokkaido[42]: Vertically integrated railway company operating rail network and providing services on the northern island in Japan. It remains a state-owned business.

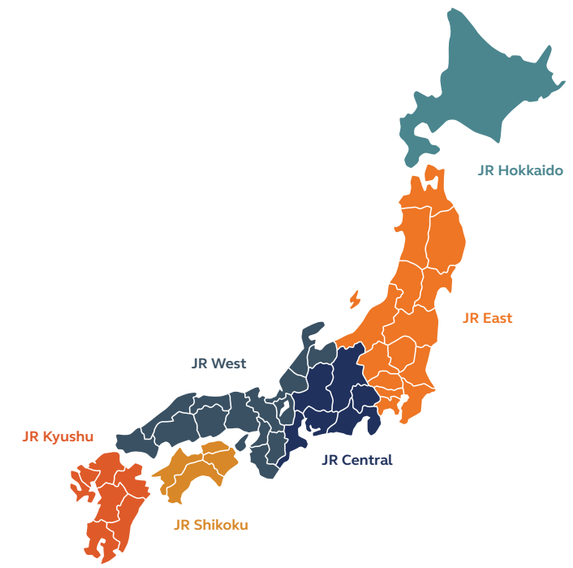
JR East[43]: Vertically integrated railway company operating rail network and providing services on the main island of Japan, the largest railway company in Japan. Its network of routes are centred on Tokyo and Yokohama. It is a listed company.

JR Central[44]: Vertically integrated railway company operating rail network and providing services on the main island of Japan. The core of JR Central’s operations is the Tokaido Shinkansen, which links the metropolitan areas of Tokyo, Nagoya, and Osaka, as well as conventional lines centred on Nagoya and Shizuoka. It is a listed company.

JR West[45]: Vertically integrated railway company operating rail network and providing services on the main island of Japan. Its operations are centred on Kyoto, Osaka and Kobe. It is a listed company.

JR Kyushu[46]: Vertically integrated railway company operating rail network and providing services on the southern island in Japan. It is a listed company.

JR Shikoku[47]: Vertically integrated railway company operating rail network and providing services on the Shikoku Island in Japan. It remains a state-owned business.



JR Freight)[48]: Railway company providing freight services. Unlike the passenger businesses it operates nationally across all of Japan. It does not own any tracks. It remains a state-owned business.

Shinkansen: The Japan high-speed (bullet) trains. They operate on dedicated infrastructure.

Shinkansen Holding Corporation: The owner of the Shinkansen infrastructure when the rail sector was restructured, and remained a separate company until being purchased by the three main JR companies in 1991, who have integrated the Shinkansen into their businesses.

[42] https://www.jrhokkaido.co.jp/global/
[43] https://www.jreast.co.jp/e/aboutus/
[44] https://global.jr-central.co.jp/en/company/
[45] https://www.westjr.co.jp/global/en/about-us/
[46] https://www.jrkyushu.co.jp/english/
[47] https://www.jr-shikoku.co.jp/global/en/
[48] https://www.jrfreight.co.jp/en/corporate-overview

Key differences to UK model, and why these differences matter

Japan's rail network by length (c.16,500 miles) is around one and half times the size of the UK's (c. 10,000), but the usage shows marked differences. Passenger km is over six times higher in Japan (c. 435 billion km pa compared to c. 69 billion km), with rail achieving a c. 33% modal share compared to under 5% in the UK. This increased passenger usage is reflected in the revenue in both countries, with annual revenue (pre-Covid) of c. £350 billion in Japan compared to c. £11 billion in the UK.

This higher usage of rail in Japan supports a rail sector that is virtually self-funding, and operates without any significant government subsidy. The three main railway companies, JR East, JR Central, JR West, all operate without any government subsidy.

This contrasts with the UK, where the rail sector requires significant government subsidy, including to passenger operators and funding of the Infrastructure Manager, Network Rail. The Japanese system is mostly self-financing, including the operation and maintenance of the infrastructure. This is driven by high passenger numbers and associated revenue, high levels of non-railway activities and income, and the writing off of the majority of historical debt when the current organisation structure was put in place.

There is separation between the high-speed Shinkansen network and the conventional network, with the Shinkansen operating on a dedicated network. This has important comparative implications. Unlike the UK long-distance services are not sharing tracks with stopping passenger trains and freight trains. This contributes to the high levels of punctuality achieved (average delay per service of under one minute) and the frequency achieved on Shinkansen lines (e.g. Tokaido Shinkansen between Tokyo and Osaka operates up to 13 trains per hour, with each train having 16 coaches).

The characteristics of Japan, geographical and economic, support mass transit. The geography of Japan means that most cities are located along the coastlines. These dense, urban populations mean that mass transit is essential. The rail network is focused on serving the, predominantly, urban population in large cities, and the Shinkansen high-speed services connecting the major cities.

This contrasts with the UK network in a number of important characteristics. The UK has a higher proportion of regional services, and operates mixed traffic service patterns on all the main lines, with long-distance services sharing access with stopping services and freight services. The population density and distribution in the UK is significantly more dispersed.

The success of Japan's rail sector is focused on the high-speed and urban networks. The rural routes are comparatively underserved with low passenger usage, reflecting the low population densities. While rail services in Japan are predominantly provided by the six "JR" companies, rural routes are often operated by smaller railway operators, many of whom are partly owned by regional or local governments, and who frequently operate at a loss due to low demand.

Despite the high number of passengers seen in Japan, passenger demand has been broadly static, and Japan has not seen the growth in demand observed in the UK in recent years. This reflects the historic high modal share for rail in Japan, but also means the network infrastructure has not had to address the increased level of demand and increased service frequencies seen in the UK.

Perhaps the most important difference between the two countries is the vertical integration of the railway companies, who own the infrastructure, as well as providing passenger services.

The current Japanese rail model dates from 1987 when Japan National Railways was split into six separate geographical vertically integrated railways and a separate freight operating business. Subsequently, four of the railway businesses are listed companies, with the remaining two and the freight business remaining state-owned. The objectives of reform and privatisation were to:

- Improve efficiency and reduce subsidy
- Better meet local customer needs
- Attract private sector investment
- Make the railways relatively free of political interference
- Improve on the poor industrial relations

This approach not only created a very different operating model to the current but also reflects very different operating conditions and objectives, including in most cases the removal of subsidy requirements, a clear objective to keep railways free of political interference, and private investment, including private ownership of the infrastructure.

The geographically focused businesses are relatively self-contained, to a far greater extent than seen in the UK Network Rail regions, with c. 95% of trips entirely within the regional boundaries of the six vertically integrated railways. The Shinkansen services which cross nominal regional boundaries operate on dedicated infrastructure, significantly reducing operational interfaces.

The role of government is relatively limited, which was a deliberate design when the rail sector was restructured, however it continues to have a role in jointly planning rail infrastructure.

Investment in new lines continues to be funded, in most cases, by the government, and therefore the costs of the railway companies reflect the OMR (operate, maintain, renew) costs of the infrastructure.

The financial sustainability of the railway companies, including their funding and operation of the infrastructure, has also been facilitated by the removal of a number of unprofitable local lines from the JR networks. These are now managed independently, and require government financial support.

Japan

Therefore, while Japan has a core model, centred on the six JR companies, it is important to recognise the smaller companies too and that the financial and operational structure of these secondary routes is very different. In the UK the costs and operation of secondary routes are integrated into the Network Rail regions and TOCs, and arguably the individual funding requirements for these routes is not transparent.

Passenger services are provided under a very different model in Japan compared to the UK. There is no concept of PSO services or tendering for the provision of services. Therefore, all services are provided under a commercial model, with the respective regionally focused railway company determining service patterns and frequencies.

Government does not specify service patterns or frequencies in Japan. These are a commercial decision for the railway companies. Government however retains a role in approving the level of fares.

Competition between the companies exists in many cases, as there is competition on parallel lines between the JR companies and private railways in many urban areas and on some long-distance routes (e.g. Osaka to Kyoto). This allows Japan to reap benefits of competition whilst having a vertically integrated structure.

Provision of rural line services and some regional lines are frequently provided by separate railway companies, who are generally part owned by regional or local government. These services are not provided on a commercial basis, and the companies operating them are frequently loss making.

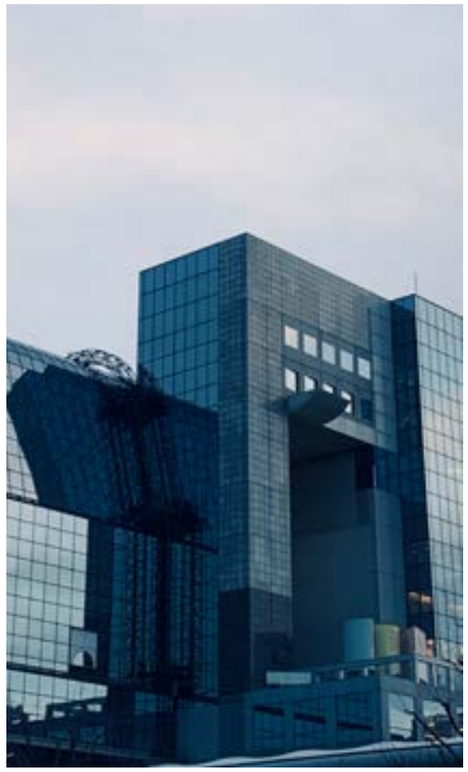
It is therefore important to make the distinction between the six JR companies which are in most cases profitable, and fund the infrastructure, and secondary routes where government support remains.

Freight services are provided under very different models between the two countries. In contrast to passenger numbers, rail freight volumes in Japan are c. half of those in the UK, and are provided by a single state-owned freight company - JR Freight. Unlike the passenger companies, it does not own the infrastructure.

Part of the rationale of the Japan rail reform was to reduce cross subsidy between the passenger and freight businesses. However, to ensure the freight business was sustainable it does not pay access charges for use of the infrastructure to reduce its operational costs.

Therefore, the Japanese rail freight sector is smaller in both volume transported and modal share than the UK, continues to be provided by a single state-owned operator, and is not subject to access charges.

Track Access Charges, as seen in the UK, are not applied in Japan, in part reflecting the vertically integrated nature of the businesses. However, the JR companies pay a “rent” to government for their ownership of the infrastructure, which is used to part fund investment in new routes.



The following observations can be made from the Japanese model:

- Geographical vertical integration is enabled by the vast majority of trips being made within the railways’ geographical boundaries. A similar model in the UK would involve considerably more cross-boundary traffic.
- Competition in the Japanese model remains very important, whether that be competition on parallel railway lines or regulatory comparative competition.
- The private sector railways have brought a strong focus on cost control and efficiency as well as innovation.
- The companies have significant commercial freedom particularly in relation to service levels.
- The strong financial position of the three main Island companies is due to very high passenger numbers and revenue (helped by geographical characteristics) but is also helped by significant non-rail related revenues, and also enabled by the three main island railway companies acquiring only 40% of JNR’s debt at privatisation.
- High levels of punctuality are helped significantly by having a segregated high-speed network and are deeply engrained in Japanese culture.

Key components of sector model

Funding and ownership model

Japan has a very different model to those seen in the UK and Europe, with the rail sector structured around regional vertically integrated companies. The current structure was established in the 1980's and the model adopted was primarily driven by the level of debt carried by Japanese railways and a parallel decline in ridership.

The Japanese economic growth in the 1950's and 60's was accompanied by significant investment in rail, including the development of the Shinkansen network and non-rail activities such as property. The 1980's reform was a consequence of a downturn in passenger demand, and revenue, and the level of debt occurred from the earlier investment. At the time of reform, Japan National Railways had debts of ¥3.7 trillion (c. £255 billion).

It is in this context that the current industry structure was developed.

In 1987, the previous single railway was split into six separate geographical vertically integrated businesses and a freight operating business with the following objectives:

» Improve efficiency and reduce subsidy

» Better meet local customer needs

» Attract private sector investment

» Make the railways relatively free of political interference

» Improve on the poor industrial relations

The current funding model, and self-funding nature of most of the Japanese rail sector is a consequence of these decisions and the structure that preceded it.

» The Japanese government took on 60% of the historic debt and the remaining 40% was allocated to the three main-island railways JR East, JR Central and JR West. The debt was therefore either written off, or allocated to the "big three" new companies, that had the capacity to cover this remaining debt. The government also provided additional funding for the restructuring of the rail sector, including a large employee redeployment programme.

» A significant proportion of revenues are derived from non-railway activities such as housing development, shopping centres at stations, hotel management, tourism, and the operation of other modes of transport such as buses. For example, JR East reports c. 47% of its revenue from non-rail related activities.

» High passenger numbers result in high revenue. Passenger km are c. six times higher than the UK, however reported revenue is over 30 times higher (this includes revenue other than fare box). This level of revenue supports operating costs, infrastructure OMR and debt servicing.

Government remains responsible for the funding of new lines, however these are partly funded by the railway companies through an infrastructure rent fee.

Four of the JR companies have been privatised (JR Central, JR East, JR West, JR Kyushu). The government continues to own the two smallest JR passenger companies (JR Hokkaido, JR Shikoku) and JR Freight. These companies continue to receive state subsidy.

The focus on Japan's railways tends to be on the "big three" JR companies which are self-funding, profitable, and generate high revenues.

It should however be noted that the six JR passenger companies only own 87% of all railway track. The remaining 13%, mainly rural and regional, is divided among other railway companies these are mostly privately owned, but regional and local governments typically are a key shareholder (these companies require subsidy).

Japan

Tender model (PSO)

Passenger services in Japan are not tendered. There is additionally no concept of PSO services. Therefore, all services are provided under a commercial model, with the respective regionally focused railway company determining service patterns and frequencies.

Government does not specify service patterns or frequencies in Japan. These are a commercial decision for the railway companies. Government however retains a role in approving the level of fares.

There is no regulatory or legal obligation to maintain a certain level of services, including local services, but communities often negotiate with the JR companies regarding the maintenance of local lines and services.

However, as highlighted above, rail services and demand are concentrated in the urban areas at the expense of rural services. Consequently, there are a number of smaller railway operators who provide services on rural lines, many of whom are partly owned by regional or local governments, and who frequently operate at a loss due to low demand.

Open access (commercial) model

All passenger trains are provided under a commercial model. There is no separate concept of PSO services or competitive tenders for passenger services. The government does not set service specifications or frequencies.

The responsibility for service specification is with the respective railway company.

Services can (very) broadly be categorised into three categories:

» High-speed long-distance Shinkansen linking the major cities across Japan;

» Networks focused on the major cities, providing high-frequency, high-volume services;

» Regional and rural routes, with low frequency, low-demand services.

The JR companies provide the first two categories on a fully commercial basis.

Rural and regional services are provided in some instances by the JR companies, but in other instances by smaller private companies – these companies generally receive subsidy for their operation.

There is no direct on-rail competition, but competition between the different companies exists in many cases, given the number of parallel routes.

There is no equivalent of the UK and European open access model, whereby a new entrant can set up a competing service on the same infrastructure.

Japan's railways have failed to grow in recent years (noting it continues to retain 33% modal share) in part due to demographic changes but also its failure to respond to intermodal competition, particularly from air. The emergence of cheap overnight buses and low-cost airlines has resulted in the withdrawal of night trains.

Freight sector model

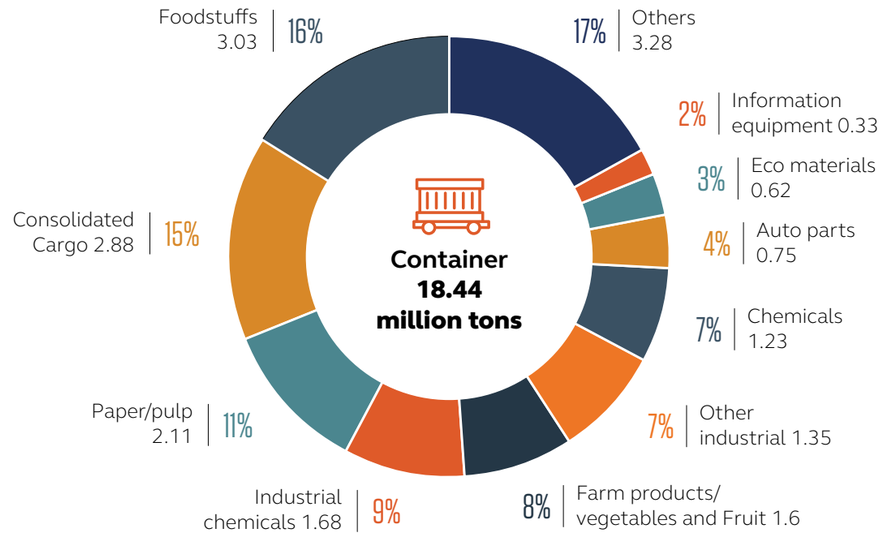
Freight services are provided by JR Freight, which remains a state-owned business. Unlike the passenger companies it does not own the infrastructure. It does not pay access charges for use of the infrastructure, in part to mitigate losses in the business. Rail freight modal share is c. 5%.

Japanese rail freight has declined significantly; however volumes now appear constant.

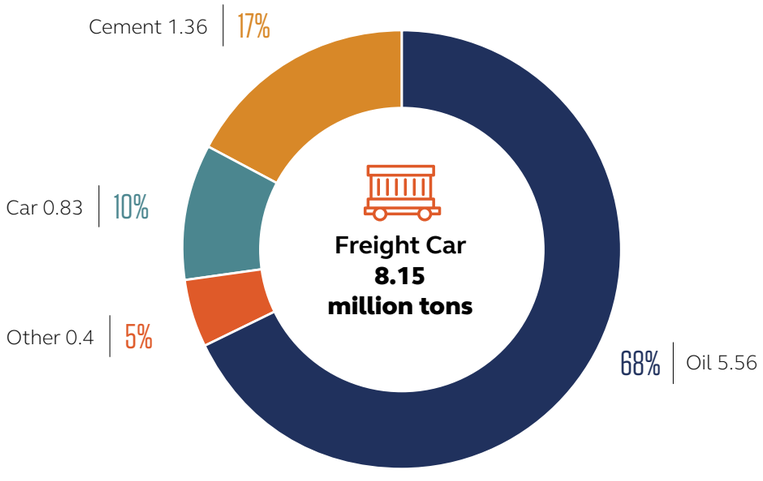
A single nationwide company was established by the 1987 reforms. Recognising the generally long distances travelled, freight trains usually cross the borders which demarcate the networks of the geographically focused passenger companies. The rail reform was designed to ensure JR Freight could access the trunk lines owned by the passenger companies.

Current freight volumes are categorised as types of traffic as shown below.

Container freight volume by category (2020)[49]



Freight car freight volume by category (2020)[49]



[49] https://www.jrfreight.co.jp/en/corporate-overview

Separation between IM and RU

Japan retains a vertically integrated rail system with railway companies being responsible for infrastructure and passenger train operations. This is in clear contrast to the UK and European models where separation between the Infrastructure and the Railway Understanding is established. The Japanese structure was put in place in 1987 and designed in response to the challenges facing the sector at that time, and has broadly remained unchanged since then. There has been no development of regulatory requirements to restructure the sector, unlike in Europe with the EU railway packages.

The six geographically based vertically integrated passenger railway businesses are responsible for c. 87% of the track length. The integrated model is retained on regional and rural routes operated by smaller companies.

The Shinkansen operates on a dedicated network and is operationally separate to the conventional network.

Ownership of the Shinkansen is held with the respective, geographically focused railway companies.

Passenger through trains, both Shinkansen and conventional, are operated with a clear separation of operational responsibilities at the border station between the companies. In general, drivers change at the border station and drive trains on their company's track only, with limited exceptions where changing crews is practically difficult at the border or where one railway is too small to hire and provide the necessary training for the drivers.

The integration of the infrastructure management and railway operations has established a model whereby the revenue (farebox and external revenues) is directly used to fund the infrastructure. The railway companies are responsible for the OMR costs of the infrastructure, and the level of revenue means that the majority of the network is self-financing.

This integrated model is reflected in access charges. Track Access Charges, as seen in the UK, are not applied in Japan, in part reflecting the vertically integrated nature of the businesses. However, the JR companies pay a "rent" to government for their ownership of the infrastructure, which is used to part fund investment in new routes.

While government has a relatively "hands-off" role, it does jointly plan rail infrastructure with the private railway companies. This includes both new routes and network developments, but also encompasses a wider planning system that encourages the building of commercial developments and housing alongside the railway route. These developments are led by the railway companies, and the revenue is used to fund the rail infrastructure.

Punctuality data is not routinely published in comparable formats to the UK and EU, but Japan's railways are noted for their reliability and punctuality. It is stated that the average delay on a Shinkansen service is under one minute. However, the Shinkansen operates on an entirely dedicated network, and cultural influence on performance is also very significant. In 2016 the average delay reported by JR Central was 24 seconds, including incidents beyond the control of the operator.

The safety regulator is the Ministry of Land, Infrastructure, Transport and Tourism (MILT).

Japan

Devolution to regions

There is no significant involvement of regional authorities in the specification or management of passenger rail services.

There is no PSO concept for services, with the railway companies providing services on a commercial basis.

The organisational model adopted in the 1980's was also designed to reduce political interference in the management of railways.

However, as highlighted above, rail services and demand are concentrated in the urban areas at the expense of rural services. As a consequence, there are a number of smaller railway operators who provide services on rural lines, many of whom are partly owned by regional or local governments, and who frequently operate at a loss due to low demand.

While there is no concept of PSO services, or regulatory or legal obligation to maintain a certain level of services, including local services, communities often negotiate with JR companies regarding the maintenance of local lines and services.

Rolling stock funding and ownership

Reflecting the vertically integrated nature of the businesses, the JR businesses own their rolling stock. Rolling stock is directly owned, there is no established leasing model.

There is also some cross-ownership with rolling stock manufacturers. For example, JR Central has a majority shareholding of Nippon Sharyou, a subsidiary that builds their trains.

This type of integration across the supply chain is a common model in Japan.

It should also be noted that train services are not provided under a tender model, or time defined access agreement, meaning long-term planning horizons can be adopted.

Service facilities (depots) model

Services facilities are owned by the vertically integrated railway companies, who provide maintenance in-house.

Ticketing

Japanese rail ticketing broadly falls into three categories, which generally align with the different types of services.

» Multi-modal PAYG ticketing is the norm within urban regions, with a common technology supporting the different regional systems. Tickets can be used in different regions, with a "clearing house" to allocate revenues where a ticket has been used outside of its normal region.

» The Shinkansen services are generally pre-reserved, train specific ticketing, though a single coach is normally available for passengers without a pre-booked ticket.

» Regional and rural services typically operate on a point-to-point model, a standard ticketing model.

Fares are proposed by the railway operator, but must be approved by the Japanese Transport Ministry (MILT). The operator proposes an upper limit and the Ministry approves it. The approval criteria are: fares do not exceed the appropriate cost, plus appropriate profit under efficient operation. The railway operator can then set fares up to that limit.

Long-distance services in Japan such as bullet trains have a unique fares system which require customers to hold two fares. In addition to the basic fare (which covers the distance to be travelled), customers must purchase either a reserved or unreserved seat supplement. Akin to GB rail, if travellers on a more flexible unreserved seat supplement outnumber the available seats in the unreserved coaches, it means that passengers must stand.

However, in a number of Japan's long-distance services, coaches with reserved seating offer a higher quality travel experience and as such, customers are incentivised to book a reserved seat.

Despite the Japanese rail system being notorious for overcrowding in dense metropolitan areas, fares do not typically differ between peak and off-peak. As rail transportation is so widespread in metropolitan areas, firms are encouraged to allow flexible working hours to spread peak traffic as much as possible.

There is price cap (fares) regulation and the regulator adopts a comparative or yardstick competition approach. Under this scheme, rail operators compete with each other to improve performance, and the regulator assesses the operators' performance by using common measures. The results of this assessment are used when fare revision is being considered.

Glossary

The terminology used by authorities and industry parties in European countries at times differs from the terms used frequently in the UK rail sector. The phraseology used frequently is derived from the definitions used in EU legislation.

In compiling this review, the "standard" terms used within the EU rail sector have been used, reflecting the descriptions and definitions in place in the relevant countries.

While these terms are also used within the UK environment, they may not be frequently cited.

Seen below is a glossary of referenced EU railway reform packages and terminology used in this report, with a summarised interpretation and phraseology translated for the UK context.

1st Railway package (2001)	Provisions included the required separation between the Infrastructure Manager and the Railway Undertaking functions.
2nd Railway package (2004)	Provisions included the establishment of a common regulatory framework for rail safety and the opening of the rail freight market to competition.
3rd Railway package (2007)	Provisions included the liberalisation of international passenger services.
1st Railway Package recast (2012)	Provisions included strengthening non-discriminatory access to the rail network and specific measures on non-discriminatory access to service facilities.
4th Railway Package (2016)	Provisions included the "technical pillar" to establish interoperability, the "market pillar" requiring the opening of domestic traffic to competition, and the requirement to competitively tender all PSO services from December 2023 onwards.
Competent Authority	The entity responsible for the provision of PSO services and ensuring their delivery. In the UK context this would be the Franchising Director / Secretary of State.
Infrastructure Manager	The body responsible for the operation and control of the rail infrastructure. In the UK, this is Network Rail.
PSO – Public Service Obligation	Defined in Regulation 2016/2338 as part of the 4th Railway Package. It establishes the principle that passenger rail services should be provided on a commercial basis, and should only be designated PSO if the market cannot provide. Where services are designated as PSO, competitive tendering should be the norm and direct awards should be the exception. Under the definition in 2016/2338, had the UK remained in the EU, it could be argued that the UK long-distance services should have been provided under a commercial model rather than the former franchise model.
PTA – Public Transport Authority	In the context of this report these are the regional bodies responsible for rail services. In many cases they are also the Competent Authority. PTAs referenced in this report typically have greater powers than UK PTAs, and are more akin to TfL or Transport Scotland.
Railway Undertaking	Railway operators, either commercial passenger operators or PSO operators. The definition also includes freight operators. In the UK we generally refer to TOCs and FOCs.
Service Facility	A commonly used term in Europe for a rolling stock maintenance depot.

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About Rail Delivery Group

If you have travelled by train or booked a journey for friends or family, you will have used one of Rail Delivery Group's (RDG's) services. We are integral to the running of the railway and play a crucial part at every stage of the customer journey.

We provide customers with information on their train service, we help them reserve their seat, we offer them discounted fares through Railcards, and we help arrange assistance for those customers that need additional support when travelling by train. We do all of this and much more.

Next year, we will be celebrating 200 years of Britain's railway. But, at RDG, we are not content with doing things as we've always done them. We're active in pushing forward change, driven by our purpose to create a simpler, better railway for everyone in Britain.

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