

Current railway models: Great Britain and overseas

Evidence paper

This paper provides an overview of the structure of the rail sector in Great Britain and examines a number of comparator sectors in other countries. The Review will draw on this evidence in the subsequent phases of its work.

Similar papers on other key rail issues are being published as part of the Review – including on the role of the railway in Great Britain, and the experience of railway users (both passengers and freight).

Alongside these evidence papers, the Review is issuing a new phase of its ongoing Call for Evidence process – with a deadline of 30 April 2019. This will seek views on the evidence and wider issues presented by the Review to date and on our proposed objectives and assessment criteria.

The Review will continue to engage widely with people using and working on the railway.



Current railway models: Great Britain and overseas

Evidence paper

March 2019

The Williams Rail Review team has actively considered the needs of blind and partially sighted people in accessing this document. The text will be made available in full on the Department for Transport website. The text may be freely downloaded and translated by individuals or organisations for conversion into other accessible formats. If you have other needs in this regard please contact;

The Williams Review
Great Minster House
33 Horseferry Road
London SW1P 4DR
Telephone 0300 330 3000
Website www.gov.uk/dft
General enquiries: <https://forms.dft.gov.uk>

© Crown copyright 2019

You may re-use this information (not including logos or third-party material) free of charge in any format or medium, under the terms of the Open Government Licence. To view this licence, visit <http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/> or write to the Information Policy Team, The National Archives, Kew, London TW9 4DU, or e-mail: psi@nationalarchives.gov.uk

Where we have identified any third-party copyright information you will need to obtain permission from the copyright holders concerned.

Contents

- 1. Introduction..... 3
- 2. Structure of the rail sector in Great Britain..... 5
- 3. The international landscape 12
- 4. Models and structures 21
- 5. System approaches..... 28
- Endnotes 33

1. Introduction

- 1.1 The Rail Review is looking to develop and test new ways of organising this country's rail system, and delivering better for passengers, taxpayers and the economy, including by carrying rail freight.
- 1.2 Understanding the international landscape for the railway presents an opportunity to learn and improve. As passengers, we all like to compare our rail experiences overseas to the railway in this country. Looking at the differences and the similarities can provide a sense check, and helps puts the aims for reform in context. To get the context right, it is critical to understand which comparisons make sense, and how to interpret what they tell us.
- 1.3 More importantly, perhaps, other countries provide real-world test cases for how to do things, and how not to do them. The railway in Great Britain faces challenges, but we know it is not the only railway that has faced problems, or has had to solve them. Many of the challenges that the sector here is facing apply to railways around the world. Comparisons and conversations can help us understand how other people have solved the issues, what it means for passengers and freight customers, and how well the different approaches seem to work.
- 1.4 Railways occupy an important part in wider transport systems in Europe and around the world. However, the precise role they play – for example, moving freight or passengers, serving local and commuter demand versus regional and longer distance travel – varies from country-to-country. There are also major differences in the organisational and funding structures used on different national railways. The railways in some countries are dominated by a single state entity, whilst in others there are much more diffuse structures and a range of different roles for private sector organisations. Great Britain is an outlier in some respects, having moved more quickly and firmly towards private sector contracted train operators than most other European countries have done. It is also unusual by lacking a national railway operator, and by relying less on regional transport bodies or governments than many other European countries, for reasons that might be shaped by geography, economies, history and political cultures.
- 1.5 This paper sets out some key comparisons, alongside an overview of how the privatised system evolved in this country, and how it currently operates. It also includes a consideration of rail systems in a selection of different

countries: France, Germany, the Netherlands, Italy, Japan, Sweden and Switzerland; along with certain markets in the USA and Australia.

- 1.6 The organisation of the rail sector in Great Britain is reviewed in Chapter 2. The chapter considers the respective roles of the sector's key constituent organisations and how the sector has evolved since privatisation in the 1990s. The remainder of the paper considers key issues from rail systems in other countries. Chapter 3 introduces the countries we have reviewed as part of this work, considering issues such as demand, network utilisation levels, expenditure, and performance. Chapter 4 reviews the differing organisational approaches adopted in each of these systems, including the mix of public and private sector involvement. The final chapter looks at how these systems deal with a range of operational issues – including performance management, timetable planning, contracting, and investment management.
- 1.7 The lessons from these other countries are not simple, and no system could be simply transplanted wholesale. However, the Review team will continue to explore and test the international examples in order to provide ideas and guidance for the future organisation of rail. We would welcome the submission of further case studies and examples of best practice.

2. Structure of the rail sector in Great Britain

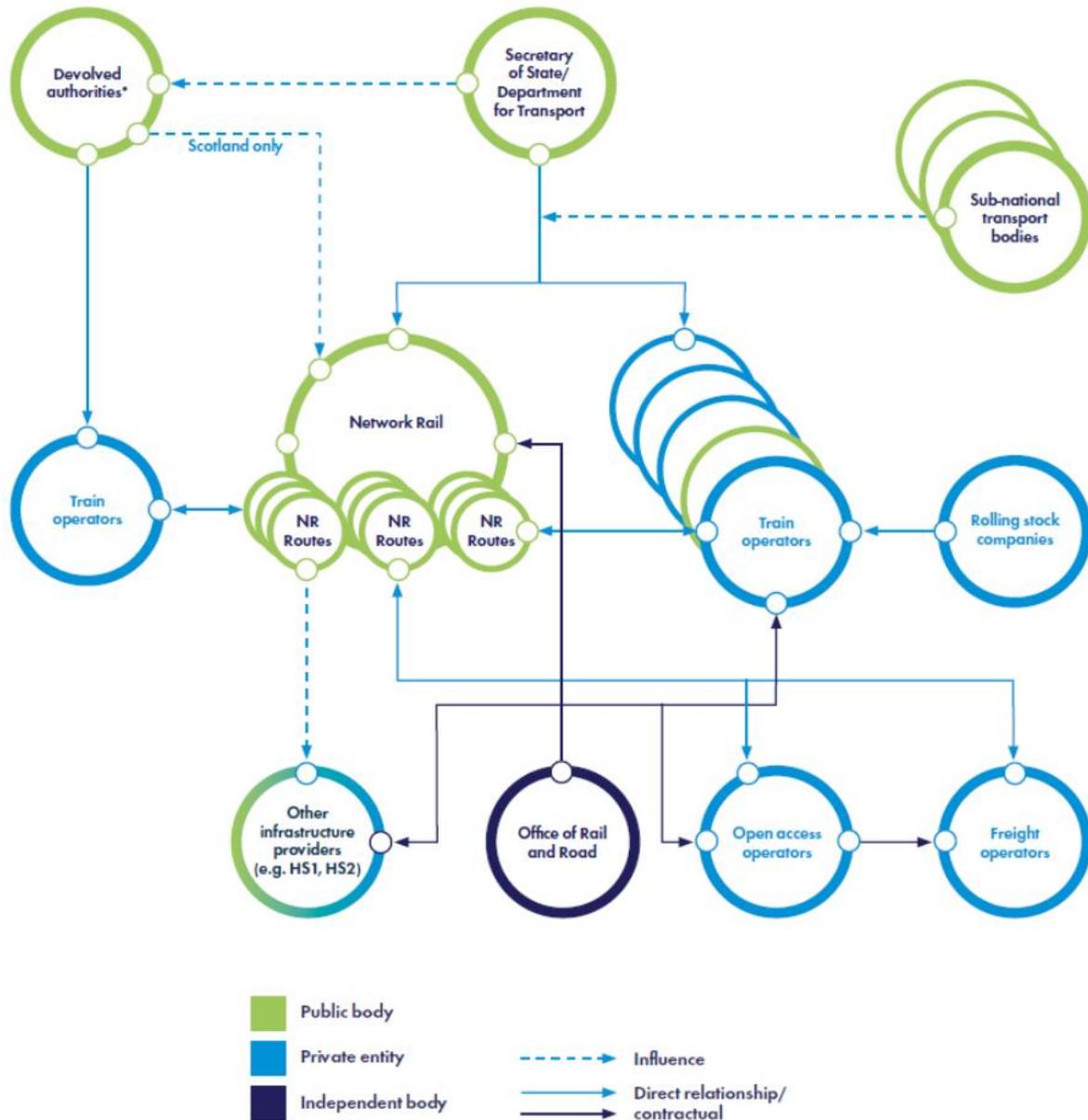
- 2.1 Since the opening of the pioneering Stockton and Darlington Railway almost 200 years ago, the structure of the railway in Great Britain has changed many times. Throughout the nineteenth and twentieth centuries, nationalisation, British Rail and privatisation, the railway has helped shape our country and remains fundamental to the nation and our communities. In the last few decades the growth in train services and passengers has made rail travel important for ever more people, and today it is part of the day-to-day lives of millions of passengers, communities and businesses.
- 2.2 In common with almost all modern national railways, the railway in Great Britain requires significant public sector funding. This subsidy is used, along with fares income, to maintain the network and offer a geographic spread of rail services to a range of different communities and passenger groups. It allows trains to run at a reasonable frequency and provide journeys that people want to make. Most publicly funded railways share some key functions and have similar organisations, for instance a strategic body; a safety authority; an infrastructure provider; bodies that design contracts and procure passenger train operators; and delivery organisations to run passenger and freight trains, operate stations and depots and take care of the passengers. Whilst different national railways carry out many of these same functions, the organisational and commercial approach varies between countries and railways.
- 2.3 The organisation of Great Britain's railway today reflects the structures created by the Railways Act 1993¹ (amended and expanded in the Railways Act 2005²). The privatisation process took from 1994 until 1997 to complete, and involved dissolving British Rail as a single entity, and splitting the infrastructure (including the tracks, bridges, tunnels, depots, and signalling systems) from fleet ownership and the train service operations (running the trains, managing some stations and managing the customer interface). Duties and ownership largely passed to private sector bodies and British Rail's rail freight operations were sold. Although the underpinning legal framework set at privatisation has remained largely unchanged, the structure of the railway has continued to evolve. Some of the main changes which have affected functions and organisations since privatisation are discussed below.

- **Central government:** Although it continues to be responsible for the strategy and funding of Great Britain's railway, its role in the delivery of train services and its relationship to the infrastructure manager has changed over time. Powers have been transferred to both the Scottish and Welsh governments as devolution has evolved (Scottish Ministers are the Franchising Authority for the ScotRail and Caledonian Sleeper franchises, while Welsh Ministers are the Franchising Authority for the Wales and Borders franchise³). The Railways Act 1993 created powers to franchise rail services (which are currently exercised by the Secretary of State for Transport), provided powers for the enforcement of train operator obligations and the protection of assets, and prevented public sector bodies directly operating train services, except in strictly limited circumstances. The Railways Act 2005 reduced the financial jurisdiction of the then Office of Rail Regulation,⁴ imposing a limit on its financial powers as determined by the government and requiring the Secretary of State to specify what they want (the High Level Output Specification, HLOS) in return for the public subsidy provided to the railway industry (the Statement of Funds Available, SoFA) on behalf of the taxpayer. Scottish Ministers undertake these roles for Scotland.
- **The procurer and specifier of train services:** Different public sector organisations have had responsibility for designing, letting and managing franchise contracts since privatisation. These contracts largely define the services that the funder wants the railway to offer to its passengers. The Office of Passenger Rail Franchising took this role initially, but was subsequently replaced by the Strategic Rail Authority (SRA) a reform which recognised the growing lack of longer term or network-level strategy. However, the organisational structure changed again in 2004, when the Department for Transport (DfT) announced the abolition of the SRA. Franchising powers, and many of the strategic functions, were taken over by the DfT directly, largely in order to align the responsibility for funding rail operations with the levers and accountability for decisions. The framework for franchising in both the 1993 and 2005 Acts remained the same and rests on competitive tendering of rail franchises to private operators. However, the DfT does not franchise and manage all train operators on the heavy rail network. Responsibility for some train services initially franchised centrally has been passed to local authorities in a small number of cases by removing them from the scope of the Act – principally where the services in question have few interactions with the wider network. The main examples include the transfer of the services that now form “London Overground” to Transport for London (TfL) and the transfer of services in the Liverpool city region to Merseytravel, which has been responsible for the MerseyRail franchise since it was let in 2003. For Scotland and Wales, the governments have been given franchising powers. In other cases, public sector transport bodies, such as West Midlands Rail Executive and Transport for the North, have worked in

partnership with the DfT to specify franchises and play an ongoing role in the in-life management of these contracts.

- **The track:** Infrastructure provision has undergone profound changes in organisation and ownership since the initial post-privatisation settlement. At privatisation, a single regulated private company – Railtrack – was made owner of the network. On 7 October 2001, Railtrack was placed into Railway Administration with Network Rail (NR) eventually taking on its responsibilities. NR was set up as a not-for-dividend private company, and brought maintenance activities in-house to reduce the railway’s dependence on contractors. In 2014, NR was reclassified as an arms-length public sector body of the DfT. More recently, this year NR has announced its “Putting Passengers First”⁵ programme in order to embed a customer service mindset and ensure a better focus on performance with closer working with train operators through a more devolved regional and route structure.
- **The trains:** At the time of privatisation the British Rail passenger train fleet was transferred to private rolling stock companies (ROSCOs). ROSCOs own most of the rolling stock and lease it out to the train operating companies. However, since privatisation, new and improved train fleets have been procured using third party finance. This has happened either through a government led process – as was the case for the Thameslink Class 700 fleet – or through the franchising process. British Rail’s freight trains were effectively sold to two freight operators, English Welsh & Scottish (EWS) and Freightliner, although more exist today.
- **The operator of train services:** Since privatisation various contractual structures for passenger franchises have been developed with differing degrees of specification, different levels of risk transferred to operators, and different lengths (typically between 7 and 10 years long). There have also been instances where the franchising authority has taken over operations temporarily through an arms’ length public sector body whilst a new competition was organised. The franchise operators reflect a mix of British and international companies, some of which are directly, or indirectly, owned by other national governments. Driven by the growth in passenger numbers, many of the franchises have become significant in size, with some having annual revenues of more than £1 billion. Freight services continue to be delivered by private sector or overseas state-owned companies.
- **The regulator:** The role of the rail regulator, now known as the Office of Rail and Road (ORR), was established by the 1993 Act. Its scope includes licensing of train operators and infrastructure managers, regulation of the infrastructure and oversight of the charges which operators must pay to use the railway. There were some significant changes made in the 2005 Act, including the reform of the regulated funding process to better recognise the

reliance on taxpayer support of the railway and to more closely involve the UK and Scottish Governments in the process. The transfer of railway safety responsibilities from the Health and Safety Executive was also implemented.



* Includes Transport Scotland, Transport for Wales, Transport for London and Merseytravel

Figure 1. Overview of the rail industry in Great Britain

2.4 Having highlighted some of the key changes that have happened to the sector since the 1990s, Figure 1 provides an overview of the industry as it is organised today. The diagram demonstrates that the rail system is a complex blend of both private and public sectors, and it shows some of the

relationships that exist. However, in the interests of simplicity, it excludes bodies such as East West Rail which are public bodies involved in developing, designing and delivering major projects. Some key features of today's system are described below.

- The **funding** of the national network (infrastructure and operations) comes from a combination of revenue from passengers and public sector grants. It is specified by the DfT and other public bodies with devolved responsibilities.
- The **network infrastructure** is publicly owned and operated by NR which has a single shareholder, the Secretary of State for Transport. The network is operated and maintained through access charges (levied on passenger and freight operators) and a network grant provided to NR as part of a multi-year funding settlement process (known as Periodic Reviews). NR also generates income from its property portfolio.
- The majority of **passenger train services** are operated under publicly-specified franchise contracts let by DfT, Transport Scotland or Transport for Wales. Franchises contain obligations about train services, business initiatives, investment and fares, and the obligations and freedoms given to operators within the terms of franchise contracts – these vary significantly depending on the nature of the franchise and the objectives of the franchising body. There is currently a public sector body directly operating the Intercity East Coast franchise on a temporary basis, as a result of the financial failure of the previous franchisee. In addition to the franchised services, there are a small number of private passenger operators on the network including Hull Trains and Grand Central. These operators do not have a contract with a public authority and operate a very small portion of passenger services.
- **Freight operators** are private sector companies who respond to the needs of freight shippers and the wider freight market. To run they must secure paths on the network for which they pay access charges to NR. Freight operators also receive some financial support for intermodal traffic from ports, in recognition of the significant economic, environmental and social benefits which rail freight delivers for the country by moving heavy and bulky freight off roads and reducing congestion.
- The majority of the **train fleet** in Great Britain is owned by private sector ROSCOs,⁶ and leased to train operators for the duration of the franchise contracts. Again, the model is mixed. Some of the newer fleets have been procured directly by the DfT (or others such as TfL) but financed privately. There were three ROSCOs established at privatisation when the BR fleets were sold, but new entrants have made rolling stock an innovative and competitive market.

- The **Office of Rail and Road** plays a substantial role regulating NR and to a lesser degree the train operators. Its roles include independent safety regulation, the agreement of government funding settlements for NR and economic regulation, and regulation of access and access rights which NR offers to its track access customers (i.e. the passenger and freight operating companies). The regulated framework sets the context within which industry parties operate.

2.5 In addition to these core bodies, there are a number of other railway bodies who are important to the effective working of the railway. These include:

- The **British Transport Police**⁷ is the national police force for the railways providing a policing service to rail operators, their staff and passengers throughout England, Wales and Scotland. It is funded by the train operating companies, freight companies and NR.
- **Community rail partnerships**⁸ bring together local groups and partners from the rail industry with industrial groups to deliver a wide range of rail activities, including bringing station buildings back to life, art and education projects and organising special events, which promote the railway and its relevance to the community.
- **Transport Focus**⁹ exists to ensure that operators, funders and regulators of transport systems put transport users first and is an arms-length body of the DfT. The 2005 Act created a new Rail Passengers' Council as a single national organisation, which became Passenger Focus in 2006, and was renamed Transport Focus in 2014 when it took on responsibilities for user interests in road, bus and light rail.
- The **Rail Safety and Standards Board**¹⁰ was established in April 2003, in response to recommendations made by Lord Cullen following the public inquiry into the Ladbroke Grove accident. It is a non-statutory body which, amongst other things, provides oversight of the rail technical standards. It brings together its members (infrastructure managers, train operators, rolling stock lessors and suppliers) to support shared decisions, products and services. It is structured as a not-for-profit company with its own board.
- The **Rail Delivery Group** (RDG)¹¹ the Rail Value for Money Study undertaken by Sir Roy McNulty¹² recommended the creation of a leadership body to take responsibility for coordinating and leading on cross industry initiatives. RDG was established in June 2011 and includes NR as a member, along with passenger and freight operators. As well as co-ordination functions, it took on the activities that were previously undertaken by the Association of Train Operating Companies, including the settlement of passenger revenues between the different train operators.

2.6 In addition to its role in setting the framework, sponsoring NR and franchising, the DfT has directly funded and sponsored some major rail projects in the period since privatisation. These include the Thameslink Programme¹³ and the Intercity Express Programme.¹⁴ For others, it has created separate public-sector organisations that act as arms' length development, design and delivery bodies, including High Speed 2 Limited,¹⁵ East West Railway Company¹⁶ and Crossrail Limited (which was subsequently transferred to TfL¹⁷).

3. The international landscape

- 3.1 As with Great Britain, railways internationally have been through many changes. Many of them unified privately built rail systems under state ownership and, have subsequently, in many countries, transferred railways to operate at arm's length from government, or privatised elements of the rail system.
- 3.2 One of the earliest countries to break from state operation was Japan. The organisation of its railways has undergone a number of very substantial changes:
- The first major rail nation to introduce high speed rail – in 1964.
 - The first to break up a previously-nationalised state railway into six vertically integrated regional companies.
 - The first to then privatise some of these regional companies, whilst two regional companies (and the freight division) remain in the public sector.
- 3.3 The breakup and privatisation of the Japanese state railway in 1987 was closely followed by the EU's First European Railway Directive in 1991. This signalled the start of major change in railway organisations across Europe, with European state railway networks separating infrastructure management and train operations, and being gradually opened up to competition, with the private sector taking over certain operations – principally train services. New market entrants have typically operated alongside the state operator, on infrastructure which is publicly owned. In all European railways, there is typically an on-going role for government, particularly in respect to funding. Switzerland has not been subject to EU regulation but has taken on the obligation of liberalising its rail market by enacting the EUs rail liberalisation packages.¹⁸
- 3.4 In contrast to Europe and Japan, the USA and Australian rail networks are dominated by private sector freight operators, a fact which reflects the sheer size of their geographies. However, there are some markets in these countries which are more like European-style passenger railways. These include the long distance services operated by Amtrak in the USA and commuter networks within the states of Victoria and New South Wales in Australia.

Key characteristics of the geographic comparisons

3.5 There are inevitably challenges when considering international comparisons:

- National rail systems reflect historical developments, the economies and political choices in those countries, and the geography and distribution of the population served.
- The organisation of rail functions can be closely related to the physical locations and connections between tracks, stations and depots.
- High level comparisons can be misleading if they disguise some of the key differences between countries such as the passenger markets served (for example, long distance, regional and commuter) within each of the countries.

3.6 A number of key characteristics of the geographies are discussed in this section. These start to explore some of the different factors applying in different countries, which we will use to test and develop the recommendations of the review as they are developed (Note: the analysis available is in respect of the United Kingdom rather than Great Britain, and as such includes Northern Ireland).

The networks and their usage

3.7 This section takes a core set of countries and makes some comparison about population, network use and service intensity (figures 2 to 4).

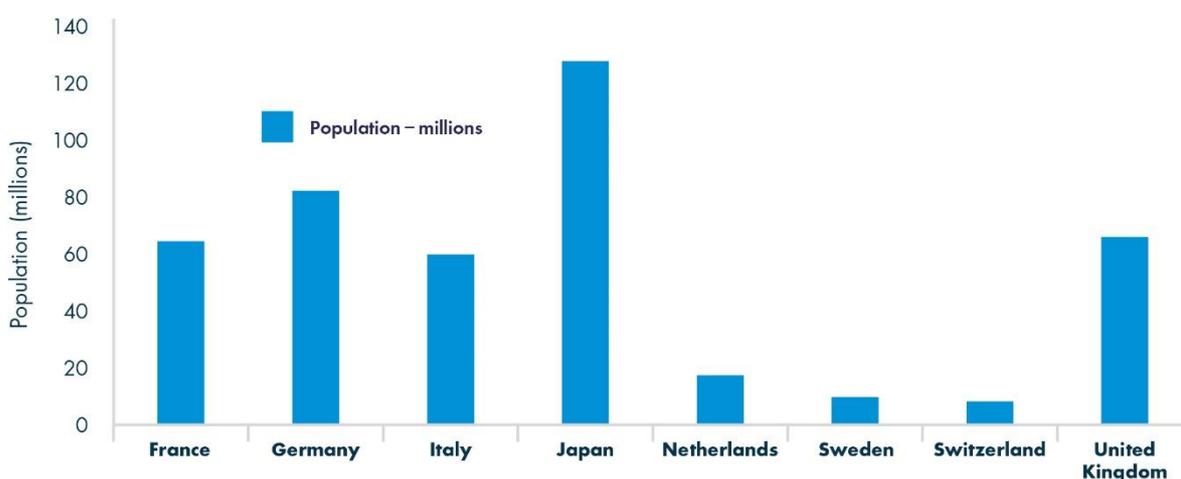


Figure 2. Population of comparator countries (2016)¹⁹

3.8 Japan has a population much higher than the other countries at 128 million. United Kingdom, France, Germany and Italy are broadly similar, and the

sample also includes some smaller countries in the Netherlands, Sweden and Switzerland.

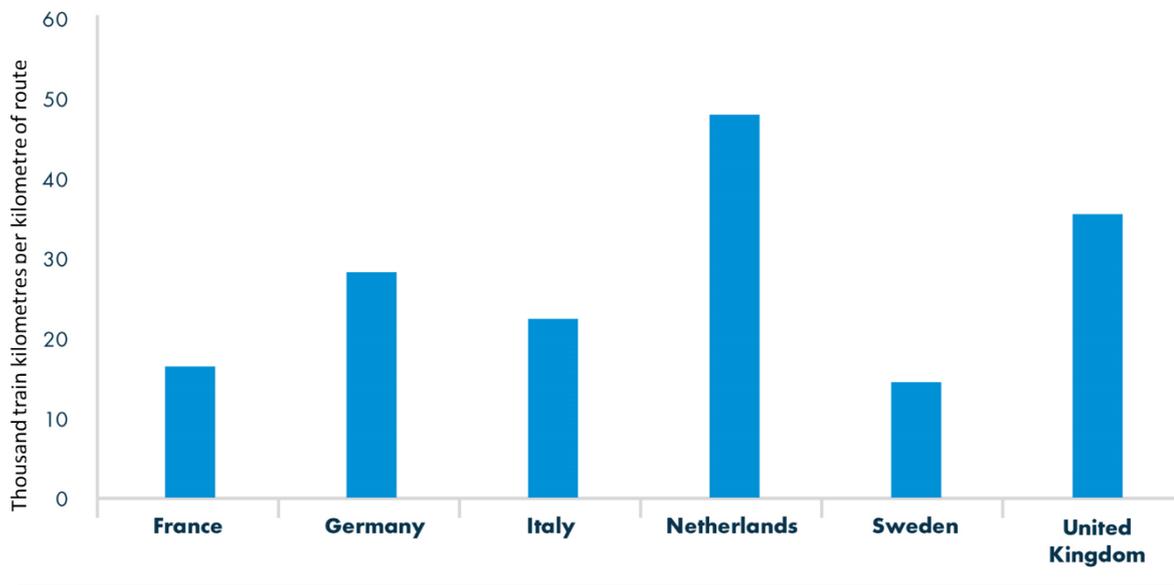


Figure 3. Utilisation of the network in 2016²⁰

- 3.9 Amongst the major European networks included above, the Netherlands has a very high level of utilisation (measured as the number of train kilometres operated in 2016 per kilometre of route). Networks with a higher level of utilisation have more trains competing for the available capacity.
- 3.10 The level of utilisation in the UK, which is already high, is expected to continue to increase above the 2016 level shown in figure 3. The frequency of train services is expected to go up further in response to growing demand – for example, more trains are now operating as a result of the Thameslink programme²¹ which is transforming north to south travel across London.

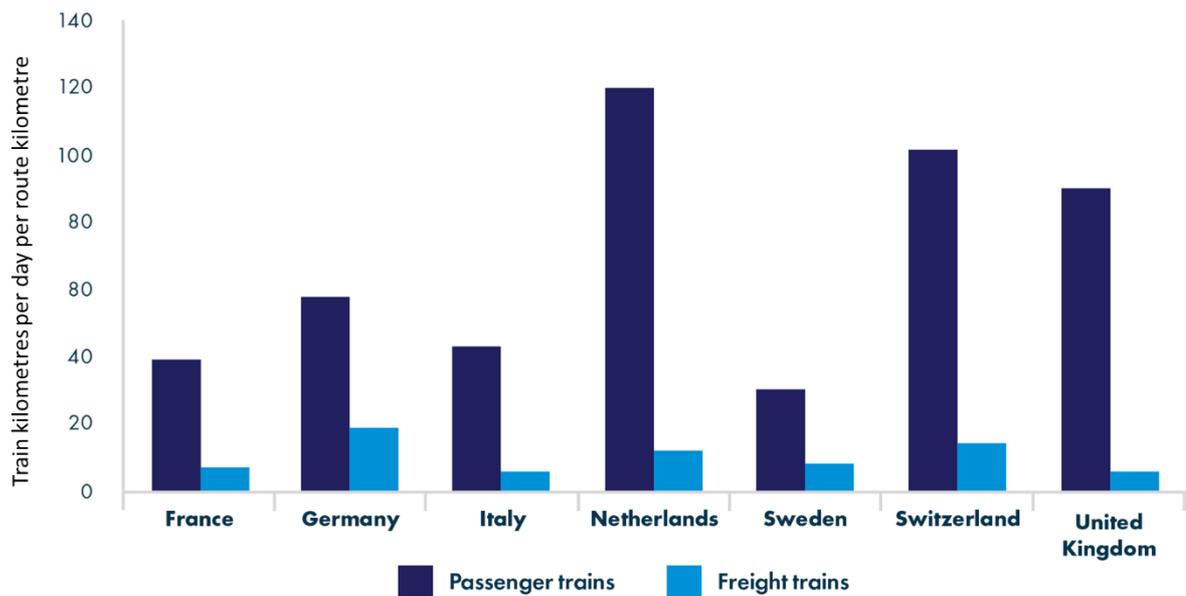


Figure 4. Network usage split by passenger and freight in 2016²²

3.11 How intensity of use varies between passenger trains and freight trains is shown in figure 4. The high passenger intensity in Switzerland reflects the relatively high level of use of public transport in Switzerland and a timetable run on consistent intervals (the clock-face timetable) introduced in 1982. High intensity, high modal share and a clock-face timetable is consistent with the Netherlands. Whilst the UK uses its overall network less intensively than Switzerland and the Netherlands, the UK railway stands out in comparison to the other larger European nations. Germany, Italy and France all have rail networks with a much lower intensity of passenger train usage than the UK.

3.12 Germany, along with the Netherlands and Switzerland, has a relatively high level of freight usage compared to the other countries shown in figure 4. This reflects their more central geographic position within Europe, which increases the number of east-west and north-south freight movements.

Passenger growth and investment

3.13 The countries we have examined also vary in how much rail travel has grown in recent decades. Figures 5 and 6 compare growth, and set out the investment which has gone into expanding and improving the railway so it can carry more people and provide new journeys.

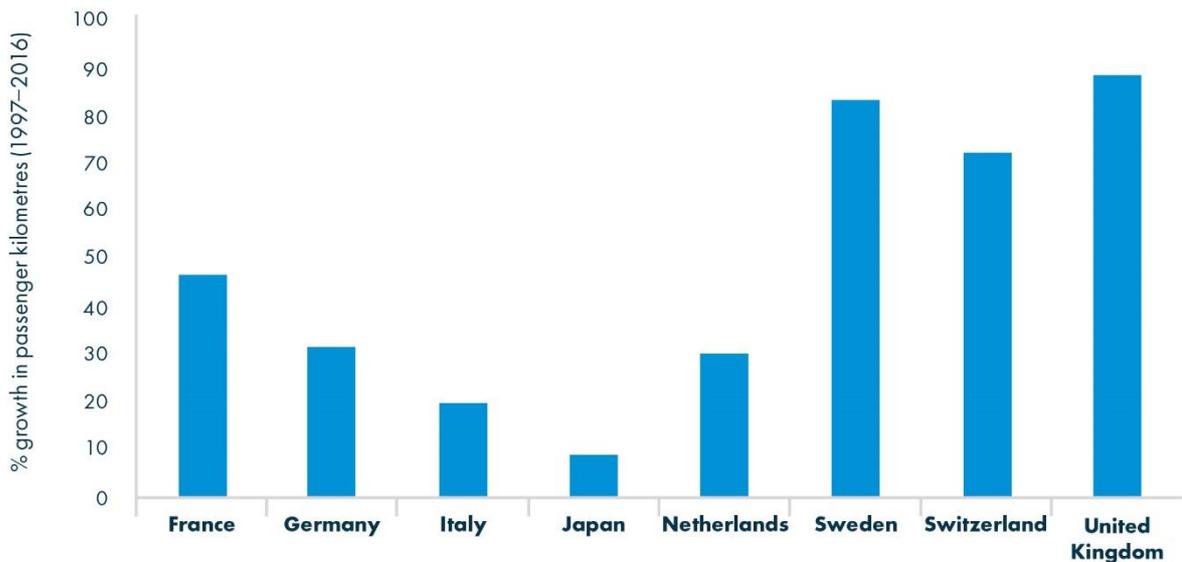


Figure 5. Growth in passenger kilometres between 1997 and 2016²³

3.14 The growth of rail passengers and freight traffic is typically linked to changes in gross domestic product (GDP) and demographic trends. It is also affected by wider factors that change people’s travel choices, notably the cost of petrol. However, the relationship between these factors and passenger growth is complicated. Between 1997 and 2016, passenger kilometres in the UK have grown by 89%, which is higher than other countries in the comparison. This is only partly explained by GDP growth and the relevant demographic and economic factors, and is influenced by the low base level of mode share that rail has in the UK from which to grow.

3.15 The level of UK growth is closely followed by Sweden, which has a blend of public and private operators and has grown 84%, and Switzerland, which operates a predominantly state-owned railway and has grown 73%. Other European comparisons which we have considered range between 20% to 47%, with Japan’s increase being much less at 9%. This is likely to reflect the already high modal share of rail travel in Japan and declining population.

3.16 High levels of passenger growth inevitably increase pressure on the rail systems and their performance. This is due to the pressure to run more services, longer trains or increased dwell time at stations so passengers can get on and off trains.

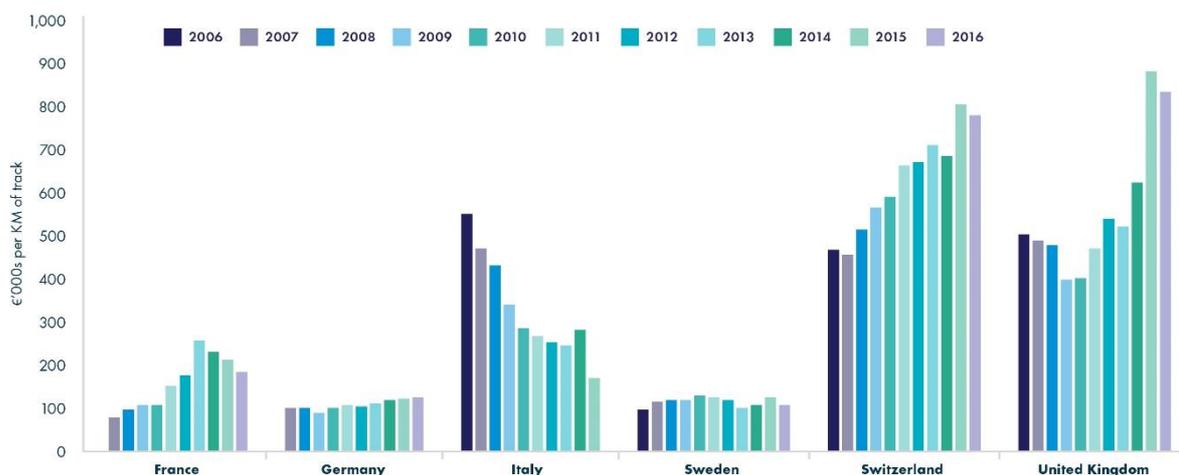


Figure 6. Expenditure on infrastructure in rail per KM of track²⁴

**Note: the above comparison should be treated as illustrative only, for example, it does not take into account the return on the investment and the complexity of infrastructure enhancements*

- 3.17** In response to historic lower levels of investment and significant growth since 1997 on what is already a highly utilised network, the UK has sustained a significant programme of investment in rail infrastructure, as shown by the increasing trend in Figure 6.
- 3.18** As can be seen in Figure 6, UK investment levels are significantly higher than other European countries shown except Switzerland. The Swiss have continued to invest significantly in their network in order to achieve a high-performance level and greater network resilience. Other countries, given the levels of passenger growth and historic spend, may be in a position where higher levels of spend will be required in the coming years. For example, in January this year, Deutsche Bahn issued its 'Five-point plan for 2019'²⁵ aimed at increasing capacity to handle future traffic. This includes greater investment in the network (e.g. €1.1 billion on digital infrastructure), along with other operational initiatives such as more employees in depot facilities, and better management of construction sites.
- 3.19** The high levels of infrastructure investment in the UK reflect real world maintenance and renewal activities, and ongoing engineering work on the track, on systems and at stations. These works require access to the network, and can require the closure of tracks, train diversions or speed restrictions so work can get done. As passengers know only too well, engineering works cause disruption at weekends or with major closures, and over-running works can have unexpected impacts that affect many journeys. The introduction of new rolling stock (such as the Thameslink Class 700 fleet and the Intercity Express Trains) also create challenges

and can cause disruption. Investment therefore represents a benefit and a risk. It's important to securing service improvements and improving asset condition, but it can have a shorter-term impact that disrupts passengers and freight operators.

Performance and satisfaction with the railway

3.20 Performance and reliability are a key area where comparisons between different railways provide importance context about our railway services. The data shown in this sector covers the latest periods and geographies for which reliable comparable international data exists. However, of course, the disruption experienced by many UK passengers in 2017 and 2018 – most notably in the North and on Thameslink services in Summer 2018 – will not be shown in these comparisons.

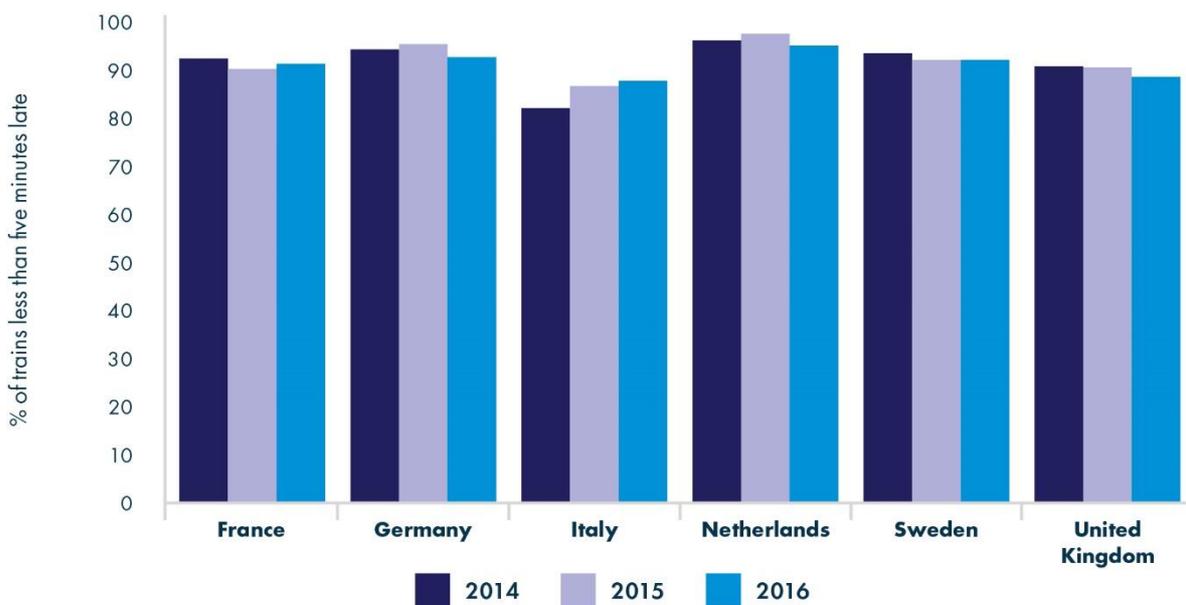


Figure 7. Punctuality of regional and local passenger services ²⁶

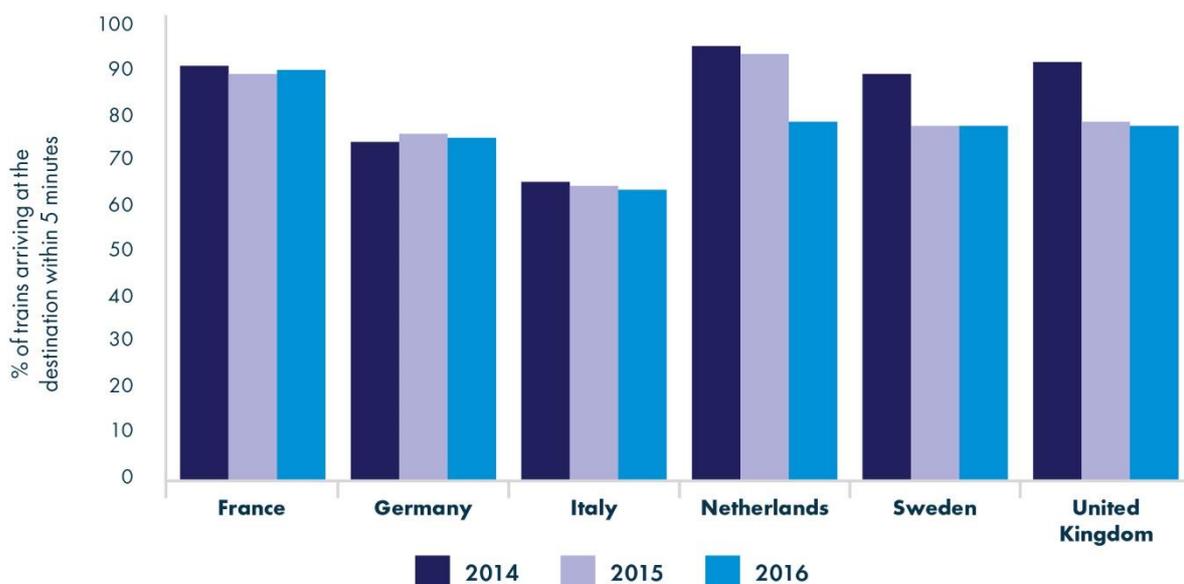


Figure 8. Punctuality of long distance services (2014-2016)²⁷

**Note: the countries were asked to report the proportion of services that arrived within 5 minutes of their schedules arrival time. There are some variations in methodology, such as some countries reporting using a threshold of 5 minutes precisely, and others 5 minutes and 59 seconds, or recording of punctuality at intermediate stations rather than at route end. For long distance services, the requested threshold was 15 minutes in 2014 and 5 minutes thereafter.*

3.21 This comparison shows that the punctuality (as an important measure of performance for the passenger) of the UK's regional services lagged behind those of other countries in 2016 (2016: UK 88% compared to France 90%; Germany 92%, Netherlands 94% and Sweden 91%), and worsened from 2014 to 2016 as shown in Figure 7. However, long distance punctuality performance in the UK was comparatively better in 2016 – at 78%, being the same as Sweden and in line with the Netherlands (79%), and higher than both Germany (75%) and Italy (63%). France performance is notably higher at 90% in 2016.

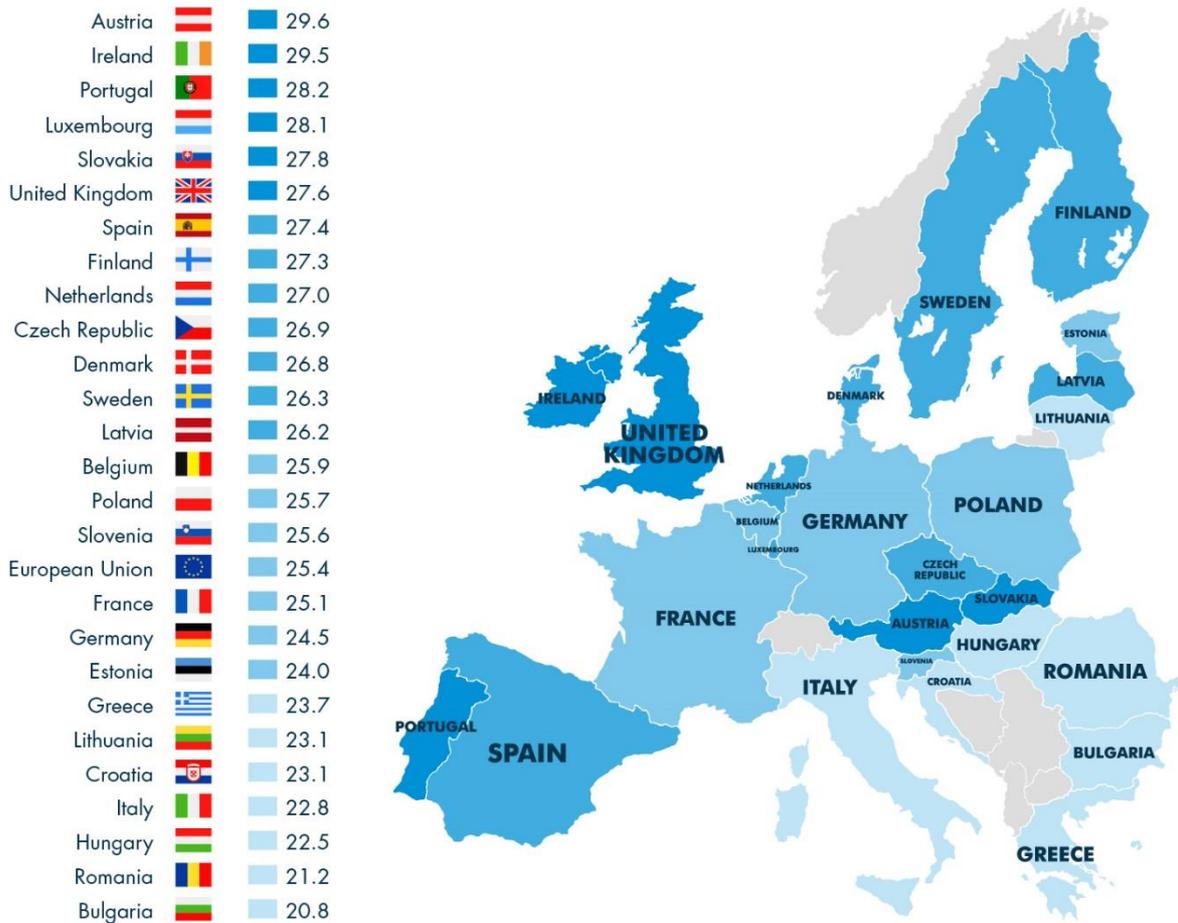


Figure 9. Overall population satisfaction index with railway transport (2018)²⁸

3.22 In 2018, the EU commissioned a survey, the Flash Eurobarometer 463, on satisfaction with passenger rail services in member states²⁹. It covered: rail services including buying tickets and train stations; getting information and handling complaints; the availability and reliability of trains and seats; services on trains; accessibility (stations and trains); and, assistance for persons with reduced mobility.

3.23 This survey placed the UK in the top quartile along with Austria, Ireland, Luxembourg, Portugal and Slovakia.

4. Models and structures

4.1 This chapter considered the differing organisational approaches adopted in a number of countries. Features considered include the mix of public and private sector involvement in the railway; different approaches to either aligning or separating out infrastructure and train service operations between different organisations; and the degree of devolution to local bodies that exists within each model.

Most railways have a mix of public and private sector involvement

4.2 The evolution of railways around the world has been influenced by changing political environments and the markets served, along with the desire, in some countries, for competition and a general pressure for better performance for the passenger.

4.3 It is notable that the delivery of train services in every country is typically provided through a mixture of public and private entities, albeit to varying degrees.

4.4 The organisational and legal structure of the rail networks in Europe is shaped by EU legislation. There have been four consecutive “packages” of EU legislation, aimed at gradually opening up rail markets to competition. The most recent “fourth railway package”³⁰ establishes the general right for railway operators established in a Member State to operate passenger services anywhere in the EU. It also lays down enhanced rules aimed at improving impartiality in relation to access to railway infrastructure and the charges levied for such access, and reinforces the requirement that public service contracts in rail (e.g. franchises) should be subject to a competitive tender process, except in specific (now more limited) circumstances.³¹

4.5 This is expected to result in increasing private sector involvement in Europe, through tendering for public service contracts for the running of passenger services. The legislation does, however, provide scope for contracts to be awarded directly (i.e. without competitive tendering), including to public bodies, in certain circumstances.

4.6 Other countries, outside the EU, also have a mixture of public and private sector involvement in delivering an operational railway, although in a variety of ways. For example: Japan has a number of private sector railway companies responsible for running both the infrastructure and train services

as a fully integrated company in some regions, alongside two such companies that are owned by the public sector. The USA has an intercity service provider, Amtrak, which is effectively government-owned, operating predominantly on track owned by private rail freight operators.

Country	Public sector	Private sector *
Australia	Long distance services and regional services predominantly State owned. Infrastructure government owned	Some suburban services operated by private sector companies along with freight
France	Government owned SNCF holding company, with functionally separate track and train companies	Rail freight open to competition and regional passenger services may follow
Germany	Government owned Deutsche Bahn holding company, with functional separation of track and train	Regional State tendered concessions, with new private sector entrants. Small amount of long distance under open access
Italy	RFI and Trenitalia are government owned, as part of Ferrovie dello Stato Italiane, with functional separation of track and train	NTV offers competition on high-speed rail
Japan	Broken up and privatised (fully integrated), albeit with loss making regional railway companies remaining in public ownership	Number of regional and commuter railways are private companies with significant business outside rail
Netherlands	Owned by the government, ProRail provides the infrastructure and Nederlandse Spoorwegen (NS) provides the majority of the passenger services	Small regional private contracted passenger service companies exist albeit very limited
Sweden	Track and train separated, with train operations privatised, but infrastructure in public ownership (including majority of stations)	Long distance services run as open access or under contract. Regional and suburban services under contract from regions
Switzerland	SBB is the largest operator and is publicly held. SBB also manages the infrastructure	Some freight operators, especially those operating trans-alpine
United Kingdom	Separated and privatised by function, with track now back in public ownership. Currently Intercity East Coast franchise under public operation	Passenger services franchised to private operators, freight services privatised along with rolling stock lease companies. Some long distance open access operators
USA	Amtrak, which is effectively government owned, provides intercity services across track	The freight operators are private and are vertically integrated owning their own

	typically owned by freight operators and also owns some track upon which it operates. Regional / commuter services (not Amtrak) are mostly operated by States	track (although they trade access with each other). Some regional suburban / commuter services contracted out to private operators
--	---	--

Table 1. Summary of public and private sector roles in comparator rail systems

**Private operators also includes operators owned by foreign governments*

4.7 For countries we have considered outside Japan and the USA, there has, in the main, been a move towards the provision of train services by private sector operators, although in no country is it as significant as the UK. The UK's transition to the private sector operation of trains in the 1990s was very rapid. Other countries have taken a more gradual approach, with this transition continuing today as EU legislation evolves.

Different approaches to track and train alignment exist

4.8 The EU's Fourth Railway Package Market Pillar Directive³² seeks to enable competition either for or in the market for train service delivery by mandating the separation of the infrastructure manager activities from those of the passenger and freight operators. Scope still remains though, subject to certain conditions, for cooperative arrangements between the infrastructure manager and operators where these are aimed at facilitating reduced costs or improved performance. The subcontracting to operators of development, maintenance and renewal works is also permitted, so long as the infrastructure manager supervises this and retains ultimate responsibility.

4.9 As a result of the legislation and the evolution of railway structures in Europe, there are a number of approaches used in different countries:

- France – currently integrates track and train responsibilities at a holding company level through SNCF, which is owned by the government. The infrastructure and operating passenger and freight services are separated, run by SNCF Réseau and SNCF Mobilités respectively. There is some regrouping currently underway (e.g. station infrastructure being bought into SNCF Réseau).
- Germany – the German network is integrated at a holding company level, Deutsche Bahn (DB), but technically separated through different entities within the group, including the infrastructure manager (DB Netze), station

operations (DB Netze Stations) and passenger services (DB Regio / DB Fernverkehr) each having their own profit and loss accounts and separate boards.

- Italy – the Italian rail service is provided through Ferrovie dello Stato Italiane (FSI) which includes Trenitalia (majority train service operator) and Rete Ferroviaria Italiana (RFI, the infrastructure manager), along with other subsidiaries that manage stations and provide technical services. The infrastructure and train operations, whilst technically separate, in practice work very closely together.
- Sweden – operates a clearly separate rail system. Trafikverket is the state-owned infrastructure manager for rail (and other modes including roads), responsible for path allocation, traffic control and track access charges. Passenger services are run by a mix of open access operators and competitively tendered contracts (although direct awards are possible). Stations and property are managed by a separate government owned business, Jernhusen.
- Switzerland – whilst not a member state of the EU, there is some degree of organisational separation between SBB as infrastructure manager and the train operations. In practice, all passenger services are provided under forms of concessions, with SBB being the largest operator. SBB is wholly owned by the Federal Office for Transport.
- Netherlands – operates a vertically separate rail system, with the infrastructure owned and run by ProRail, and the train operations being predominantly run by Nederland's Spoorwegen (NS) which are both government owned. ProRail and NS were separated in 2003, but discussions continue in the Netherlands about the best way to co-ordinate the activities.

4.10 Three broad models capture the different approaches in Europe:

- Full separation, with the infrastructure and the train operations run by separate companies with no common ownership at a holding company level: the Netherlands; UK; Sweden.
- Full separation, with infrastructure and train operations run by separate companies under a common holding company, but the companies maintain their own strategy and finances: Italy.
- Separation of infrastructure and train operations under a holding company, but in practice still controlled by the holding company which has the overall strategy and finances: France; Germany.

4.11 As noted above, the EU is unique in requiring such separation between the infrastructure manager and train operations. In other countries, different approaches have been adopted, for example:

- Japan – track and train operations are combined under single leadership as fully integrated railway companies, with an overall profit and loss account and single management responsibility. Infrastructure and train services are operated, planned and managed together enabling decisions to be made quickly.
- USA – Most of the USA rail network is owned and operated by private freight operators. However, intercity passenger operations run by Amtrak (effectively government owned) are predominantly operated on tracks owned by freight operators or state agencies (it owns 1,003 kilometres of track in the Northeast Corridor between Boston and Washington D.C., albeit a small proportion of the track upon which it operates).

4.12 Where there is a heavily utilised network, for example in Switzerland and Japan, in practice there is close cooperation between the infrastructure and train operations.

National and local decision making varies, but typically follows the political landscape

4.13 The rail systems that have been considered are national networks and therefore substantially operate under a national transport ministry, and have national regulatory bodies and national standards.

4.14 To a greater or lesser extent all have a regional element, although the scale of this typically reflects the extent to which political devolution and regional decision-making is prevalent in a given country. Typically, the role of regional bodies in specifying and procuring rail services is greater where the bodies have both budget responsibility and democratic responsibility for representing the passenger. For example:

- Germany – Has a relatively evenly spread population across the country with a strong regional government structure. There are a number of public transport tendering authorities and they mostly operate independently although there is a national organisation BAG-SPNV that is intended to share best practice. The authorities vary in size and are funded by the German States who in turn are funded by the Federal Government. However, States are able to provide more funding if they wish. Long distance services are operated on a national basis by DB Fernverkehr and are not subject to competitive tendering. Competing operators can also access the railway on an open access basis, but in practice this is minimal.
- Italy – Trenitalia, which runs the majority of the train services is government owned and operates intercity services and overnight train services under a 10-year contract (signed January 2017³³). Local services are let by regional authorities, although to date contracts have only been let to either Trenitalia

or Trenitalia dominated joint ventures (except a few minor local lines). The infrastructure manager operates on a national basis.

- Sweden – Sweden also has a substantial degree of political devolution. Contracting for local services is undertaken at county level, through a number of public transit authorities. Longer distance services are let by the national transport agency or operate on an open access basis. A standard tendering process had been developed to drive consistency. The authorities are also responsible for tendering local bus contracts and as such can, and do, take a wider view of transport solutions. This has enabled integration of transport modes in larger counties. There are instances where the authorities have cooperated with each other to consider depot capacity, rolling stock, traffic planning and to pool resources.
- Switzerland – Switzerland has strong political devolution to its cantons, however SBB, the largest operator, is controlled by the central government. BLS is the other main operator which is majority owned by the canton of Berne. Recognising that there is a need for certain solutions to be delivered on a network wide basis (such as digital signalling), further reform is underway to give enhanced ‘system management’ powers to SBB to act to develop such solutions across the national network.
- France – the French state railway, SNCF, has been restructured into functional organisations to separate long distance, regional and infrastructure services. However, SNCF remains the dominant operator and the French rail market has yet to see new entrants for domestic passenger services.
- Netherlands – the former state railway, NS, has been restructured so that the infrastructure is managed by ProRail and the freight business sold. The network is among the most intensely used in Europe so coordination is important.

4.15 In Japan, the national network was broken up into six regional companies that operate both the infrastructure and the train services, and one nationwide freight company. These compete with private railway companies with significant businesses outside of rail, notably real estate, shopping centres and retail. This structure was created to enable the privatisation of the system rather than devolution. Four of the six large regional companies have been listed on the stock exchange. They are responsible for fares (within regulated boundaries), and timetables, taking into account the master plans agreed with government.

4.16 In Australia, the provision of rail services is driven at the State level which is responsible for policy making, funding and contracting passenger services where applicable. In practice most passenger services are State run.

- 4.17 Regional devolution allows decisions to be made more locally, and – under some systems – can help integrated transport authorities plan across modes. However, it is recognised that effort has to be made to ensure coordination between regions and with long distance services in order to ensure the rail network as a whole works. Coordination is a live issue in several railways, and there are instances where better coordination is currently felt to be required (principally regarding timetabling, capacity allocation and ticketing). Even where significant decisions are devolved to regional passenger transport authorities, central governments often do have a role. This varies, from simply providing the funding to the regions, through to setting overall policies and specifying rail services.
- 4.18 One of the challenges encountered with a regional approach is the risk of not being able to secure the necessary skills and expertise across the network. This appears to be harder to achieve if there is no national railway operating company remaining. It is notable that, in Germany, the national role of Deutsche Bahn provides an effective national champion that – subject to adequate funding by the Federal Government – is able to retain skills and expertise and develop network-level strategies, for instance on digitalisation.

5. System approaches

5.1 The previous chapter reviewed the differing organisational structures in rail. This chapter considers different operational approaches adopted within various overseas railway systems. It examines the different approaches employed to performance management, timetable planning, contracting of delivery partners, and the handling of infrastructure investment.

Performance challenges are not unique to the UK

5.2 Rail systems are complex. The UK has seen performance challenges, especially on the intensively used parts of the network. This has helped drive the infrastructure investment programme, which is often intended to expand capacity, which should reduce pressure on assets and help improve performance (see figure 6). As noted above, however, the volume and scale of new fleet and engineering work in itself creates risks of disruption.

5.3 A number of the other rail systems internationally are facing similar challenges, albeit to varying degrees. This situation in other countries is in part due to:

- Relatively low levels of historic maintenance and renewals spend over recent years, which has resulted in more challenges to performance levels. Programmes of investment appear to be required, as demonstrated by the recent 'Five-point plan for 2019' announced by Deutsche Bahn in Germany.³⁴
- New rolling stock introductions have impacted performance or hampered growth, principally from delays in their introduction, for example, the delayed delivery of the new ICE trains on the German network,³⁵ and new trains delivered late in the Netherlands which were eventually withdrawn from service.³⁶ This is consistent with the delay to the introduction in the UK of new fleets such as the new Class 700 Thameslink trains.³⁷

5.4 There are a number of factors specific to infrastructure in other countries that almost certainly play a role in higher performance levels and help build more resilience in the system compared to the UK. These include:

- The level of network utilisation in a number of major European countries (France, Germany, Italy and Sweden – see figure 3) – is significantly less than in the UK. This factor could reduce the impact of knock-on delays.

- In some cases, routes have been strategically enhanced over time to have four-track railway running which enables fast and slow trains to be run on separate tracks and provide greater resilience particularly on congested parts of the network (for example, in the Netherlands on routes between Leiden and the Hague). There are parts of the UK network that have four tracks, although some congested routes into cities have two tracks (for example, the route into Leeds from Doncaster on the East Coast Mainline).
- Many networks make greater use of separating tracks that cross each other through the use of bridges (referred to as grade separation) rather than having flat crossings, which impact performance. The Thameslink programme is an example of a major project which sought to untangle the tracks on some of the most congested track in the UK.³⁸
- Those countries with historically high levels of investment in the network, for example in Switzerland as noted above in Figure 6 (Expenditure on infrastructure in rail per kilometre of track) has resulted in higher levels of performance.

5.5 Performance of rail networks are impacted by many factors, including the infrastructure (for example, its age and layout) and the approach to operations on it. The heavy utilisation of the network in UK means there is an increasing need for mitigations to tackle performance, which could, amongst other things, be through:

- Targeting capital expenditure to provide greater capacity or resilience to the network (such as grade separation noted above); or
- Balancing intensity of usage with performance, although reducing existing service levels is a difficult trade off once services are being delivered.

There are trade-offs between stability and flexibility in timetable planning

5.6 A number of countries adopt a very long-term approach to setting timetables – this enables stability in the delivery of the timetable, but also provides time to plan timetables in detail and implement infrastructure enhancements to deliver a timetable prior to their launch. Two notable examples include:

- Switzerland – establishes the timetable six years out and once agreed it is binding – changes are achieved in relatively small steps rather than significant timetable recasts. In addition, Switzerland operate timetables as regular intervals with the same peak and off-peak service (except for some S-Bahn routes which have a higher peak service) which minimises the variability in timetabling. The timetable is also focused on enabling good

connections for passengers at key hubs. This approach has led to a well-integrated and high performing system with good connectivity.

- Netherlands – like Switzerland, the Netherlands has a timetable operating at regular intervals where major timetable changes are rarely made. Changes that do happen are planned several years in advance and subject to widespread consultation. Given the high service frequencies that operate and the focus on interchanging between trains then substantial change to timetables is more difficult and takes time to implement.

5.7 This approach to timetable setting prioritising regular intervals and connections of key hubs has trade-offs in terms of longer journey times and limiting flexibility, making it harder to respond to shorter-term changing market demands or passenger preferences, and so ruling out changes to timetables on a more frequent basis. In addition, substantial changes are more difficult on more intensely used networks given increased interactions.

5.8 In the UK, significant projects are being planned and delivered – for example, infrastructure enhancements in the North of England, and the phased launch of High Speed 2, which will have a major impact on timetables. Notwithstanding, a longer-term approach which positions a timetable as the primary objective along with connections rather than simply filling the network space, could provide a different way to approach network design.

Regional services are typically let under concessions with a variety of approaches to longer distance

5.9 The franchising system in the UK, for both long distance and regional services, is typically focused on driving revenues through sharing the risk associated with revenues with the operator. There are no examples from the countries considered of competitively tendered contracts of such high value as the UK.³⁹ In addition, UK contracts are let directly by the government, which is typically the role of an authority in other countries.

5.10 Such services are either not competitively tendered or, when they are, they are relatively small concessions for regional services, let by regional authorities in the countries. These are typically for specific routes, for example, the recently awarded ‘Augsburger Netze’ route concession, rather than the larger geographies covered by the franchises in the UK. These concessions are typically gross cost contracts, where the operator has the risk relating to the cost of delivery but not the passenger revenue risk. Rather than transferring passenger revenue risk, these contracts often contain some limited payments or incentives aimed at giving the operator

some interest in overall revenue growth. In the UK, this is similar to the model used on the London Overground contract let by TfL. These contracts require the authority to set out exactly what it wants to be delivered. The passenger transport authorities are therefore typically responsible for fares and marketing, as well as train service patterns.

- 5.11 Alternative approaches are adopted for long distance services, for example in Sweden, where contracts are structured on a net cost basis with the operator carrying both revenue and cost risk. In most instances, whilst the regional services are subject to contracts, the longer distance services are still run by the state operator, such as Deutsche Bahn in Germany, although there is some open access provision in Sweden and Italy.
- 5.12 In Japan, the private railway companies are responsible for the infrastructure and the delivery of passenger services. Whilst they have the ability to react to change most people believe it would be highly unlikely in a Japanese context that that services would ever be cut in the event of reducing revenues, as this would not be culturally acceptable. The structure of these companies, however, contains some degree of protection against the economic effect of the declining population in Japan. In addition, the main railway companies generate a significant amount of other revenue from non-rail sources such as property development which provides them with more stability than rail-only companies would have.

Certainty of long term funding of infrastructure is important

- 5.13 Funding of rail infrastructure in the UK is determined as part of the five-year control period review, whilst funding for franchising and projects is handled as part of government spending reviews. The separate organisations in UK rail each have separate financial frameworks, either set via contracting (for the train operators) or via funding agreements.
- 5.14 Typically, in other rail networks across Europe a longer-term view is taken, albeit sometimes with review points:
- Germany – has a Federal Transport Infrastructure plan covering a timeframe of 10-15 years and currently runs to 2030, with the funding level agreed every five years.
 - Sweden – the national infrastructure plan covers 12 years and is updated every fourth year (current plan to 2029). This plan is focused on wider transport to ensure the most efficient transport system for passengers.

- Switzerland – has a 10-year funding cycle for infrastructure (the proposed programme between 2025-2035 has been recently announced).
- 5.15 Often the funding of infrastructure is substantially ringfenced from that applied to deliver the train services, which enables stability and clarity, particularly for the infrastructure.
- 5.16 The private companies in Japan operate without direct subsidy, although there is indirect subsidy to fund infrastructure investment.

Endnotes

-
- ¹ <https://www.legislation.gov.uk/ukpga/1993/43/contents>
- ² <https://www.legislation.gov.uk/ukpga/2005/14/contents>
- ³ For the Wales and Borders services in England the Secretary of State remains the Franchising Authority with the Welsh Government acting as agent.
- ⁴ Office of Rail Regulation changed its name to the Office of Rail and Road to reflect new responsibilities with effect from 1 April 2015. <https://orr.gov.uk/highways-monitor/news-and-media/email-alerts/2015/office-of-rail-regulation-to-be-re-named-office-of-rail-and-road>
- ⁵ <https://www.networkrail.co.uk/who-we-are/putting-passengers-first/>
- ⁶ <https://orr.gov.uk/about-orr/who-we-work-with/industry-organisations/rolling-stock-companies>
- ⁷ <https://www.btp.police.uk/>
- ⁸ <https://communityrail.org.uk/community-rail/community-rail-partnerships/>
- ⁹ <https://www.transportfocus.org.uk/about/history/>
- ¹⁰ <https://www.rssb.co.uk/Pages/about-us.aspx>
- ¹¹ <https://www.raildeliverygroup.com/about-us.html>
- ¹² <https://www.gov.uk/government/publications/realising-the-potential-of-gb-rail>
- ¹³ <https://www.thameslinkprogramme.co.uk/>
- ¹⁴ https://en.wikipedia.org/wiki/Intercity_Express_Programme
- ¹⁵ <https://www.hs2.org.uk/>
- ¹⁶ <https://eastwestrail.co.uk/>
- ¹⁷ <https://www.crossrail.co.uk/about-us/>
- ¹⁸ https://ec.europa.eu/transport/modes/road/non-eu-countries_en
- ¹⁹ United Nations population data (2016)
- ²⁰ RMMS Databook (2019)
- ²¹ <https://www.thameslinkprogramme.co.uk/about-us>
- ²² Independent Regulators Group – Rail (2018)
- ²³ OECD Data
- ²⁴ Investment: OECD Data <https://data.oecd.org/transport/infrastructure-investment.htm>; Track length: <https://ec.europa.eu/eurostat/data/database>
- ²⁵ <https://ir.deutschebahn.com/en/news-presentations/news/detail/deutsche-bahn-fuenf-punkte-plan-fuer-das-jahr-20190/>
- ²⁶ RMMS Databook (2019)
- ²⁷ RMMS Databook (2019)
- ²⁸ Flash Eurobarometer 463 on Europeans' satisfaction with passenger rail services, 2018
- ²⁹ <https://utk.gov.pl/download/1/45607/fl463.pdf>
- ³⁰ https://ec.europa.eu/transport/modes/rail/packages/2013_en
- ³¹ The relevant part of Regulation 1370 which sets out the requirement for competing contracts comes into full effect from 3 December 2019
- ³² Directive (EU) 2016/1370
- ³³ <https://www.railjournal.com/passenger/main-line/trenitalia-signs-10-year-intercity-contract/>
- ³⁴ <https://ir.deutschebahn.com/en/news-presentations/news/detail/deutsche-bahn-fuenf-punkte-plan-fuer-das-jahr-20190/>
- ³⁵ <http://www.spiegel.de/international/germany/german-rail-warns-of-delays-due-to-siemens-delivery-problems-a-868763.html>
- ³⁶ <https://www.railwaygazette.com/news/high-speed/single-view/view/fyra-dispute-settled-as-ansaldobreda-buys-back-v250-trainsets.html>
- ³⁷ <https://www.nao.org.uk/wp-content/uploads/2017/11/Update-on-the-Thameslink-programme-Summary.pdf>
- ³⁸ <https://www.thameslinkprogramme.co.uk/improvements/bermondsey-dive-under>
- ³⁹ Note: the relevant part of Regulation 1370 which sets out the requirement for competing contracts comes into full effect from 3 December 2019