International whole industry including train operating cost benchmarking

Final report to the Rail Value for Money Study

Department for Transport / Office of Rail Regulation

Hamburg, May 9th, 2011
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</table>
The Whole Industry Cost Benchmarking is part of DfT's and ORR's "Value for Money"-studies

Background

• The aim of the study is to examine railway systems in GB and other European countries and to compare costs, revenues and outputs

• The scope of the study mainly encompasses
  – The identification and breakdown of whole industry costs, consisting of infrastructure, train operations and rolling stock
  – The application of normalisation procedures to make costs comparable across countries
  – The identification of staff employed in different functions, including the cost for employment
  – The outputs produced in each country such as train kilometres, passenger kilometres and tonnage, including development over time
  – The funding and revenue streams of each country and the flow of financial means
  – The underlying frameworks in the different countries, for example market structures, allocation of responsibilities and different accounting treatments
A large share of the data and information has been provided directly by the railways

Approach (1 of 2)

• The study is based on data and information from a total of four "core countries" (GB, France, Sweden and The Netherlands) and supplementary information from Germany and Switzerland, covering a large number of infrastructure managers, train and freight operators as well as rolling stock providers

• However, the approach to collect and discuss the data varies from country to country:
  – GB
    Data has been provided by DfT/ORR on 19 train operating companies, data from Network Rail has been collected through a questionnaire
  – Germany
    The focus has been on the effects of public tendering services in regional services; the data has been based on research
  – France
    Data have been provided by the infrastructure manager RFF and by SNCF through a questionnaire
A large share of the data and information has been provided directly by the railways

Approach (2 of 2)

– Sweden
   The data on Sweden's infrastructure have been provided by Trafikverket through a questionnaire; data on SJ had to be gathered through research

– Switzerland
   Data on Switzerland have been used partially and were collected through publicly available sources

– The Netherlands
   Both Nederlandse Spoorwegen as ProRail have provided their data and information through a questionnaire

• Generally, data were requested for the year 2009

• For France, Sweden and The Netherlands data completeness and consistency was assured by the means of meetings and personal contacts to discuss the input

• We are very grateful for the contribution made by all peers and DfT's/ORR's value for money-team. Without their intensive support this study would not have been feasible
For the evaluation GB's nineteen train operating companies have been grouped into three categories

**Grouping of TOCs**

<table>
<thead>
<tr>
<th>London and South-East Operators (LSE)</th>
<th>Intercity (Long Distance) Operators</th>
<th>Regional Operators</th>
</tr>
</thead>
<tbody>
<tr>
<td>• c2c</td>
<td>• Cross Country</td>
<td>• Arriva Trains Wales</td>
</tr>
<tr>
<td>• Chiltern</td>
<td>• East Coast</td>
<td>• First Great Western²</td>
</tr>
<tr>
<td>• First Capital Connect</td>
<td>• East Midlands Trains</td>
<td>• Merseyrail</td>
</tr>
<tr>
<td>• First Great Western¹</td>
<td>• First Great Western²</td>
<td>• Northern</td>
</tr>
<tr>
<td>• London Midland¹</td>
<td>• Virgin Trains</td>
<td>• Scotrail</td>
</tr>
<tr>
<td>• London Overground</td>
<td></td>
<td>• Transpennine</td>
</tr>
<tr>
<td>• Nat. Exp. East Anglia³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• South West Trains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Southeastern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Southern</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Classified by DfT as both LSE and regional, here grouped as LSE
2) Classified by DfT as 33% LSE, 26% regional, and 41% IC (based on train mileage)
3) Classified by DfT as both LSE and IC, here grouped as LSE
The sample of companies covers more than 80% of infrastructure and passenger train operation in each country.

**Market coverage (1/2)**

<table>
<thead>
<tr>
<th>Country</th>
<th>Infrastructure track-km of national total [%]</th>
<th>Passenger train-km [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>GB</td>
<td>99%&lt;sup&gt;1)&lt;/sup&gt;</td>
<td>95%</td>
</tr>
<tr>
<td>France</td>
<td>100%&lt;sup&gt;2)&lt;/sup&gt;</td>
<td>100%&lt;sup&gt;2)&lt;/sup&gt;</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>100%</td>
<td>85%</td>
</tr>
<tr>
<td>Sweden</td>
<td>89%</td>
<td>62%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>85%&lt;sup&gt;3)&lt;/sup&gt;</td>
<td>100%&lt;sup&gt;4)&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

1) Remaining 1%: LCR; value for UK (including Northern Ireland): 97%
2) Excluding narrow gauge; including narrow gauge: 98.5%
3) Value excluding narrow gauge; including narrow gauge: 61%
4) Including train-km by SBB on other Infrastructure Managers’ tracks; Train-km SBB on SBB’s tracks: 99%
In GB some smaller train operating franchises have not been considered

**Market coverage (2/3)**

- **Great Britain**
  - Infrastructure track-km do not include the track of London Continental Railways
  - Passenger train-km include the supply of 19 franchise operators; excluded are open access operators, Eurostar, Nexus and minor railways

- **The Netherlands**
  - Passenger train-km only cover NS (Nederlandse Spoorwegen), the state owned railway operator

- **Sweden**
  - Infrastructure track-km do not include the track of railways such as Botniabanan or Inlandsbanan
  - Passenger train-km only cover SJ, the state owned railway operator but not supplies from competitors

- **France**
  - Infrastructure track-km only includes standard-gauge track of SNCF
In GB some smaller train operating franchises have not been considered

**Market coverage (3/3)**

- Switzerland
  - Infrastructure track-km do only include SBB's network but not any track of private railway lines
  - Passenger train-km do only include passenger-km of SBB-trains. Passenger train-km of SBB trains on other infrastructure managers' track are also included
The study covers infrastructure costs, train operating costs and revenues

**Synoptical overview**

<table>
<thead>
<tr>
<th>System</th>
<th>Costs</th>
<th>Revenues</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFRA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Renewal</td>
<td>Traffic M.</td>
</tr>
<tr>
<td></td>
<td>Operating</td>
<td>Station M.</td>
</tr>
<tr>
<td></td>
<td>Overhead</td>
<td>TAC</td>
</tr>
<tr>
<td></td>
<td>Operations</td>
<td>Traction Power</td>
</tr>
<tr>
<td></td>
<td>Overhead</td>
<td>Fees</td>
</tr>
<tr>
<td>TOC</td>
<td>Train operator</td>
<td>TAC</td>
</tr>
<tr>
<td></td>
<td>Overhead</td>
<td>Chargers &amp; Fees</td>
</tr>
<tr>
<td></td>
<td>Rolling stock</td>
<td>Power supply</td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td>Fees</td>
</tr>
<tr>
<td></td>
<td>Capital costs</td>
<td>...</td>
</tr>
</tbody>
</table>

Only partly covered
## Content

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2. Market development and structures

2.1. Long term development (comparison)

2.2. Long term development (by country)

2.3. Market structures

2.4. Market players

2.5. Conclusions
The traffic supply per inhabitant is highest in Sweden

Development of rail traffic supply

Train-kilometres per capita 2000-2008

Source: UIC, SIKA; calendar years
The gap between Sweden and the other countries is due to both passenger and freight services

**Traffic supply by freight and passenger services**

### Train-kilometres per capita 2000

<table>
<thead>
<tr>
<th>Country</th>
<th>Freight Rail</th>
<th>Passenger Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRA</td>
<td>8,9</td>
<td>2,6</td>
</tr>
<tr>
<td>NED</td>
<td>8,3</td>
<td>0,7</td>
</tr>
<tr>
<td>SWE</td>
<td>12,9</td>
<td>4,5</td>
</tr>
<tr>
<td>UK</td>
<td>8,0</td>
<td>0,8</td>
</tr>
</tbody>
</table>

### Train-kilometres per capita 2008

<table>
<thead>
<tr>
<th>Country</th>
<th>Freight Rail</th>
<th>Passenger Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRA</td>
<td>8,2</td>
<td>1,4</td>
</tr>
<tr>
<td>NED</td>
<td>8,8</td>
<td>0,8</td>
</tr>
<tr>
<td>SWE</td>
<td>15,3</td>
<td>5,2</td>
</tr>
<tr>
<td>UK</td>
<td>8,1</td>
<td>0,7</td>
</tr>
</tbody>
</table>

Source: UIC, SIKA; calendar years
Sweden, UK and France had significant growth rates in passenger transport

Development passenger transport (1/2)

Index passenger-kilometres 1996-2008

Source: UIC, SIKA; calendar years
Dutch growth rates have been rather modest

Development passenger transport (2/2)

- In contrast to the other countries in the Netherlands had rather modest growth rates in railway passenger transport over the last decade
- This development is due to the following facts
  - It is traditionally a very well developed network and one of the most densely used networks in Europe
  - It has mostly served for passenger transport and been a strong commuter network with good intercity connections
  - Over the past decades the network had only been slightly extended (track length grew by only 5% since 1982)
In The Netherlands freight transport boomed but UK had also gained more than 40%

Development freight transport

Index net-tonne-kilometres 1996-2008

1) Development of gross-tonnes kilometres

Source: UIC, SIKA; calendar years
The Netherlands opened the market and created competition among operators

**Development freight transport**

- In The Netherlands freight has more than doubled in the past decade for a number of reasons:
  - An increase in international transport
  - Higher transport volumes of iron ore and coal to Germany
  - A strong growth of container and swap body transport
  - The introduction of the shuttle concept in the mid 90ies for transports between The Netherlands and Germany

- This positive development has been supported by open access to the network and a continuously growing number of market entrants

- Furthermore, new companies have entered the market for leasing rolling stock providing for example flexible rental and lease agreements

- France where SNCF is the only rail freight carrier has seen a massive decline due to pressure from open access freight operators who are said to have fared much better

- Furthermore SNCF's performance is troubled by frequent strikes, restrictive working policies and low efficiency and quality levels
2. Market development and structures

2.1. Long term development (comparison)
2.2. Long term development (by country)
2.3. Market structures
2.4. Market players
2.5. Conclusions
In France passenger transport has increased moderately and steadily in the long-term

Passenger transport in France

<table>
<thead>
<tr>
<th>Passenger Transport Supply</th>
<th>Passenger Transport Output(^1)</th>
<th>Passenger Transport Volume(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[mln. Passenger Train km]</td>
<td>[mln. Journeys]</td>
<td>[bln. Passenger km]</td>
</tr>
<tr>
<td>2004 401</td>
<td>2005 n.a. 963</td>
<td>2004 n.a. 78,3</td>
</tr>
<tr>
<td>2009</td>
<td></td>
<td>2009</td>
</tr>
</tbody>
</table>

Development passenger transport [Index 1996]

Source: UIC, journeys and passenger km only available for 2005 and 2008

1) Data only partly available from 1996 to 2001 and for 2005 and 2008
In France freight transport has declined significantly since the 90ies

Freight transport in France

Freight Transport Supply
[mln. Freight Train km]

Freight Transport Output
[mln. Net tonnes]

Freight Transport Volume
[bln. Net tonne km]

In France freight transport has declined significantly since the 90ies

1) Data only partly available from 1996 to 2001 and for 2005 and 2008

Source: UIC
In The Netherlands passenger transport has increased, with more and shorter journeys

Passenger transport in the Netherlands

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>124</td>
<td>325</td>
<td>14,3</td>
</tr>
<tr>
<td>2005</td>
<td>123</td>
<td>339</td>
<td>15,0</td>
</tr>
<tr>
<td>2006</td>
<td>123</td>
<td>339</td>
<td>15,0</td>
</tr>
<tr>
<td>2007</td>
<td>129</td>
<td>362</td>
<td>16,3</td>
</tr>
<tr>
<td>2008</td>
<td>131</td>
<td>339</td>
<td>16,2</td>
</tr>
</tbody>
</table>

Development passenger transport [Index 1996]

Source: UIC
In The Netherlands freight transport has doubled in the past decade – with a strong increase in efficiency

Freight transport in the Netherlands

Freight Transport Supply
[mln. Freight Train km]

<table>
<thead>
<tr>
<th>Year</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>11</td>
<td>11</td>
<td>12</td>
<td>12</td>
<td>14</td>
</tr>
</tbody>
</table>

Freight Transport Output
[mln. Net tonnes]

<table>
<thead>
<tr>
<th>Year</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>31</td>
<td>34</td>
<td>39</td>
<td>39</td>
<td>44</td>
</tr>
</tbody>
</table>

Freight Transport Volume
[bln. Net tonne km]

<table>
<thead>
<tr>
<th>Year</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>5.2</td>
<td>5.6</td>
<td>6.1</td>
<td>6.1</td>
<td>7.9</td>
</tr>
</tbody>
</table>

Source: UIC
Sweden has seen output and input broadly increasing at the same pace

**Passenger transport in Sweden**

**Passenger Transport Supply**
- [mln. Passenger Train km]
  - 2004: 86
  - 2005: 84
  - 2006: 86
  - 2007: 90
  - 2008: 94

**Passenger Transport Output**
- [mln. Journeys]
  - 2004: 147
  - 2005: 150
  - 2006: 159
  - 2007: 169
  - 2008: 179

**Passenger Transport Volume**
- [bln. Passenger km]
  - 2004: 8,7
  - 2005: 8,9
  - 2006: 9,6
  - 2007: 10,3
  - 2008: 11,0

**Development passenger transport**
- [Index 1996]

Source: UIC, SIKA
In Sweden freight transport has continuously increased

**Freight transport in Sweden**

**Freight Transport Supply**
- [mln. Freight Train km]
  - 2004: 42
  - 2005: 44
  - 2006: 45
  - 2007: 45
  - 2008: 48

**Freight Transport Output**
- [mln. Net tonnes]
  - 2004: 60
  - 2005: 63
  - 2006: 65
  - 2007: 68
  - 2008: 67

**Freight Transport Volume**
- [bln. Net tonne km]
  - 2004: 20.9
  - 2005: 21.7
  - 2006: 22.3
  - 2007: 23.3
  - 2008: 23.1
  - 2009: 19.4

**Development freight transport**
- [Index 1996]

Source: UIC, SIKA
In GB substantial gains in train utilisation were realised

Passenger transport in GB

<table>
<thead>
<tr>
<th>Passenger Transport Supply</th>
<th>[mln. Passenger Train km]</th>
</tr>
</thead>
<tbody>
<tr>
<td>459</td>
<td>468</td>
</tr>
<tr>
<td>470</td>
<td>474</td>
</tr>
<tr>
<td>455</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>2005</td>
</tr>
<tr>
<td>2006</td>
<td>2007</td>
</tr>
<tr>
<td>2008</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Passenger Transport Output</th>
<th>[mln. Journeys]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.045</td>
<td>1.082</td>
</tr>
<tr>
<td>1.151</td>
<td>1.232</td>
</tr>
<tr>
<td>1.255</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>2005</td>
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<td>2006</td>
<td>2007</td>
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<tr>
<td>2008</td>
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<table>
<thead>
<tr>
<th>Passenger Transport Volume</th>
<th>[bln. Passenger km]</th>
</tr>
</thead>
<tbody>
<tr>
<td>41,8</td>
<td>43,2</td>
</tr>
<tr>
<td>46,2</td>
<td>49,0</td>
</tr>
<tr>
<td>50,7</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>2005</td>
</tr>
<tr>
<td>2006</td>
<td>2007</td>
</tr>
<tr>
<td>2008</td>
<td></td>
</tr>
</tbody>
</table>

Development passenger transport
[Index 1996]

Source: UIC
GB freight output increased while supply has been reduced to almost the level of 1996

**Freight transport in GB**

**Freight Transport Supply**
- [mln. Freight Train km]
  - 2004: 45
  - 2005: 50
  - 2006: 48
  - 2007: 45
  - 2008: 40

**Freight Transport Output**
- [mln. Net tonnes]
  - 2004: 101
  - 2005: 105
  - 2006: 108
  - 2007: 102
  - 2008: 103

**Freight Transport Volume**
- [bln. Net tonne km]
  - 2004: 21.6
  - 2005: 23.1
  - 2006: 23.2
  - 2007: 22.9
  - 2008: 22.2

Source: UIC

© civity 2010 // 2011/05/23, civity, WholeIndustryCostBenchmarking.pptx, ORR_IndustryBenchmark_Daten Qualität, UIC
2. Market development and structures

2.1. Long term development (comparison)
2.2. Long term development (by country)
2.3. Market structures
2.4. Market players
2.5. Conclusions
In France infrastructure manager and train operator have a complex relationship

**Market organisation in France**

<table>
<thead>
<tr>
<th>Regulation of safety, track access and competition</th>
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<tbody>
<tr>
<td>Établissement public de sécurité ferroviaire (Safety)</td>
</tr>
<tr>
<td>L'Autorité de régulation des activités ferroviaires (Access)</td>
</tr>
<tr>
<td>Conseil de la concurrence (Competition)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Determination of national policy aims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry for Ecology, Energy, Sustainable Development and Planning (National Political Entity)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Multi-annual contract (incl. social fare obligations)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payments to SNCF for social fare obligations and, primarily, pensions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control of RFF only through a government representative in RFF's board</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regions (Regional Entity)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Owner of the railway infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>RFF (Infrastructure owner)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>State-mandated service contract (maintenance, traffic control etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Track access charges</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SNCF (incumbent transport operator)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pôle infrastructure (incl. Stations) (Infrastructure Maintainer)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pôle Transport Public (Transport Operator)</th>
</tr>
</thead>
</table>

Source: Internationalisation of Infrastructure
The French government enforces its aims in the rail transport primarily via ownership control

Determination and enforcement of policy aims in France (overview)

• Réseau Ferré de France (RFF) is charged with formulating policy pertaining to the maintenance and development of rail infrastructure, but control of RFF takes place only through a Government representative in RFF's board.

• A Contract (contrat de plan) between the State and Société nationale des chemins de fer français (SNCF) establishes multi-annual budgetary agreements, but this contract does not seem to be enforced as in other European member states according to experts.

• In General the aim for SNCF is that high-speed and long-distance services must be profitable (with free market access and without any contract).

• A list of further requirements for SNCF contains a number of social fare obligations.

• Few financial incentives and penalties are included in the contract between RFF and SNCF to enforce the obligations of the contracting parties (e.g. maintenance of network by SNCF and providing track access by RFF).

• Steering of RFF and SNCF by the national government primarily takes place via ownership control within the boards, not via contracts.

• The regions determine their transport policy aims in terms of quality (e.g. punctuality) on their own and they are fixed in service contracts with SNCF.

Source: Internationalisation of Infrastructure 2009
The Netherlands have a system of federal agencies for regulation and funding

Market organisation in the Netherlands

Regulation of safety and competition
Transport Inspectorate (Safety)
NmA Comp. Authority: Chamber of Transport (Access)

Determination of national policy aims
Ministry of Transport, Public Works and Water Management (National Political Entity)

Rail services concession until 2015
Infrastructure concession until 2015

Non-discriminatory provision of Infrastructure (track, stations) and other public services
ProRail (Infrastructure Provider)

Design, award and control of regional services
Regional Authorities (Regional PTAs)

Tendering of unprofitable lines

Ownership and financial control
Ministry of Finance (Shareholder)

Regulation of safety and competition
Ministry of Finance (Shareholder)

Operating transport
NS (Incument)
Other TOCs (Competitors)

Source: Internationalisation of Infrastructure, van de Velde, Jacobs and Stefanski 2009
The Netherlands have a system of federal agencies for regulation and funding

Determination of policy aims in the Netherlands

Regulation of safety and competition
- Transport Inspectorate (Safety)
- NmA Comp. Authority: Chamber of Transport (Access)

Ownership, funding and control
- Ministry of Transport, Public Works and Water Management (National Political Entity)
- Ministry of Finance (Shareholder)

Design, award and control of regional services
- Regional Authorities (Regional PTAs)

Framework for ProRail concerning general policy on track usage and network development

Non-discriminatory provision of Infrastructure (track, stations) and other public services
- ProRail (Infrastructure Provider)

Transport Policy aims
- Regions (Regional Political Entity)

Transport policy aims laid down in public service contracts

Operating transport
- NS (Incumbent)
- Other TOCs (Competitors)

Source: Internationalisation of Infrastructure, van de Velde, Jacobs and Stefanski 2009
The national government in the Netherlands has some ambitious aims for the rail sector

Policy aims in the Netherlands as determined by national government (overview)

- The national government has identified four aims for improving the quality and capacity of both passenger and freight transport. They are:
  - frequent services on the busiest lines in and around the Randstad region in the west of the country;
  - cohesive regional public transport systems revolving around rail transport;
  - a sufficient quality of travel times to the various parts of the country;
  - a future-proof strategy for freight transport routes.
- In its 2007 coalition agreement, the government aimed for 5% annual growth in passenger transport during its term in office.
- The public incumbent operator NS and ProRail, the provider of the infrastructure, received 10 years concession contracts in 2005 that include financial incentives based on performance indicators (e.g. NS has performance indicators on passenger growth and punctuality). NS and ProRail have to propose yearly improved values for these performance indicators in so called transport and infrastructure plans which have then to be judged and agreed upon by the Ministry.

Source: van de Velde, Jacobs and Stefanski 2009
In Sweden a number of public actors organise a fairly liberalised market (but state owned companies dominate)

Market organisation in Sweden

Figure based on non-commercial services (note: Sweden has recently liberalised commercial services (introduction of free market access for commercial services), figure shows only main actors (e.g. excluding other individual infrastructure managers with ~10% of nationwide track length). Source: Banverket Sector Report 2008/9, Trafikverket Homepage, Alexandersson
In Sweden the policy objectives are set by the national and the regional and local levels

Determining of policy aims in Sweden

Regulatory aims (e.g. non-discriminatory actions of incumbent), steering "at arms length" by government

Transport policy aims (according to long-term national transport policy), steering "at arms length" by government

Transport policy aims (according to long-term regional transport policy)

Transport policy aims laid down in public service contracts

Source: Banverket Sector Report 2008/9, Trafikverket Homepage, Alexandersson and Hultén 2009
The overall objective in Sweden is to provide a socio-economically viable, efficient and sustainable transportation.

Policy aims in Sweden as determined by Trafikverket (overview)

- **Overall vision:** Everybody arrives smoothly, the green and safe way
- **The aim is to meet transport policy targets**
  - The overall objective of the transport policy in Sweden is to ensure socio-economically viable, efficient and sustainable transportation for citizens as well as for trade and industry
  - The functional objective of transport policy: Availability
  - The considerate objectives of transport policy: Health, safety and the environment

Source: Trafikverket November 2010
In GB the ORR plays a central role in regulating the railway industry

**Market organisation GB**

- Office of fair trading (Competition)
- Rail safety and standards board (Safety)
- High Level Specification Statement of Funds available
- Office of Rail Regulation (Competition, Safety)
- Network Rail
- Train Operating Companies
- Passenger Transport Executives
- ROISCO

Source: Internationalisation of Infrastructure, Network Rail
2. Market development and structures

2.1. Long term development (comparison)
2.2. Long term development (by country)
2.3. Market structures
2.4. Market players
2.5. Conclusions
By number of companies GB and Sweden have the most developed market for passenger traffic

### Overview market participants (1 of 2)

<table>
<thead>
<tr>
<th>Category</th>
<th>France</th>
<th>Netherlands</th>
<th>Sweden</th>
<th>GB</th>
</tr>
</thead>
</table>
| **Government Agencies**       | • Ministry for Ecology, Energy, Sustainable Dev. and Planning  
                                 • L’Autorité de régulation des activités ferroviaires  
                                 • Établissement public de sécurité ferroviaire  
                                 • Conseil de la concurrence  
                                 • Ministry of Public Works and Water Management  
                                 • Chamber of Transport  
                                 • Transport Inspectorate  
                                 • Ministry of Enterprise, Energy and Communications  
                                 • Rikstrafik  
                                 • Transport Styrelsen | • DfT  
                                 • ORR |
| **Infrastructure Managers**   | • RFF (network) (Public)  
                                 • SNCF Gares & Connexions (Stations) (Public) | • ProRail Ltd. (Public)  
                                 • NL Railinfrastruct Company (Public)  
                                 • Trafikverket (Public)  
                                 • Others: Inlandsbanan AB (Public), A-Train AB (PPP), Jernhusen AB (stations) (Public) | • Network Rail (Private)  
                                 • Northern Ireland Railways (Public) |
| **Train Operating Companies** | • SNCF Voyages (Public)  
                                 • SNCF Proximités (Public)  
                                 • Others: Arriva (Public DB), Veolia (Private), DB Regio NRW (Public), Connexxion | • Nederlandse Spoorwegen (Public)  
                                 • Stockholmståg KB (Public SJ)  
                                 • A-Train AB  
                                 • Others: Veolia Transport Sverige AB (Private), Svenska Tågkompaniet AB (Public), Arriva Tåg AB (Public DB), Roslagståg AB (Public), Inlandsbanan AB (Public), DSBFirst Sverige AB (PP), Merresor AB (PP), SJ Norrlandståg AB (Public) | • First (Private)  
                                 • Stagecoach (Private)  
                                 • Govia (Public Private Keolis)/Go-ahead)  
                                 • Arriva (Public DB)  
                                 • Abellio (Public NS)  
                                 • National Express (Private)  
                                 • Others incl. DB |
Also in freight and rolling stock the level of diversity of players in the markets differs significantly

**Overview market participants (2 of 2)**

<table>
<thead>
<tr>
<th>Category</th>
<th>France</th>
<th>Netherlands</th>
<th>Sweden</th>
<th>GB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Freight Operating Companies</strong></td>
<td>• SNCF Geodis (Public)</td>
<td>• DB Schenker Rail Nederland (Public)</td>
<td>• Green Cargo AB (Public)</td>
<td>• DB Schenker (Public)</td>
</tr>
<tr>
<td></td>
<td>• Euro Cargo Rail (Public DB)</td>
<td>• Cross-border:, Rail4chem (Public SNCF),</td>
<td>• Cargo Net AB (Public)</td>
<td>• Freightliner Intermodal (Private)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SNCF Fret (incl. ITL, Public), Dillen &amp;</td>
<td>• Malmtrafik i Kiruna AB (Private)</td>
<td>• Freightliner Heavy Haul (Private)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lejeune Cargo (Private), HGK AG (Public),</td>
<td>• Hector Rail AB (Private)</td>
<td>• DRS (Public)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B-Cargo (Public SNCF), TX Logistics AG (PP Trenitalia)</td>
<td>• Others: TGOJ Trafik AB (Public), Tågåkeriet i Bergslagen AB, TX Logistik AB (Public Private Trenitalia), RailCare Tåg AB (Private), Peterson Rail AB (Private), Tågfärdsproduktion i Sverige AB, DB Schenker Rail Scandinavia A/S (Public), MidCargo AB (Private), Stena Recycling AB (Private)</td>
<td>• G.B. Railfreight (Private)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Domestic: ACTS (Private), ERS Railways BV (Private), Rotterdam Railfeeding (Private), Veolia Cargo Nederland BV (Public SNCF)</td>
<td>• Angel Trains (Private)</td>
<td>• Fastline (Private)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• AB Transitio (Public)</td>
<td>• Advenza (Private)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Transwaggon AB (Private)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Tågåkeriet i Bergslagen AB (Private)</td>
<td></td>
</tr>
<tr>
<td><strong>Rolling Stock Leasing Company</strong></td>
<td>• Railpool (Public banks)</td>
<td>• AB Transitio (Public)</td>
<td>• Angel Trains (Private)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Ox-Traction (Private)</td>
<td></td>
<td>• HSBC Rail (Private)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• CB-Rail (Private)</td>
<td></td>
<td>• Porterbrook (Private)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Alpha-Trains (Private)</td>
<td></td>
<td>• Sovereign trains (Private)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Mitsui Rail Capital Europe (Private)</td>
<td></td>
<td>• QW Rail Leasing (Private)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Siemens Dispolok (Private)</td>
<td></td>
<td>• Diele Trains Ltd. (Public)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Lyods TSB General Leasing (Private)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Other Spot-hire companies</td>
<td></td>
</tr>
</tbody>
</table>
SNCF absolutely dominates the rail market in France

**Market shares rail services**

*SNCF absolutely dominates the rail market in France*

**Market shares rail services in France**

- **SNCF**: 32%
- **TER**: 9%
- **TRN + TIR**: 11%
- **Greater Paris**: 17%
- **Freight**: 17%
- **High Speed**: 25%
- **New Railway enterprises**: 3%
- **Other**: 2%

Source: RFF

**Market shares freight operators in France**

- **SNCF**: 85%
- **DB Schenker**: 8%
- **Other**: 7%

Source: SNCF Annual Report 2009, RFF

Source: Annual Reports, UIC
SNCF provides transport and infrastructure related services

Profile SNCF

Portfolio
- Markets: Long-distance, regional, commuter and night rail
- Services:
  - Urban, sub-urban and regional transport
  - High-speed rail
  - Freight and logistics
  - Maintenance and engineering services
  - Maintenance and operation of stations

Key Financials

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2008</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Sales [GBP mln]</td>
<td>22,151</td>
<td>20,006</td>
<td>16,116</td>
</tr>
<tr>
<td>- Proximités</td>
<td>5,857</td>
<td>5,037</td>
<td></td>
</tr>
<tr>
<td>- Voyages</td>
<td>6,565</td>
<td>5,930</td>
<td></td>
</tr>
<tr>
<td>- Geodis</td>
<td>6,567</td>
<td>6,377</td>
<td></td>
</tr>
<tr>
<td>Operating result</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[GBP mln]</td>
<td>129</td>
<td>775</td>
<td>683</td>
</tr>
<tr>
<td>Staff (Group)</td>
<td>161,771</td>
<td>163,485</td>
<td>166,213</td>
</tr>
</tbody>
</table>

Output

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Train-km [mln]</td>
<td>492,5</td>
<td>498,6</td>
<td>482,3</td>
</tr>
<tr>
<td>Passenger-km [bln]</td>
<td>81,5</td>
<td>86,3</td>
<td>85,7</td>
</tr>
<tr>
<td>Gross-tonnes-km [bln]</td>
<td>97,6</td>
<td>84,9</td>
<td>66,2</td>
</tr>
<tr>
<td>Number of passengers [mln]</td>
<td>1,032,0</td>
<td>1,075,9</td>
<td>1,077,9</td>
</tr>
</tbody>
</table>

Source: Annual Reports, UIC  1) Conversion via average OECD spot rates per year

© civity 2010 // 20115224_ch8_HotheindustrieCostBenchmarking.pptx
RFF is the French infrastructure manager

Profile RFF

Portfolio

- Responsibilities: RFF ensures funding, development and promotion of the network, manages and pays for work performed by the main contractor, and decides on the procedures relating to traffic management and the running of the network.
- Infrastructure management and maintenance work is outsourced to SNCF as well as traffic control (state-mandated).

Key Financials¹)

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2008</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Sales [GBP mln]</td>
<td>2,921</td>
<td>2,462</td>
<td>1948</td>
</tr>
<tr>
<td>Operating result [GBP mln]</td>
<td>1,412</td>
<td>-315</td>
<td>-5</td>
</tr>
<tr>
<td>Investment new projects [GBP mln]</td>
<td>1,399</td>
<td>1,195</td>
<td>0</td>
</tr>
<tr>
<td>Staff (end of year)</td>
<td>1,166</td>
<td>939</td>
<td>843</td>
</tr>
</tbody>
</table>

Output

- Length of lines - end of year (Kilometres):
  - 2007: 29.918
  - 2008: 29.901
  - 2009: 30.041

- Operated by SNCF:
  - 2007: 553.0
  - 2008: 624.0
  - 2009: 955.0

- Electrified:
  - 2007: 29.918
  - 2008: 29.901
  - 2009: 30.041

Source: Annual Reports, UIC ¹) Conversion via average OECD spot rates per year

The organisational structure is completed by 12 regional divisions.
There is significant competition on the Dutch freight rail market – DB Schenker largest operator

Market shares freight Netherlands

Market shares freight operators in Netherlands based on track access charges 2008 [%]

- DB Schenker (Railion): 66%
- ACTS: 8%
- ERS: 9%
- others: 6% (included in Rail4Chem)
- SNCF (incl. ITL): 2%
- Ruhrtalbahn: 3%
- Hafen und Güterverkehr Köln: 1%
- Rotterdam Rail Feeding: 2%

Source: Pro Rail
Passenger services are dominated by NS Reizigers

**Market shares passenger services Netherlands**

Market shares passenger services in Netherlands based on train-km 2008 [%]

- **86%** NS Reizigers
- **14%** Regional operators

Source: Pro Rail
NS Group provides passenger transport in the Netherlands and abroad

Profile NS

Portfolio

- Services: Rail operations (high speed, national, regional), bus services, associated sales and service activities, Station management, hub development and operation, fleet management and maintenance, rail infrastructure & construction
- Markets: Netherlands, Great Britain, Germany, Czech Republic, France and Belgium

Key Financials

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2008</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue [GBP mln]</td>
<td>4,092</td>
<td>3,379</td>
<td>2,764</td>
</tr>
<tr>
<td>Ticket revenue [GBP mln]</td>
<td>1,637</td>
<td>1,422</td>
<td>1,190</td>
</tr>
<tr>
<td>Operating Result [GBP mln]</td>
<td>143</td>
<td>261</td>
<td>243</td>
</tr>
<tr>
<td>Staff (number year-end)</td>
<td>33,582</td>
<td>29,384</td>
<td>28,676</td>
</tr>
</tbody>
</table>

Source: Annual Reports, UIC 1) Conversion via average OECD spot rates per year

Organisation

Output

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Train-kilometre [mln]</td>
<td>109,6</td>
<td>110,8</td>
<td>112,7</td>
</tr>
<tr>
<td>Passenger-km [bln]</td>
<td>16,3</td>
<td>16,2</td>
<td>15,5</td>
</tr>
<tr>
<td>Seat-km [bln]</td>
<td>59,6</td>
<td>59,0</td>
<td>54,8</td>
</tr>
<tr>
<td>Passenger rolling stock [tld]</td>
<td>2,6</td>
<td>2,9</td>
<td>2,9</td>
</tr>
</tbody>
</table>
ProRail is the Dutch infrastructure manager – all maintenance outsourced

Profile ProRail

Portfolio
- Responsibility:
  - maintenance and extensions of the national railway network infrastructure
  - allocating rail capacity
  - traffic control

Key Financials

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2008</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue [GBP mln]</td>
<td>1,314</td>
<td>1,144</td>
<td>910</td>
</tr>
<tr>
<td>Gross investments [GBP mln]</td>
<td>959</td>
<td>813</td>
<td>587</td>
</tr>
<tr>
<td>Operating Result [GBP mln]</td>
<td>15</td>
<td>1</td>
<td>21</td>
</tr>
<tr>
<td>Staff (number year-end)</td>
<td>3,679</td>
<td>3,220</td>
<td>2,903</td>
</tr>
</tbody>
</table>

Organisation

Source: Annual Reports, UIC

1) Conversion via average OECD spot rates per year
Trafikverket owns 89% of the track infrastructure in Sweden

Market shares infrastructure

Market shares infrastructure managers in Sweden based on output
[\% of track-km]

- Trafikverket: 89\%
- Inlandsbanan AB\(^1\): 10\%
- A-Train Ab: 1\%
- Others: 0\%

1) North-South Axis from Gällivare via Öresund to Mora owned by 15 local authorities

Source: Trafikverket Railsector Report 2009
SJ AB dominates the passenger market in Sweden

Market shares passenger transport operators in Sweden based on output ¹)
[\% of passenger-kilometre]

- SJ AB: 82\%
- Private Operators: 18\%

Market shares passenger transport operators in Sweden based on revenue
[\% of net revenues]

- SJ AB: 71\%
- Arriva Tåg AB: 13\%
- Stockholmståg KB: 5\%
- DSBFirst Sverige AB: 3\%
- Inlandsbanan AB: 3\%
- Roslagståg AB: 2\%
- Svenska Tågkompaniet AB: 2\%
- Veolia Transport Sverige AB: 0\%
- A-Train AB: 0\%

Source: Transportstyrelsen

¹) Contracted interregional rail services make up for 6\% of SJ transport volume
Green Cargo dominates the freight market both by share of rail transport output and net revenues

**Market shares freight**

**Market shares freight operators in Sweden based on output**
[61%, 22%, 17%]

**Market shares freight operators in Sweden based on revenue**
[74%, 4%, 7%, 4%, 1%, 1%, 0%, 0%]

*Source: Transportstyrelsen*
SJ provides passenger services including rolling stock maintenance

Profile SJ AB

Portfolio
• Markets: Long-distance, regional, commuter and night rail
• Services:
  – Rail Services
  – Fleet ownership and maintenance
  – Customer services in train stations, call centers and with travel agencies
• Subsidiaries: Norrlandståg, Stockholmtåg, SJ Event, SJ Service Academy and Linkon

Key Financials

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2008</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Sales [GBP mln]</td>
<td>737</td>
<td>744</td>
<td>609</td>
</tr>
<tr>
<td>Operating profit [GBP mln]</td>
<td>53</td>
<td>66</td>
<td>60</td>
</tr>
<tr>
<td>EBIT Margin</td>
<td>7,1 %</td>
<td>8,1 %</td>
<td>8,4 %</td>
</tr>
<tr>
<td>Staff (Group)</td>
<td>4,439</td>
<td>4,539</td>
<td>4,053</td>
</tr>
</tbody>
</table>

Source: Annual Reports, UIC

1) Conversion via average OECD spot rates per year
Trafikverket is the Swedish infrastructure manager – responsible for rail and road

Overview Trafikverket

Portfolio
• Responsibilities:
  – Long-term planning of the transport system for all types of traffic (incl. rail, road, maritime, air)
  – Building, operating and maintaining public roads and railways
  – Administering the theoretical and driving tests licence and certificate of professional competence.
• Subsidiaries: Norrlandståg, Stockholmståg, SJ Event, SJ Service Academy and Linkon

Organisation

Key Financials

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2008</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income from</td>
<td>576</td>
<td>1573</td>
<td>410</td>
</tr>
<tr>
<td>appropriations and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>grants [GBP mln]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income fees [GBP mln]</td>
<td>436</td>
<td>368</td>
<td>286</td>
</tr>
<tr>
<td>Investments [GBP mln]</td>
<td>1,061</td>
<td>872</td>
<td>685</td>
</tr>
<tr>
<td>Staff (average number)</td>
<td>6.588</td>
<td>6.534</td>
<td>6.518</td>
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Output

Length of lines - end of year (Kilometres)

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
</table>
| Civil Engineering [no]

Source: Annual Reports, UIC

1) Conversion via average OECD spot rates per year
Green Cargo is Sweden’s largest cargo and logistics company owned by the government

Profile Green Cargo

Portfolio
- Markets: Rail and secondary road transport in Sweden mainly steel, chemicals, automotives, engineering, forestry and retail
- Services: Freight transport services and logistics incl. Warehousing, handling, distribution
- Subsidiaries: TGOJ Trafik AB, NTR AB, Hallsbergs Terminal AB, Cargonet AS (partly), DB Schenker Scandinavia (partly)

Organisation

Key Financials (Group) 1)

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2008</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Sales [GBP mln]</td>
<td>494</td>
<td>529</td>
<td>609</td>
</tr>
<tr>
<td>Profit [GBP mln]</td>
<td>-19</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>Net investment [GBP mln]</td>
<td>77</td>
<td>49</td>
<td>15</td>
</tr>
<tr>
<td>Staff (Group)</td>
<td>2.719</td>
<td>2.859</td>
<td>2.770</td>
</tr>
</tbody>
</table>

Output

Source: Annual Reports, UIC 1) Conversion via average OECD spot rates per year
In GB there is a number of competitors both in passenger services and freight rail services

**Market Shares rail services GB**

**Market shares passenger service operators in GB**

- DB: 3%
- Nat. Exp.: 7%
- Abellio: 10%
- Arriva: 11%
- Govia: 17%
- Stagecoach: 18%
- First: 26%
- other / unknown: 8%

Source: ORR

**Market shares freight operators in GB**

- G.B. Railfreight: 5%
- DRS: 5%
- Advenza: 0%
- Fastline: 1%
- Freightliner Heavy Haul: 16%
- Freightliner Intermodal: 21%
- DBS: 51%

Source: ORR
2. Market development and structures

2.1. Long term development (comparison)
2.2. Long term development (by country)
2.3. Market structures
2.4. Market players
2.5. Conclusions
The number of railway undertakings and their market shares are quite different

Summary of market structures

- France has hardly any competition
- GB has the most developed competitive market structure with market shares well distributed among players
- Sweden and The Netherlands take a position in the middle with state owned companies still dominating – both in freight and passenger services
- In The Netherlands the degree of competition in freight seems to be higher than in Sweden
In all countries demand for passenger services has grown since 1996

**Conclusions**

- Between 2000 and 2008 Sweden had the highest growth rates in traffic supply per capita which was driven by both passenger services and freight.

- On the demand side Sweden, UK and France have seen a growth in passenger-kilometres of up to 50% (1996 until 2008).

- Demand in The Netherlands grew less as the Dutch network has been quite utilised before and now faces saturation problems.

- The development in rail freight is quite different:
  - The Netherlands have more than doubled net-tonne-kilometres between 1996 and 2008.
  - Growth was modest in the UK and Sweden.
  - In France rail freight transport has declined steadily since the end of the 90ies.

- In The Netherlands net tonne kilometres grew stronger than freight train kilometres supplied indicating an increase in efficiency.

- British freight companies have also managed to realise some substantial gains in train utilisation.
The way markets are organised varies between the four countries

Conclusions

• In France RFF is directly subordinated to the Ministry and responsible for managing the railway infrastructure; maintenance is contracted out to SNCF

• SNCF plays a dominating role in the French market providing services to passengers as well as to the freight sector; there are only a few small private entreprises

• In The Netherlands ProRail acts as infrastructure manager having fully outsourced all maintenance and renewals which is comparable to Sweden

• Passenger services are mainly provided by NS with a small percentage of regional operators; freight is mainly provided by state-owned DB-Schenker and a growing number of private operators

• The former Swedish railway administration Banverket became Trafikverket in April 2010, combining the responsibilities of managing infrastructure for road and rail now

• In contrast to other countries, there is a separate entity in Sweden managing the railway stations (Jernhusen)
The way markets are organised varies between the four countries

Conclusions

• In Sweden passenger and freight services are still dominated by state-owned SJ with some smaller public and private operators in both segments

• Apart from GB Sweden is the only country in the sample where rolling stock is provided by a rolling stock company to operators (but limited to regional traffic)

• GB is the only country in the sample with a nearly complete franchise system, a fully separated provision of rolling stock and a regulator performing extensive economic regulation
<table>
<thead>
<tr>
<th>Content</th>
<th>page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction</td>
<td>3</td>
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<tr>
<td>2. Market development and structures</td>
<td>12</td>
</tr>
<tr>
<td>3. Performance</td>
<td>61</td>
</tr>
<tr>
<td>4. Infrastructure</td>
<td>71</td>
</tr>
<tr>
<td>5. Train operations (incl. Rolling stock)</td>
<td>116</td>
</tr>
<tr>
<td>6. Freight train operations</td>
<td>150</td>
</tr>
<tr>
<td>7. Funding and revenues</td>
<td>152</td>
</tr>
<tr>
<td>8. Market analysis Germany</td>
<td>162</td>
</tr>
<tr>
<td>9. Methodology</td>
<td>185</td>
</tr>
<tr>
<td>10. Conclusions</td>
<td>195</td>
</tr>
</tbody>
</table>
GB’s supply and demand are second highest in sample

Traffic demand and supply (2009)

1) Corresponding to the 19 franchised TOCs; GBR 19 is an accumulation of GBR LSE, Regio and IC
The GB's train utilisation is at the lower end of the sample

**Average train utilisation (2009)**

- Average utilisation of trains is particularly high in France
- This is very much driven by SNCF's high speed system which is accounting for a large share of the passenger transport supply
- These trains have a large seat capacity (~ 500 seats), fairly long train sets (~240m), partly use double stack coaches (TGV Duplex) paired with a high demand
- Utilisation of TGVs was 78% in 2007
East Coast shows the highest average train utilisation

Average train utilisation (2009)

[passenger-km / train-km]
Switzerland and the Netherlands use their infrastructure more intensively than UK

System performance (2009) (1/2)

Train frequency
[k train-km / route-km]

<table>
<thead>
<tr>
<th>Route-km calculated as sum of route lengths of the individual TOCs, normalised to the real total route-km. Approximate values only, therefore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route-km calculated as sum of route lengths of the individual TOCs, normalised to the real total route-km. Approximate values only, therefore</td>
</tr>
<tr>
<td>Train km of all operators would lead to a value of 9 k train-km/route-km</td>
</tr>
</tbody>
</table>
The Swiss railways have consequently promoted their railways network

**System performance (2/2)**

- The Swiss have the most densely used network in Europe; on the one hand this is due to international traffic being a centrally located transit network.
- On the other hand the Swiss railways have undertaken strong efforts to increase the attractivity and utilisation within the country.
- Some reasons for this development are:
  - A high degree of quality (punctuality, cleanliness etc.) and a focus on customers.
  - Large investments in rolling stock and infrastructure.
  - The integrated synchronised timetable for optimised connections and reduced travel-times.
  - A regionally dense and well balanced transport service offer.
  - An attractive pricing model (Switzerland has the highest share of full-fare travelcards; it's also valid for many buses, trams and boats).
  - A high degree of intermodal integration.
- The Swiss government backs the railway system by its favourable environmental legislation.
GB has the lowest train utilisation while infrastructure utilisation is less than medium

Train utilisation vs. infrastructure utilisation

Average train utilisation
[passenger-km/train-km]

High structural unit cost efficiency
Related to inhabitants GB's supply is comparable to most others, demand is fairly low.

System performance (2009)

<table>
<thead>
<tr>
<th>Supply [train-km / inhabitant]</th>
<th>Demand [passenger-km / inhabitant]</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSE</td>
<td>SBB</td>
</tr>
<tr>
<td>GBR 19</td>
<td>5</td>
</tr>
<tr>
<td>SNCF</td>
<td>18</td>
</tr>
<tr>
<td>NSR/NT</td>
<td>1,612</td>
</tr>
<tr>
<td>SJ Group 2)</td>
<td>850</td>
</tr>
<tr>
<td>SBB</td>
<td>1,336</td>
</tr>
<tr>
<td>GBR 19</td>
<td>936</td>
</tr>
<tr>
<td>SNCF</td>
<td>763</td>
</tr>
<tr>
<td>NSR/NT</td>
<td>7</td>
</tr>
<tr>
<td>SJ Group 3)</td>
<td>7</td>
</tr>
<tr>
<td>SBB</td>
<td>2,181</td>
</tr>
</tbody>
</table>

1) Inhabitants LSE-Region (London and Southeast): 16,04 m
2) Train km of all operators would lead to a value of 9 k train-km/inhabitant
3) Train km of all operators would lead to a value of 954 passenger-km/inhabitant
Punctuality is lower in GB than in other countries of the sample

System performance (2009)

<table>
<thead>
<tr>
<th>Region</th>
<th>Punctuality [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSE</td>
<td>91</td>
</tr>
<tr>
<td>Regio</td>
<td>90</td>
</tr>
<tr>
<td>IC</td>
<td>81</td>
</tr>
<tr>
<td>GBR 19</td>
<td>88</td>
</tr>
<tr>
<td>SNCF Voyages</td>
<td>81</td>
</tr>
<tr>
<td>SNCF</td>
<td>91</td>
</tr>
<tr>
<td>NSR/NT</td>
<td>93</td>
</tr>
<tr>
<td>SJ Group</td>
<td>89</td>
</tr>
<tr>
<td>SBB</td>
<td>97</td>
</tr>
</tbody>
</table>

- Punctuality is difficult to compare due to different measuring concepts, definitions, thresholds, timetable reserves etc.
- In this sample all countries use time-to-5 as threshold

Source: Annual reports, peer group
Based on a recently conducted international study GB's punctuality is slightly above average.

**System performance (2009)**

- The sample includes Western European countries and UK performance (punctuality) has been rebased to each comparator’s metric.
- Performance refers to all trains.
- The figures shown are 2009/2010 UK performance less 2009 reported comparator performance, for example: GB’s punctuality is 5.57% higher than country A’s.

Source: NR/ATOC/ORR Performance Benchmarking 20010
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6. Freight train operations | 150
7. Funding and revenues | 152
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10. Conclusions | 195
4. Infrastructure

4.1. Introduction

4.2. Total cost and network characteristics

4.3. Maintenance and renewal costs

4.4. Network operations costs

4.5. Infrastructure operating costs (overhead)

4.6. Conclusions
Infrastructure costs are analysed by activities and asset categories.

**Infrastructure Costs**

- **Maintenance costs** will be split into the most important asset categories.

- **Renewal costs** for the existing network will be split into the most important asset categories and cover a five and ten year horizon.

- **Operating** costs result from running the network and consist of two main cost elements:
  - Operations: The costs to manage traffic, stations and customers; traction power is looked at separately.
  - Overhead: Administrative activities which cannot be attributed to any specific business activity but are necessary for the business to function.
4. Infrastructure

4.1. Introduction

4.2. Total cost and network characteristics

4.3. Maintenance and renewal costs

4.4. Network operations costs

4.5. Infrastructure operating costs (overhead)

4.6. Conclusions
Accumulated infrastructure cost are highest in UK

Total infrastructure costs (2009, fully normalised)

[k GBP / track-km]

1) Cost elements included in operating vary strongly between countries
2) Cost for operating are included in operations
Network characteristics strongly vary among peers, especially main track-km and station density

**Network characteristics (2009)**

1. **Main track-km**
   - [Index in %]
   - Country
   - 100
   - 61
   - 24
   - 10
   - 9

2. **Switch density in main track**
   - [Index in %]
   - Country
   - 100
   - 89
   - 50
   - 49
   - 29

3. **Degree of electrification**
   - [Index in %]
   - Country
   - 100
   - 100
   - 79
   - 61
   - 40

4. **Station density**
   - [Index in %]
   - Country
   - 100
   - 79
   - 48
   - 45
   - 22

1) Stations and flag stops
Network utilisation also strongly varies among peers, especially passenger and freight train mileages

**Network performance (2009)**

<table>
<thead>
<tr>
<th>Country</th>
<th>Total passenger train mileage [Index in %]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Total freight train mileage [Index in %]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Total train frequency (passenger and freight) [Index in %]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Total gross tonnage (passenger and freight) [Index in %]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>
4. Infrastructure

4.1. Introduction

4.2. Total cost and network characteristics

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4.6. Conclusions
This chapter looks into Network Rail's normalised expenditures on maintenance and renewals

Introduction

• According to the comparison of total infrastructure costs Network Rail has the highest expenditures per track-km in the sample
• As shown before Network Rail has a lower switch density than other networks, the lowest degree of electrification and a utilisation (train-kilometres and gross tons) which is close to average
• These parameters cannot be influenced by an infrastructure manager in short or medium term, if at all. To avoid a comparison based on fundamentally different network characteristics and performance levels civity applies a normalisation method based on the UIC LICB benchmark
• Furthermore face values are normalised by applying currency conversion rates to equalise different purchasing powers between countries compared
• The next page shows the application of normalisation factors by asset group. Please refer to chapter 9 for more details on the normalisation process
• This chapter provides a more detailed insight in Network Rail's expenditures on maintenance and renewals
Normalisation of infrastructure costs is based on the methodology as applied within the UIC LICB benchmark

### Infrastructure cost normalisation

<table>
<thead>
<tr>
<th>Cost function</th>
<th>Switch density</th>
<th>Degree of electrification</th>
<th>Train frequency</th>
<th>Gross tonnage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>R</td>
<td>M</td>
<td>R</td>
</tr>
<tr>
<td>Civil engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Track</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signalling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telecommunications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buildings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operational overhead</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For further information on the methodology and normalisation process please refer to chapter 9; the "x" indicates the application of a normalisation factor to a cost function.
The definitions of maintenance and renewal are based on the ones used in UIC’s LICB¹)

**Definitions**

**Maintenance**
Activities performed in order to optimise asset lifetimes and to sustain the condition and capability of existing infrastructure, e.g.
- Inspections
- Measuring
- Failure prevention
- Repairs (but not replacement)
- Routine over-hauls
- Small scale replacement work excluded from the definitions of renewals

**Renewals**
- Mainly capital expenditures projects where existing infrastructure is replaced with new assets
- Replacement of complete systems or systematic replacement of components at the end of their lifetime
- Borderline to maintenance differs among the railways, usually it depends on minimum cost levels and/or minimum scope

¹) LICB = Lasting Infrastructure Cost Benchmarking
Non normalised maintenance costs are the second highest in GB

Maintenance costs (2009, PPP-normalised)

<table>
<thead>
<tr>
<th></th>
<th>Civil engineering</th>
<th>Track</th>
<th>Power supply</th>
<th>Signalling</th>
<th>Telecommunications</th>
<th>Other</th>
<th>Stations³</th>
<th>Operational overhead</th>
</tr>
</thead>
<tbody>
<tr>
<td>NR¹)</td>
<td>35</td>
<td></td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A²)</td>
<td>30</td>
<td></td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B²)</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D²)</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[k GBP / track-km]

1) Station maintenance costs including TOCs (NR: 24 m GBP; TOCs: 141 m GBP)
2) Operational overhead included in asset cost positions (no separate position)
3) Stations are indicated below the line as not all infrastructure managers are responsible for station management
After normalisation GB’s maintenance costs are still at the higher end

Maintenance costs (2009, fully normalised)

[k GBP / track-km]

1) Station maintenance costs including TOCs (NR: 24 m GBP; TOCs: 141 m GBP)
2) Operational overhead included in asset cost positions (no separate position)
Renewal levels in GB are highest in the sample

Renewal costs (5-year-average 2005-2009, PPP-normalised)

1) No station renewals at TOCs
2) Operational overhead included in asset cost positions (no separate position)
After normalisation GB's renewal cost levels are still highest in sample

Renewal costs (5-year-average 2005-2009, fully normalised)

[k GBP / track-km]

1) No station renewals at TOCs
2) Operational overhead included in asset cost positions (no separate position)
The condition of the British Network leads to higher activity levels

**Maintenance and renewal costs**

- Former analyses\(^1\) has shown that based on the age structure Network Rail had built up an investment backlog
- As a consequence Network Rails has increased renewals levels in order to catch-up on the investment backlog which is partly explaining the high expenses in the sample
- Furthermore, current track quality and system reliability require enhanced maintenance activity levels
- In addition to activity levels determining the volume of activities efficiency plays an important role, both in maintenance and renewals
- For maintenance a number of cost driving factors had been identified:
  - Annual labour cost levels are higher than European average
  - Different unit cost levels across Network Rail's maintenance delivery units
  - The under-utilisation of plant and machinery in combination with mark-ups for plant in the UK

\(^1\) Gap Analyses by BSL in 2008
There are various underlying factors with a negative impact on efficiency in maintenance and renewals

**Maintenance and renewal costs**

- Similarly, a number of underlying reasons had been identified for renewal activities:
  - Comparatively high labour cost levels per full time employee
  - Higher procurement costs for plant and machinery
  - UK uses mainly conventional plant whereas other European countries more commonly use high output equipment
  - Productive times in possessions are shorter than in other countries
  - Non realised economies of scale due to longer work-sites
  - High transaction costs in projects and insufficient stability in planning

- The issue of higher staff costs had been addressed in a recent study on "People in the GB Rail Industry; a PPP-adjusted comparison of NR's annual salary with DB, ProRail and Banverket (Trafikverket) shows significant disadvantages of Network Rail compared to Germany and Sweden (25% less cost in Sweden than in GB)
For a more realistic picture of renewals comparisons would need to be based on a steady state

Steady state

Steady state reinvestment needs

Typical renewal forecast

- Currently cost comparisons show annual maintenance and (mid-term) renewal expenditures
- Expenditures are determined by work activity volumes and corresponding unit cost
- Therefore, a period of increased renewal expenditures (e.g. to catch up an investment backlog) does not necessarily reflect inefficiency in unit costs
- Vice versa an infrastructure manager with low expenditure levels in the comparison might just invest less in its network and consequently build up an investment backlog
- To get a realistic picture of the individual position, comparisons need to be based on steady-state activity levels
- An age- and condition-based renewal forecast covering at least one life cycle shows typical ups and downs (see upper illustration)
- The derivation of long-term annual averages would mean an important step from comparing expenditure levels to comparing different cost levels needed for balanced infrastructure maintenance and renewals
- The lower graph – based on real data – shows the order of magnitude by which current expenditures deviate from steady-state regeneration levels

Remarks
On average, all infrastructure managers renewed more during the last five years compared to the last decade.

10 year average of renewals (1)

Cost index
[avg. 00-09 = 100%]
The comparators' renewal volumes were on average more than 15% higher in the last five year period

10 year average of renewals (2)

• The graph depicts Network Rail's renewal expenditures indexed over a period of ten years (red line)

• In a ten year perspective (brown line) these expenditures have been 7% lower than in a five year perspective (black line) or: between 2005 and 2009 Network Rail has uplifted the level of renewals

• This difference has been analysed for other countries in the peer group, too; the result is that all countries show the same trend: average renewal volumes in a five year period are 12% to 21% higher than in a ten year period
Considering a 10-year average does not change GB's relative position

Renewal costs (10-year-average 2000-2009, fully normalised)

[k GBP / track-km]

1) No station renewals at TOCs
2) Operational overhead included in asset cost positions (no separate position)
Due to different sourcing strategies Network Rail's staff numbers can hardly be compared to other infrastructure managers

**Staff infrastructure maintenance and renewals**

- Network Rail employs 564 staff for maintenance per main track km and 220 for renewal activities per main track km; concerning maintenance Network Rail's strategy is to fully insource these activities

- The degree of outsourcing maintenance and renewals varies broadly throughout Europe, two countries in the sample have chosen to fully outsource maintenance and renewals

- Over more than a decade they have developed the market for infrastructure maintenance and construction companies, nowadays employing staff to manage the network and contractors only

- One country with a similar sourcing philosophy as GB has a total headcount for maintenance and renewal staff which is about 12% less than in GB
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### Definitions

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Traffic management</strong></td>
<td>Staff responsible for strategic / operational planning, signalling, traffic control, supervisory tasks, train paths</td>
</tr>
<tr>
<td><strong>Station management</strong></td>
<td>Staff responsible for the management of passenger stations, dispatching of trains etc.</td>
</tr>
</tbody>
</table>
| **Customer service and security**          | Staff responsible for passenger information in call and customer centers, assistance on platforms and in stations, ticket sales, security personnel in stations.  

*These costs could not be separated and are included in the other positions*

| **Traction power supply**                  | Acquisition and provision of the traction power or production and provision (if infrastructure operator produces the energy himself)              |
GB's costs for network operations are the second highest

Network operations (2009)

- Including TOCs (NR: 17 m GBP; TOCs: 183 m GBP)
- Excluding station management
- Traction Power not in every country provided by infra manager or data not available

1) Including TOCs (NR: 17 m GBP; TOCs: 183 m GBP)
2) Excluding station management
3) Traction Power not in every country provided by infra manager or data not available
The cost of traffic management is usually driven by traffic control, Network Rail is on a similar level as others

**Network operations**

The cost for network operations are difficult to grasp as peers had difficulties to separate the cost by different cost categories

**Traffic management**

- All peers were able to provide figures on traffic management cost in total
- These cost comprise different functions such as strategic / operational planning, signalling, traffic control, supervisory tasks, production of train paths
- From our experience we expect most staff to be allocated to signalling, traffic control and production of train paths
- GB's spending per train-km, as the significant cost driving factor, is rather similar for Network Rail and the two peers A and B, possibly revealing some potential for Network Rail compared to peer B
- Peer C's cost are comparably high due to a high number of interlockings that have not been centralised so far
Network Rail's cost of station management per train kilometre are lower than in country C

Network operations

Station management

• Station management cost as another significant position was provided separately only Network Rail/TOCs and by one other peer

• As British TOC's are partly responsible for station management their cost position "Staff cost commercial" had to be split into "Stations" as part of infrastructure and TOCs' operations cost

• Network Rail displays a slight cost disadvantage against peer C based on main track-km, but a cost advantage based on train-km which is the most driving factor for expenses in this area (more trains reveal an impact on passenger information, assistance on platforms/in stations, ticket sales etc.)

• Peer B is not in charge of station management, thus no cost is emerging

• For peer A it was not possible to separate station management cost from "other train operations" cost, thus not being comparable without further analysis

• The study "People in the GB Rail Industry" points out that there may be too many stations employing one staff only which could be questioned
In particular "other train operations cost" include a number of different cost elements

**Network operations**

**Other train operations**

- These costs include utilities, plant/machinery, IT and telephone, but also "Miscellaneous" which cannot be allocated to the cost positions in the questionnaires (e.g. general surveillance of the network, calamity management)
- Thus no one-to-one comparison of "other train operations cost" is fruitful without further analysing the activities

**Traction power supply**

- The cost for traction power supply were provided by one external peer only and are than at Network Rail (per train-km)
- To better understand better the cost differences the purchasing philosophies as well as the market prices of electric power require more in depth analysis (for reasons of anonymity no further explanations are provided here)
Network Rail's operations staff per track-km is comparatively high.

Staff infrastructure operations (2009)

[fte / k main track-km]

1) NR 7,235 fte traffic management plus 8,184 fte station management (TOCs)
2) Traffic management staff includes staff for station management
Countries A and B have completely eliminated manned signal boxes and established centralised control centres

Average route length covered by manned control points (2009)

- Some countries have been establishing centralised control centers by reducing the number of manned interlockings
- This leads to less staff and a higher productivity in terms of route kilometers managed per control center and full time employee
- If staff is effectively reduced operating costs can be decreased
- Countries A and B have managed to increase the number of route km managed per control point
Country B has benefitted rigorously from centralisation and automation

Average route length and traffic volume per fte traffic management (2009)

- Countries A and B manage a larger number of train-km per full time equivalent than other countries
- Whereas country B has significantly reduced the number of operating staff, country A has not gone that far yet
The combination of centralisation and efficiency improvements can unlock substantial cost reductions

Traffic management/control

• Several European infrastructure managers have started programmes to centralise control centers and reduce the number of interlockings

• This is an opportunity to reduce the number of staff and increase the productivity of manned control centers (90% of the total cost of network operations is driven by staff)

• The full potential can only be unlocked by a number of additional measures aiming at an improvement of efficiency such as
  – IT-based traffic planning and decision support to dispatchers
  – A reduction of traffic perturbations which create additional workload
  – The application of sophisticated staffing rules by calculation methods, parameters and time values
  – An increase of productive working time by shift flexibility, multitasking, part-time work, management of take-over times and the optimisation of working hours
  – A reduction of hourly cost of labour by increasing net working hours
4. Infrastructure

4.1. Introduction
4.2. Total cost and network characteristics
4.3. Maintenance and renewal costs
4.4. Network operations costs
4.5. Infrastructure operating costs (overhead)
4.6. Conclusions
Overhead costs can be allocated to three different categories

**Definition**

<table>
<thead>
<tr>
<th>Conventional/Commercial Overhead</th>
<th>Operational M&amp;R Overhead</th>
<th>Additional Overhead Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Finance &amp; Controlling</td>
<td>- Overhead in Maintenance and Renewal departments&lt;br&gt; - Linked for example to Asset Managers in track, signalling etc.</td>
<td></td>
</tr>
<tr>
<td>- Procurement/Purchasing</td>
<td></td>
<td>- Real Estate Management&lt;br&gt; - Safety &amp; Compliance&lt;br&gt; - Transport Police Costs&lt;br&gt; - Marketing</td>
</tr>
<tr>
<td>- Information Technology</td>
<td></td>
<td></td>
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<tr>
<td>- Human Resources</td>
<td></td>
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</tr>
</tbody>
</table>

This Overhead was to be considered and compared in the study

This Overhead is included in the Maintenance and Renewal costs

Some companies provided additional overhead costs which needs to be compared function by function
The degree of detail of overhead cost and staff data varies

### Overhead

<table>
<thead>
<tr>
<th>Network Rail</th>
<th>Network Rail provided a cost breakdown for conventional/commercial overhead and additional functions; staff is one total number</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Country A provided total cost and a limited cost separation only</td>
</tr>
<tr>
<td>B</td>
<td>Country C provided a cost breakdown for conventional/commercial overhead and additional functions; staff is broken down, too</td>
</tr>
<tr>
<td>C</td>
<td>For country C overhead numbers are not completely available</td>
</tr>
</tbody>
</table>
Network Rail's overhead consists of "conventional overhead" as well as of "other overhead"

Infrastructure operating costs (2009, PPP-normalised)

[k GBP / track-km]

1) Others include: commercial property; infrastructure development and asset management; overhead group / central, other overhead; non-controllable overhead (external to NR)

2) Others include only studies

3) Strategy, asset management, projects
Focusing on conventional overhead functions shows higher resources for IT and HR at Network Rail

Infrastructure operating costs (2009, PPP-normalised)

<table>
<thead>
<tr>
<th></th>
<th>Finance &amp; controlling</th>
<th>Purchasing</th>
<th>Information Technology</th>
<th>Human Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>NR</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

[k GBP / track-km]
The share of comparable commercial overhead is between 3% in country B and 4% in GB

Infrastructure operating costs (2009, PPP-normalised)

<table>
<thead>
<tr>
<th>Commercial overhead</th>
<th>% of total infrastructure costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>NR</td>
<td>15</td>
</tr>
<tr>
<td>A</td>
<td>6</td>
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<tr>
<td>B</td>
<td>17</td>
</tr>
<tr>
<td>C</td>
<td>6</td>
</tr>
</tbody>
</table>

- Only country B is comparable to Network Rail
- Country A only separated the cost for procurement
- Country C did not provide a complete separation either
- According to country A's annual report administration costs are at 3.3% in relation to total operational costs
- In other publicly owned railway organisations commercial overhead – including properties – makes for 4-5% of total cost
"Other overhead" at Network Rail can be broken down into four categories

Network Rail: Other overhead

[NR: 25]

[k GBP / track-km]

- Commercial property: 7%
- Infrastructure development and asset management: 7%
- Overhead group central, other overhead: 58%
- Non-controllable overhead: 27%
Pensions, group insurance, bonus payments, BT Transport Police, RSSB accumulate 73% of other overhead

Network Rail: Other overhead

**Commercial Property (44 mio. GBP)**
- Commercial lettings
- Developments
- Retail space at Network Rail's stations

**Infrastructure Development and Asset Management (43 mio. GBP)**
- Planning and development (8 mio. GBP)
- Infrastructure investments/projects (-2 mio. GBP)
- Asset management and engineering/Asset heads (37 mio. GBP)

**Overhead Group/Central, other overhead (344 mio. GBP)**
- Other corporate services (335 mio. GBP for pensions, staff annual performance bonus, group insurance etc.)
- Safety and compliance (2 mio. GBP)
- National Delivery Service (7 mio. GBP)

**Non-controllable overhead (external to NR) (158 mio. GBP)**
- Cumolo rates
- BT Transport Police costs (74 mio. GBP)
- Rail Safety & Standards Board (RSSB, 76 mio. GBP)
A comparison of overhead requires a more in-depth investigation of possible explanatory factors

**Infrastructure operating costs (1/2)**

- Both in cost per track-km as well as by percentage of total costs Network Rail's commercial overhead seems to be higher than other company's overhead; furthermore Network Rail spends more on other overhead functions
- Network Rail's other overhead mainly consists of costs for pensions, group insurance, bonus payments, BT Transport Police and the RSSB
- The difference to others could be explained by various factors:
  - By insourcing maintenance from various contractors Network Rail might have inherited various practices which need to be standardised and require resources
  - Network Rail is undertaking quite some effort to be a better asset manager and seems to accordingly dedicate resources to asset management related activities
  - The high amount for IT cost could result from a large number of applications and interfaces as well as a lot of support needed for modelling
  - The cost for Human Resource management could be driven by standards (safety, training, administration) which might be higher than elsewhere
A more in-depth analysis is needed to explore the underlying reasons for the gap

**Infrastructure operating costs (2/2)**

- Explanatory factors (continued):
  - Planning & Regulation as well as Government & Corporate Affairs seem to bind a substantial number of staff
  - Other overhead seems to be driven by cost elements which do not occur at other infrastructure managers: transport police, Rail Safety & Standards Board
  - Network Rail is spending 44 mio. GBP which covers the development and management of real estate such as complex stations. One of the countries considered is not in charge of this function
  - There is a degree of uncertainty to what extent overhead is actually included in these figures and what part is "hidden" in functions on a decentral level (for example HR or controlling support in the maintenance department)

- To remove uncertainty about the underlying reasons a more in-depth analyses including precise cost allocation and headcounts based on a detailed breakdown of overhead functions would be needed
4. Infrastructure

4.1. Introduction
4.2. Total cost and network characteristics
4.3. Maintenance and renewal costs
4.4. Network operations costs
4.5. Infrastructure operating costs (overhead)
4.6. Conclusions
Driven by renewal expenditures GB's infrastructure costs are highest in sample

**Key findings**

- GB's network is the second largest in sample, utilisation being about average. Other comparators like The Netherlands and Switzerland have denser traffic with higher train frequencies and tonnage.
- Cost differences due to utilisation and network complexity need to be adjusted as they can only be influenced in the long run. The necessary adjustments are made in the normalisation process.
- Fully normalised GB's maintenance expenditures are 10 to 20% below cost levels of countries A and B but more than twice as high as in country D.
- GB's total normalised renewal expenditures are significantly higher than the comparators' expenditures; an analyses of five and ten year average renewal expenditures shows that all peers including Network Rail have lifted up their renewals in the more recent five year period.
- As former gap analyses has shown NetworkRail's high expenditure level is not only due to catching-up on backlogs but also caused by high unit costs.
Infrastructure costs and performance (2)

Key findings

• Operation costs are strongly influenced by the number of manned interlockings and staff-related costs

• Concentration has led to a small number of centralised control centres in two countries – all manned signal boxes were abandoned; one country has unlocked significant savings potentials by effectively reducing staff numbers

• Related to traffic output GB’s operations cost are at about average; centralisation and automation of network operations in GB seem to bear a potential for efficiency increases

• Network Rail’s "classical" overhead seems higher than in other countries but comparability is very limited

• Network Rail has also provided cost data on other overhead functions which cannot be directly compared but drive Network Rail’s infrastructure cost

• Due to different sourcing strategies staff sizes for maintenance and renewals varies broadly
<table>
<thead>
<tr>
<th>Content</th>
<th>page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction</td>
<td>3</td>
</tr>
<tr>
<td>2. Market development and structures</td>
<td>12</td>
</tr>
<tr>
<td>3. Performance</td>
<td>61</td>
</tr>
<tr>
<td>4. Infrastructure</td>
<td>71</td>
</tr>
<tr>
<td>5. Train operations (incl. Rolling stock)</td>
<td>116</td>
</tr>
<tr>
<td>6. Freight train operations</td>
<td>150</td>
</tr>
<tr>
<td>7. Funding and revenues</td>
<td>152</td>
</tr>
<tr>
<td>8. Market analysis Germany</td>
<td>162</td>
</tr>
<tr>
<td>9. Methodology</td>
<td>185</td>
</tr>
<tr>
<td>10. Conclusions</td>
<td>195</td>
</tr>
</tbody>
</table>
5. Train operations (incl. Rolling stock)

5.1. Introduction

5.2. Total cost and structural characteristics

5.3. Train staff

5.4. Customer and operation management

5.5. Overhead

5.6. Track access charges and energy

5.7. Rolling stock

5.8. Conclusions
Data for passenger train operations have been evaluated using a proven functional cost structure

Cost structure

- Train staff (Drivers, crew)
- Operation & customer management
- Overhead
- Track access & energy
- Rolling stock (CAPEX, OPEX)
- Infrastructure

Train operation
Train operations costs mainly consist of train operators and rolling stock

**Train operation costs**

- **Train operation costs** will be split into three categories
- **Train operations** includes
  - Staff necessary to operate trains such as drivers, conductors and other crew
  - Staff to manage staff
  - Staff for customer management
  - Non staff related cost to access track and run trains such as track access charges and power supply and other costs
- The **overhead** necessary to operate staff and trains is separated and mainly staff driven
- **Rolling stock** costs are split into maintenance and capital costs
5. Train operations (incl. Rolling stock)

5.1. Introduction

5.2. Total cost and structural characteristics

5.3. Train staff

5.4. Customer and operation management

5.5. Overhead

5.6. Track access charges and energy

5.7. Rolling stock

5.8. Conclusions
Compared to state owned operators GB's non-normalised total train operation costs are the second lowest in sample

**Total train operation costs (2009, excluding track access, non normalised)**

<table>
<thead>
<tr>
<th></th>
<th>Rolling stock</th>
<th>Energy and user fees</th>
<th>Overhead</th>
<th>Operation and customer management</th>
<th>Train staff</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSE$^2$</td>
<td>9.56</td>
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<td>9.56</td>
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<tr>
<td>Regio$^2$</td>
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<td>IC$^2$</td>
<td>13.86</td>
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<tr>
<td>GBR 19$^2$</td>
<td>10.69</td>
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<td>C$^1$</td>
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<td>D$^1$</td>
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</tbody>
</table>

1) Cost distribution of shaded block not known
2) Operation management costs here contains a portion of rolling stock maintenance staff costs
Structural parameters differ and require normalisation

**Structural characteristics (2009)**

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<thead>
<tr>
<th></th>
<th>LSE</th>
<th>Regio</th>
<th>IC</th>
<th>GBR 19</th>
<th>A</th>
<th>B</th>
<th>C</th>
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<td><strong>Travel speed [km/h]</strong></td>
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<td>LSE</td>
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<td>67</td>
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<td><strong>Average annual running performance per unit [k train-km]</strong></td>
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<tr>
<td>LSE</td>
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<td>190</td>
<td>260</td>
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<td><strong>Total number of stopping actions [1/k km]</strong></td>
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<td>156</td>
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<td><strong>Fleet utilisation peak time [%]</strong></td>
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</tbody>
</table>

For further information on the methodology and normalisation process please refer to chapter 9.
Compared to other state-owned train operators normalised costs per train-km are second lowest in GB

Total train operation costs (2009, excluding track access, partly normalised\(^1\))

<table>
<thead>
<tr>
<th></th>
<th>LSE(^2)</th>
<th>Regio(^2)</th>
<th>IC(^2)</th>
<th>GBR 19(^2)</th>
<th>A</th>
<th>B</th>
<th>C(^1)</th>
<th>D(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Track access</td>
<td>6.44</td>
<td>4.57</td>
<td>10.22</td>
<td>6.83</td>
<td>5.11</td>
<td>1.05</td>
<td>0.44</td>
<td>1.69</td>
</tr>
</tbody>
</table>

1) Train operation and rolling stock has been normalised for the countries where normalisation factors were known
2) Cost allocation of shaded block not known
3) Operation management costs here contains a portion of rolling stock maintenance staff costs
Total staff size for train operation in GB is close to average

Staff size passenger train operation\(^1\) (2009)

1) Drivers, conductors, train crew, operation management, customer management, conventional overhead
2) Other train staff including operation management, customer management and conventional overhead
3) Operation management staff here contains a portion of rolling stock maintenance staff

112
86
86
88
67

GBR 19\(^3\)

Regio\(^3\)
LSE\(^3\)
IC\(^3\)

\[\text{fte / m train-km}\]

\(\text{Train drivers}\)
\(\text{Train conductors}\)
\(\text{Train crew}\)
\(\text{Operation management}\)
\(\text{Customer management}\)
\(\text{Conventional overhead}\)
\(\text{Other train staff}\)
Comparison of train operation costs is against state-owned operators

**Total train operation costs**

- Normalised data show that GBR19's train operating costs are at the lower level of the sample
- Track access charges have been excluded as they are externally set by the infrastructure manager and not (fully) controllable by the train operating company
- In contrast to GB the other countries have not franchised all rail passenger services and state-owned operators such as SNCF, NS Reizigers and SJ still dominate the national markets
- Whereas British Rail ceased to exist these companies are still operating
- This is clearly reflected in market structures shown in chapter 2.4; the state-operators still have significant market shares and contribute to most of the national system cost related to train operations
- In order to maximise coverage of total system cost the comparison of British TOCs is against these large and dominating state-operators and not against smaller private operators
- Nevertheless it needs to be mentioned that former studies have identified cost savings in a range of 20 to 40% from franchising (see EMCT 2007)
Comparison of train operation costs is against state-owned operators

**Total train operation costs**

- The analysis on the German market for regional passenger rail services underpins these trends: German public transport authorities have realised savings between 15 and 47%, depending on the type of service.
- Hence there could be a potential for the other countries to further reduce their costs by tendering more rail services what would challenge GBR19's actual cost position.
5. Train operations (incl. Rolling stock)

5.1. Introduction
5.2. Total cost and structural characteristics
5.3. Train staff
5.4. Customer and operation management
5.5. Overhead
5.6. Track access charges and energy
5.7. Rolling stock
5.8. Conclusions
British train operating companies have lowest train staff costs in this sample

Train staff costs (2009, non normalised)

<table>
<thead>
<tr>
<th></th>
<th>[GBP / train-km]</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSE</td>
<td>2.27</td>
</tr>
<tr>
<td>Regio</td>
<td>1.88</td>
</tr>
<tr>
<td>IC</td>
<td>1.78</td>
</tr>
<tr>
<td>GB 19</td>
<td>2.04</td>
</tr>
<tr>
<td>A</td>
<td>2.95</td>
</tr>
<tr>
<td>B</td>
<td>2.27</td>
</tr>
<tr>
<td>C</td>
<td>n/a</td>
</tr>
<tr>
<td>D</td>
<td>n/a</td>
</tr>
</tbody>
</table>

- Including train conductors

<table>
<thead>
<tr>
<th></th>
<th>Train drivers</th>
<th>Train crew</th>
<th>Train conductors</th>
<th>Other train staff</th>
</tr>
</thead>
</table>
Train staff costs normalised by travel speed lead to higher costs in country B

Train staff costs, normalised by travel speed (2009)

1) Normalisation only related to GBR19
2) Non normalised as travel speed not available
Compared to countries A and B British train staff costs are much lower

Train staff costs (2009)

<table>
<thead>
<tr>
<th>TOC 1</th>
<th>TOC 2</th>
<th>TOC 3</th>
<th>TOC 4</th>
<th>TOC 5</th>
<th>TOC 6</th>
<th>TOC 7</th>
<th>TOC 8</th>
<th>TOC 9</th>
<th>TOC 10</th>
<th>TOC 11</th>
<th>TOC 12</th>
<th>TOC 13</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>56</td>
<td>n/a</td>
<td>n/a</td>
<td>48</td>
<td>48</td>
<td>n/a</td>
<td>n/a</td>
<td>41</td>
<td>41</td>
<td>46</td>
<td>45</td>
<td>53</td>
<td>57</td>
<td>51</td>
</tr>
<tr>
<td>29</td>
<td>52¹</td>
<td>n/a</td>
<td>n/a</td>
<td>30</td>
<td>44</td>
<td>n/a</td>
<td>n/a</td>
<td>26</td>
<td>32</td>
<td>29</td>
<td>30</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

¹) Unlikely high values, possibly staff group allocation mistake in source data

[k GBP / fte]
Train staff costs can be lower at private competitors

Train staff costs

• The comparison of train staff costs per full time employee is based on privately operated British companies and two state-operated companies in countries A and B
• Experience from other countries proves that privately operated companies (for example Connex, TransRegio and metronom versus DB AG in Germany) employ their train drivers at substantially lower cost
• The difference in hourly wage rates between these companies and DB AG can be as much as 50% of what private companies pay
• One of the reasons is that private companies often do not pay tariff salaries while DB pays salaries based on official framework tariffs; furthermore they do not necessarily take over staff from the previous franchise
• As DIW econ reports (Wochenbericht des DIW Berlin Nr. 43/2007) a DB train driver's monthly gross salary is up to 2.750 Euros whereas his British colleague has a monthly income of 2.960 Euros
• If GBR19 salaries were compared to private international operators annual staff costs would probably look higher and less favourable than what the analysis has shown
According to another study British TOC staff cost are at about the same level as TOCs abroad

**Train staff costs**

- A recent study on "People in the GB Rail Industry" analyses average salaries per employee by type and company in Britain, Sweden, Germany and The Netherlands
- British TOCs' "All FTEs' costs" are at about the same level as companies in Germany and Sweden; only Dutch staff is significantly more expensive
- This is true for management/administration staff as well as for non-management/administration staff
5. Train operations (incl. Rolling stock)

5.1. Introduction
5.2. Total cost and structural characteristics
5.3. Train staff

5.4. Customer and operation management
5.5. Overhead
5.6. Track access charges and energy
5.7. Rolling stock
5.8. Conclusions
Customer management and operations management are two important support functions

Definitions

Customer management

- Planning of traffic supply and product development
- Marketing, sales (B2B, B2C)
- Customer information and support services
- Key account management

Operations management

- Duty Rostering
- Train disposition/rolling stock planning
- Timetabling and staff disposition
- Exception handling
Operation and customer management costs are lowest in GB

Operation management and customer management costs (2009)

[GBP / train-km]
Compared to country B staff numbers per train-km are higher in GB

Operation management and customer management staff (2009)

- LSE: 27.87 [fte / m train-km]
- Regio: 20.96
- IC: 23.07
- GBR 19: 24.66
- B: 21.83

- Operation management
- Customer management
Compared to country B costs per full time equivalent are lower in GB

**Operation management and customer management costs (2009)**

<table>
<thead>
<tr>
<th></th>
<th>LSE</th>
<th>Regio</th>
<th>IC</th>
<th>GBR 19</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>[k GBP / fte]</td>
<td>53.70</td>
<td>40.00</td>
<td>83.84</td>
<td>57.30</td>
<td>80.17</td>
</tr>
</tbody>
</table>

Total operation and customer management
5. Train operations (incl. Rolling stock)

5.1. Introduction
5.2. Total cost and structural characteristics
5.3. Train staff
5.4. Customer and operation management
5.5. Overhead
5.6. Track access charges and energy
5.7. Rolling stock
5.8. Conclusions
Overhead costs per train-kilometre seem to be very low in GB

Overhead costs (2009)

- LSE: 0.62
- Regio: 0.45
- IC: 0.97
- GBR 19: 0.66
- A: 0.94
- B: 1.46

1) Other: travel, information, safety

[Bar chart showing overhead costs per train-kilometre for different categories]
Other studies partially support this picture

Overhead costs

• The study on "People in the GB Rail Industry" comes to similar results for one of the countries in our sample
• For Sweden productivity in train-km per management/administration employee is slightly higher than in GB and Germany produces more than four times as many train-km per employee than British TOCs
• The German figure includes six TOCs and will probably be lower if resources from the holding are factored in and definitions of management staff are revised; despite these uncertainties the study comes to the conclusion that these factors are unlikely to fully explain this large difference
• This is also supported by the analysis on Germany included in this report which shows comparatively lean overhead structures for tendered services
5. Train operations (incl. Rolling stock)

5.1. Introduction
5.2. Total cost and structural characteristics
5.3. Train staff
5.4. Customer and operation management
5.5. Overhead
5.6. Track access charges and energy
5.7. Rolling stock
5.8. Conclusions
Track access charges are lower outside GB

Track access and energy costs (2009)

<table>
<thead>
<tr>
<th>TOC</th>
<th>Track access</th>
<th>Traction power/electric current</th>
<th>Diesel fuel</th>
<th>Stations user fee</th>
<th>Marshalling areas</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSE</td>
<td>6.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regio</td>
<td>5.59</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC</td>
<td>11.30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GBR 19</td>
<td>7.55</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>1.90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>1.69</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>7.33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>1.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cost for electric traction supply are only available for three TOCs: London Overground, Northern, Mersey and Scotrail.

In country B cost for electric traction supply are included in track access charges.
The charges for track access do not reflect the actual cost levels of infrastructure

**Track access and energy costs**

- The cost for track access per train-km is varying broadly between the five countries with Network Rail charging the highest amount per train-kilometre.
- Countries A, B and D have chosen to rather charge low track access charges which does not imply that infrastructure costs are at a lower level.
- As shown later in chapter 7 "Funding and Revenues" the countries charging low track access charges opt for a higher share of direct funding to the train operating company and vice versa.
5. Train operations (incl. Rolling stock)

5.1. Introduction
5.2. Total cost and structural characteristics
5.3. Train staff
5.4. Customer and operation management
5.5. Overhead
5.6. Track access charges and energy
5.7. Rolling stock
5.8. Conclusions
Operational and capital costs for rolling stock are highest in GB

Rolling stock costs normalised by running performance and fleet utilisation (2009)¹

---

1) For details on normalisation see chapter 9
2) A portion of rolling stock maintenance staff costs included in train operation – operation management
3) Costs for rolling stock purchase and refurbishment

---

For details on normalisation see chapter 9
A portion of rolling stock maintenance staff costs included in train operation – operation management
Costs for rolling stock purchase and refurbishment

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A part of GB's high rolling stock costs could be explained by substantial profit margins generated by the ROSCOs

ROS COs (2008)

<table>
<thead>
<tr>
<th>Year 2007</th>
<th>Expenditures</th>
<th>Revenues</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost of sales</td>
<td>Investment income</td>
</tr>
<tr>
<td>X</td>
<td>268</td>
<td>367</td>
</tr>
<tr>
<td>Y</td>
<td>260</td>
<td>300</td>
</tr>
<tr>
<td>Z</td>
<td>324</td>
<td>384</td>
</tr>
</tbody>
</table>

Source: Income Statements

1) Year 2007
The competition commission stated a variety of reasons for a not well functioning rolling stock market

**ROSCOs**

- The Competition Commission has invested the market for leasing of rolling stock for franchised passenger services and the supply of maintenance services
- Whilst the latter market segment seems to be functioning and the Commission did not find any evidence for shortages of competition, the leasing market is not fully competitive
- Some of the major reasons identified were
  - Substitutability between different fleets is limited, particularly due to technical and operational restrictions
  - The overall lack of spare capacity which weakens the ROSCOs' incentives to compete on lease rentals
  - TOCs have limited ability to refuse to do business with the ROSCOs which reduces their countervailing buying power
  - As there is no market for used rolling stock new entry into the rollings stock market is difficult
  - The mismatch of length of the franchises and asset lifetimes does not encourage TOCs to invest into own rolling stock
5. Train operations (incl. Rolling stock)

5.1. Introduction
5.2. Total cost and structural characteristics
5.3. Train staff
5.4. Customer and operation management
5.5. Overhead
5.6. Track access charges and energy
5.7. Rolling stock
5.8. Conclusions
Total cost for British train operating companies are relatively low, rolling stock cost are higher

Key findings

• Excluding track access charges GB’s total train operation cost per train-kilometre are almost the lowest in sample; however it needs to be considered that cost are compared to state railway companies

• Different structural characteristics such as travel speed and annual running performance require normalisation which has been applied where possible

• Train staff cost of GB's train operating companies are the lowest when normalised; whilst staff size for train operation in total is similar to other countries cost per full time employee are lower both for drivers and conductors

• Cost for operation and customer management are also lower in the GB, this is also true for overhead

• Track access charges per train-kilometre are highest in GB; only one comparator is on a similar level, the others charge significantly less

• GB's largest problem in competiveness results from rolling stock costs being 20-50% higher than abroad; a brief analysis of three ROSCOs' annual economic performance shows significant margins
<table>
<thead>
<tr>
<th>Content</th>
<th>page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction</td>
<td>3</td>
</tr>
<tr>
<td>2. Market development and structures</td>
<td>12</td>
</tr>
<tr>
<td>3. Performance</td>
<td>61</td>
</tr>
<tr>
<td>4. Infrastructure</td>
<td>71</td>
</tr>
<tr>
<td>5. Train operations (incl. Rolling stock)</td>
<td>116</td>
</tr>
<tr>
<td>6. Freight train operations</td>
<td>150</td>
</tr>
<tr>
<td>7. Funding and revenues</td>
<td>152</td>
</tr>
<tr>
<td>8. Market analysis Germany</td>
<td>162</td>
</tr>
<tr>
<td>9. Methodology</td>
<td>185</td>
</tr>
<tr>
<td>10. Conclusions</td>
<td>195</td>
</tr>
</tbody>
</table>
Freight train operations in GB appear to be high but data from other operators is hardly available.

FOCs (2008)

<table>
<thead>
<tr>
<th></th>
<th>[GBP / train-km]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB Schenker (former EWS)</td>
<td>34.9 35.3</td>
</tr>
<tr>
<td>Freightliner Ltd.¹</td>
<td>30.8 31.3</td>
</tr>
<tr>
<td>Freightliner Heavy Haul</td>
<td>26.9      30.8</td>
</tr>
<tr>
<td>A</td>
<td>16.4 14.0</td>
</tr>
<tr>
<td>B</td>
<td>12.4 n/a</td>
</tr>
</tbody>
</table>

¹ Year 2009
<table>
<thead>
<tr>
<th>Content</th>
<th>page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction</td>
<td>3</td>
</tr>
<tr>
<td>2. Market development and structures</td>
<td>12</td>
</tr>
<tr>
<td>3. Performance</td>
<td>61</td>
</tr>
<tr>
<td>4. Infrastructure</td>
<td>71</td>
</tr>
<tr>
<td>5. Train operations (incl. Rolling stock)</td>
<td>116</td>
</tr>
<tr>
<td>6. Freight train operations</td>
<td>150</td>
</tr>
<tr>
<td>7. Funding and revenues</td>
<td>152</td>
</tr>
<tr>
<td>8. Market analysis Germany</td>
<td>162</td>
</tr>
<tr>
<td>9. Methodology</td>
<td>185</td>
</tr>
<tr>
<td>10. Conclusions</td>
<td>195</td>
</tr>
</tbody>
</table>
Total income streams for the railway system originate from generic revenues and state provisions

Overview

- Track access charges
- Traction power charges
- Stations user fees
- Provision of marshalling yards

Infrastructure manager

Train operating companies

State funding

Revenues

State funding

Revenues (fare box)

Funding for rolling stock
Total income for infrastructure and train operations is highest per train kilometre in GB

**Total income**\(^1\) streams (2009)

<table>
<thead>
<tr>
<th>Country</th>
<th>Infrastructure</th>
<th>Train Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>GBR</td>
<td>23.6</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>18.2</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>16.4</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>15.4</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>13.4</td>
<td></td>
</tr>
</tbody>
</table>

1) State and public funding (CAPEX excluded), farebox revenues and ancillary business excl. financial flows between TOCs and IMs

- **Yellow**: Infrastructure state funding
- **Green**: Train operations revenues
- **Orange**: Infrastructure revenues
- **Grey**: Rolling stock funding
- **Red**: Train operations state funding
Total system funding per passenger kilometre is highest in GB

Total income¹) streams (2009)

1) State and public funding (CAPEX excluded), farebox revenues and ancillary business excl. financial flows between TOCs and IMs

- Infra-structure
  - GBR: 230.3 [GBP / k passenger-km]
  - A: 95.5
  - B: 127.4
  - C: 126.7
  - D: 115.6

- Train operation

[Infra-structure state funding, Infrastructure revenues, Train operations revenues, Rolling stock funding, Train operations state funding]
In most countries infrastructure is dominantly financed through state funding

Share of total revenues incl. state and public funding (2009)

<table>
<thead>
<tr>
<th></th>
<th>Track access charges</th>
<th>Traction power</th>
<th>Other revenues</th>
<th>State funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>NR</td>
<td>64</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>38</td>
<td>47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>79</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>89</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>67</td>
<td>33</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In GB both track access charges per train-km and revenues from other sources are comparatively high.

**Total infrastructure revenues (2009)**

![Graph showing total infrastructure revenues in GBP per train-km for different categories: NR, A, B, C, and D.]

- **NR**: 3.90 GBP / train-km
- **A**: 4.79 GBP / train-km
- **B**: 1.19 GBP / train-km
- **C**: 0.39 GBP / train-km
- **D**: 1.75 GBP / train-km

The graph is color-coded as follows:
- **Dark green**: Track access
- **Yellow**: Charges for traction power
- **Red**: Stations user fee
- **Purple**: Rental of stations and buildings
- **Orange**: Fees for providing marshalling areas
- **Gray**: Other revenues

1) Excluding traction power supply
GB is the only country in the sample where train operating companies' income includes a large share of state funding.

Share of total revenues incl. state and public funding (2009)

<table>
<thead>
<tr>
<th>Country</th>
<th>State and public funding</th>
<th>Other revenues</th>
<th>Advertising and merchandising</th>
<th>Farebox revenues</th>
<th>Food &amp; beverages</th>
</tr>
</thead>
<tbody>
<tr>
<td>GB</td>
<td>89%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LSE</td>
<td>6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regio</td>
<td>59%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC</td>
<td>82%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GBR 19</td>
<td>81%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>97%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>95%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>82%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Regular passenger revenues per train kilometre are highest in the UK

Regular passenger revenues (2009)

[GBP / train-km]

<table>
<thead>
<tr>
<th></th>
<th>LSE</th>
<th>Regio</th>
<th>IC</th>
<th>GBR 19</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>15.37</td>
<td>6.93</td>
<td>18.09</td>
<td>13.58</td>
<td>13.13</td>
<td>11.68</td>
<td>12.23</td>
<td>8.18</td>
</tr>
</tbody>
</table>

1) Other revenues in GB include revenue commissions which are payed by other TOCs for selling their tickets.

Farebox revenues | Other revenues\(^1\) | Food & beverages
The fare levels per passenger-kilometre stand out in GB

**Regular passenger revenues (2009)**

[GBP / k passenger-km]

1) Other revenues in GB include revenue commissions which are payed by other TOCs for selling their tickets

- LSE: 129.38
- Regio: 111.53
- IC: 131.53
- GBR 19: 127.03
- A: 67.14
- B: 85.50
- C: 87.56
- D: 67.13

- Farebox revenues
- Other revenues
- Food & beverages
GB's railway system receives higher income streams per passenger and train kilometre than other comparators

Conclusions

• In GB funding and revenue per train-kilometre including infrastructure, train operations and rolling stock is highest in sample
• Due to GB's comparatively lower utilisation of trains the funding level per passenger-kilometre is even much higher compared to other countries
• Regarding infrastructure most countries including GB finance the majority of their expenditures through state and public funding; one country generates an exceptionally high share of track access charges
• GB also generates higher infrastructure revenues per train-kilometre than other countries; they are mainly driven by rental of stations and buildings
• In contrast to other countries GB finances train operators more extensively through state and public funding
• This practice corresponds to the fact that operators pay higher track access charges per train-kilometre than elsewhere
• Regular passenger revenues per train-kilometre (fare box) are higher than in other countries; lower train utilisation leads to more significant disadvantages when relating these revenues to passenger-kilometres
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8.1. Market structure, supply and demand

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8.5. Conclusions

Exchange rate applied in this chapter: ECB 3rd of December 1 EUR= 0.848 GBP

The German regional rail services market is still characterised by a co-existence of direct awarding and tendering

**Market characteristics regional services Germany**

- **From the view of the operators** the passenger rail services market in Germany is characterised by a **parallelism of**
  - non-subsidized **long-distance services**, with, despite free market access, still a 99% market share at national rail operator Deutsche Bahn AG - DB) **and**
  - regional and short-distance subsidized services (so called **regional services**), with co-existence of direct awarding and competitive tendering
  - Until the end of 2009, approximately 32% of the annual volume of 630 million train kilometres p.a. (m tkm) was put out to public tender
- **Subsidies** were thereby **reduced by an average of 26% per train kilometre** (tkm), enabling authorities a.o. to increase train kilometres offered to passengers by 31% since the market-reform in the mid-1990s
- DBs‘ market share decreased to 80%, but their volume in train kilometres increased

---

Until the financial crisis in 2009 rail services increased their market share, a.o. due to a higher quality of regional services

Market share of rail in passenger transport sector

<table>
<thead>
<tr>
<th>Rail market share based on passenger km p.a.</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share in %</td>
<td></td>
</tr>
<tr>
<td>2002 6.8</td>
<td>• Rail services (long-distance and regional services) increased their market share</td>
</tr>
<tr>
<td>2003 6.9</td>
<td>• Reasons discussed (2)</td>
</tr>
<tr>
<td>2004 6.9</td>
<td>– Increased level of regional services, e.g. frequency, quality … (main reason)</td>
</tr>
<tr>
<td>2005 7.4</td>
<td>– New high-speed lines</td>
</tr>
<tr>
<td>2006 7.5</td>
<td>– Gasoline price increases</td>
</tr>
<tr>
<td>2007 7.5</td>
<td>• Allianz pro Schiene (2010) confirms in a study of 15 cases increases in passenger figures of 48% to 3790% due to increased service levels</td>
</tr>
<tr>
<td>2008 7.8</td>
<td>• Note: a significant share of enhancement of supply was re-funded by reduced subsidies due to tendering</td>
</tr>
</tbody>
</table>

1 Source: Allianz pro Schiene (2009, p. 13). In 2009 a slight decrease occurred due to financial crisis (see DB (2010, p. 19)

2 Discussed e.g. by BAG SPNV (2010, p. 27) and Lalive and Schmutzler (2008)

3 More details on the development of quality well be described in the next subchapter)
Based on DB figures competitors are primarily operating services with a limited volume of passengers

**Market development of regional services**

**Development of passenger km p.a. (Pkm)**

<table>
<thead>
<tr>
<th>Year</th>
<th>bn Pkm</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>41</td>
<td>6%</td>
</tr>
<tr>
<td>2006</td>
<td>44</td>
<td>10%</td>
</tr>
<tr>
<td>2007</td>
<td>45</td>
<td>11%</td>
</tr>
<tr>
<td>2008</td>
<td>47</td>
<td>13%</td>
</tr>
<tr>
<td>2009</td>
<td>47</td>
<td>14%</td>
</tr>
</tbody>
</table>

**Development of train km p.a. (Tkm)**

<table>
<thead>
<tr>
<th>Year</th>
<th>m Tkm</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>633</td>
<td>15%</td>
</tr>
<tr>
<td>2006</td>
<td>637</td>
<td>18%</td>
</tr>
<tr>
<td>2007</td>
<td>633</td>
<td>19%</td>
</tr>
<tr>
<td>2008</td>
<td>629</td>
<td>23%</td>
</tr>
<tr>
<td>2009</td>
<td>629</td>
<td>26%</td>
</tr>
</tbody>
</table>

1 Source: DB (2010, pp. 19/20)

2 Note: According to BMVBS (2010, pp. 220-221) passenger-km p.a. were 36.1 bn in 1996. The 30% increase until 2009 is thus seen as a clear success story of regionalisation of subsidised passenger rail services.
Despite a 14 year history of tendering a strong impact of national, state owned and municipal operators still remains

**Distribution of market shares in 2009**

### Market share of DB and competitors

- **DB**: 79.9% (503 Tkm)
- **Local incumbents**: 2.7% (17 m Tkm)
- **Competitors**: 17.4% (110 m Tkm)

### Distribution of competitors

- **Arriva**: 26.8%
- **Veolia**: 19.6%
- **Other municipal TOCs**: 8.1%
- **BeNex**: 7.0%
- **AVG**: 6.7%
- **Keolis**: 6.7%
- **HLB**: 6.2%
- **NedRailways**: 4.6%
- **EIB**: 3.8%
- **SBB**: 1.9%
- **Transdev**: 0.9%
- **Ruhrtalbahn**: 0.4%
- **Rhenus**: 0.1%
- **Other**: 0.1%

**Source**: KCW (2009, pp. 28/29), based on ~630 m tkm. Expected market share of competitors in 2011: 22.3%

**Note**: Market share of DB includes contracts directly awarded and contracts won in tender. Local incumbents are operators where awarding is due to historical relationship (no tendering to be expected)
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On average PTAs realised savings between 15% and 47%, depending on the type of service.

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Savings (average)</th>
<th>Competitive price</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB (direct awards)</td>
<td>47%</td>
<td>4.26</td>
</tr>
<tr>
<td>Main line</td>
<td>15%</td>
<td>6.86</td>
</tr>
<tr>
<td>Secondary line</td>
<td>33%</td>
<td>5.37</td>
</tr>
<tr>
<td>Mixed</td>
<td>23%</td>
<td>6.23</td>
</tr>
<tr>
<td>S-Bahn²</td>
<td>26%</td>
<td>5.96</td>
</tr>
<tr>
<td>All services tendered</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: KCW (2009, p. 28/29). Note: The authors calculated savings for the period 2002 to 2024 based on inflation of 1.5%, so competitive prices are only an indication.

1) S-Bahn: suburban networks serving metropolitan areas in high frequency

Note: So far no major gross-cost/net subsidy increase (after adjustment of inflation) has been announced for regional services in Germany.
In Germany half of the procurement budgets for train services cover access charges

**Average distribution of costs of production (1 of 4)**

**General assessment according to BAG SPNV (2010)**

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolling stock (capital costs, maintenance, cleaning)</td>
<td>20%</td>
</tr>
<tr>
<td>Staff (excl. maintenance)</td>
<td>12%</td>
</tr>
<tr>
<td>Energy</td>
<td>14%</td>
</tr>
<tr>
<td>Infrastructure: stations</td>
<td>9%</td>
</tr>
<tr>
<td>Infrastructure: track</td>
<td>41%</td>
</tr>
<tr>
<td>Other costs</td>
<td>4%</td>
</tr>
</tbody>
</table>

**Additional explanations**

- The figures presented here may only enable a general impression on the distribution of costs of regional services in Germany as they show average shares of operating costs per train kilometre.
- Like in other countries the height of costs for operating a specific network in reality depends on the service characteristics.
- Note that price increases of energy, staff and infrastructure are usually taken over by PTAs in Germany, why related risk margins are limited.

---

1 All values presented in this subchapter are mean values based on experiences of PTAs (source: BAG SPNV (2010, pp. 11/12)), verified by expert interviews with TOCs. Note: BAG SPNV is the national association of rail tendering authorities. Note also: Main provider of infrastructure in Germany: DB.
There is a strong variation in costs per function

**Average distribution of costs of production (2 of 4)**

**Note on infrastructure costs**

- Track access charges and user fees for stations show high variation depending on the classification of track (e.g. electrified main line vs. non-electrified secondary line) and stations (e.g. central station vs. flag stop)

- Note: DBs price system for stations will have to be changed due to a notification of the German network authority as of December 10, 2009 who claimed this system to be discriminatory

- Price increase expected by BAG SPNV for upcoming years: 2% to 3% p.a.

---

**Spread of operating costs in £ per tkm**

1 Source: BAG SPNV (2010, pp. 11-19) and assessments by experts (operators) interviewed. Note: Costs for Infrastructure and Energy are solely based on assessments by experts

2 On some lines operators are allowed to use depreciated vehicles
BAG SPNV, the association of rail tendering authorities, stresses that there is a significant variation in costs

Average distribution of costs of production (3 of 4)\(^1\)

Variation and expected increase of main cost drivers

- **Rolling stock:**
  - Share varies between 15% to 25% (0.42 £ to 2.97 £ per train kilometre – tkm), depending on
    - Type and age of vehicles required (capital costs for depreciated vehicles: ~0 £/tkm, capital costs for new cars: ~2.12 £/tkm)
    - Recovery periods used (which vary between 15 to 30 years, depending on kind of vehicle, risk aversion of the owner and kind of operations)
    - Volume operated by vehicle (costs for vehicle used only during peak hours: > 2,54 £ per tkm)
    - Height of maintenance costs, which varies between 0.42 £ to 1,70 £ per tkm, depending on kind and age of vehicle as well as capital costs, size and efficiency of the workshop
  - Price increase expected by BAG SPNV for upcoming years : 3% p.a.

- **Energy:**
  - Share varies between 8% and 15% of total costs (0.22 £/tkm to 1,78 £/tkm for electricity and 0.42 £/tkm to 1.27 £/tkm for diesel), depending on the mode of traction (electrified or diesel), the kind of services (and thus the kind of vehicles) and the topography
  - Price increase expected by BAG SPNV for upcoming years : 4% p.a.

---

1 Source: BAG SPNV (2010, pp. 11-19)
Variation of costs is not only depending on the type of service, but also on the market power of the incumbent

Average distribution of costs of production (4 of 4)

Variation of further costs & revenues¹)

- **Staff costs** presented by BAG SPNV are only costs for ticket collectors and for engine-drivers
  - Costs vary between 0.42 £ and 1.27 £ per tkm, primarily depending on the proportion of train guards required (minimum proportion with respect to fare dodgers discussed in Germany: 10%)
  - Price increase expected by BAG SPNV for upcoming years: 2.5% p.a.,

- **Other costs**
  - Are primarily costs for sales and distribution
    - Share is usually below 5% and varies between 0.17 £ 0.42 £ per tkm, depending on the kind of service, number of vending machines permitted and the fare system applied
    - Price increase expected by BAG SPNV for upcoming years: 2% p.a.
  - Furthermore other costs also entail administration costs (overhead), insurances, profit, ... .

- **Fare revenue varies** (usually 1.27 £/tkm to 2.54 £/tkm)

Cost advantages of incumbent operator²)

Its market power provides DB with several advantages for its own business, what also influences cost variations

- Sales provision for ticket distribution differs
  - Provision paid by DB to competitors: 5-8% of fare sales
  - Provision to be paid by competitors to DB: 10-18% of fare sales (rationale: DB operates the clearing-house)

- Purchasing power of DB, e.g. double stack wagon
  - DB price at Bombardier: ~1.02 m £ per vehicle
  - Price for competitors: ~1.19 m £ per vehicle

- Funding conditions: Public operators like DB (and other public TOCs) benefit from low capital costs

Note: even return on sales in 2008 shows a difference

- DB Regio AG: 11.2% (plus overhead costs of a ~8.1% share of turnover)
- Competitors: < 5.0%

¹) Source: BAG-SPNV (2010, pp. 19-21)
²) Source: KCW (2009, pp. 44/45, 59 and 62)

Note: A recent agreement between BAG SPNV and DB is that for using DBs generic product categories (e.g. „S-Bahn“) PTAs will pay 0.004 € per tkm (Source: RoterRenner 2010-107)
The results of tendering procedures also show a high variation, why general statements on prices are difficult

### Variation of net subsidies per tender

<table>
<thead>
<tr>
<th>Net subsidy payment in £ per train kilometre (in 2010 prices)¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary line (diesel)</td>
</tr>
<tr>
<td>Secondary line (diesel)</td>
</tr>
<tr>
<td>Secondary line (diesel)</td>
</tr>
<tr>
<td>Sachsen-Anhalt-Süd (secondary line, diesel)</td>
</tr>
<tr>
<td>Altmark-Börde-Anhalt (secondary line, diesel)</td>
</tr>
<tr>
<td>S-Bahn Rhein-Neckar</td>
</tr>
<tr>
<td>Mosel RB (secondary line, electrified)</td>
</tr>
<tr>
<td>Secondary line (diesel)</td>
</tr>
<tr>
<td>S-Bahn Stuttgart</td>
</tr>
<tr>
<td>Secondary line (diesel)</td>
</tr>
<tr>
<td>Main line (electrified)</td>
</tr>
<tr>
<td>S-Bahn Bremen</td>
</tr>
<tr>
<td>Löhne-Hildesheim (secondary line, diesel)</td>
</tr>
<tr>
<td>Passau-Munich (Main line, electrified)</td>
</tr>
</tbody>
</table>

²) Including indicative figures. Price adjustment applied: 1.5% p.a.

Source of data: Geyer (2008), own research, KCW (2009, p.46) and Beck and Kühl (2007, p. 782)
Germany's tendering partially led to significantly lower prices

Total train operation costs (2009, excluding track access, non normalised)

[GBP / train-km]

[GBP / train-km] for Germany: Prices out of tendering procedures, based on assessments by experts

1) Cost distribution of shaded block not known
2) Operation management costs here contains a portion of rolling stock maintenance staff costs

<table>
<thead>
<tr>
<th></th>
<th>LSE\textsuperscript{2})</th>
<th>Regio\textsuperscript{2})</th>
<th>IC\textsuperscript{2})</th>
<th>GBR 19\textsuperscript{2})</th>
<th>A</th>
<th>B</th>
<th>C\textsuperscript{1})</th>
<th>D\textsuperscript{1})</th>
</tr>
</thead>
</table>

© civity 2010 /// 2011/05/23_civity_WholeIndustryCostBenchmarking.pptx
The specific framework conditions need to be considered when comparing German train operation costs

Remarks on Germany's cost position

• In Germany mainly secondary lines have been tendered so far; they require comparatively lower standards in terms of rolling stock and cause lower infrastructure costs

• Lower rolling stock cost are also due to fleet that has already been written off

• The 5.24 GBP per train-kilometre is an assessment of average cost; the bandwidth for regional trains and secondary lines ranges between 17 and 6 GBP (including track access charges)

• Costs are not normalised considering travel speeds, stops and annual running performance
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8.5. Conclusions
Tendering hasn‘t improved infrastructure quality directly, but it raised quality levels of vehicles and services

Effects of tendering on quality

Tracks & stations: No direct influence

- No direct influence since infrastructure is primarily operated by incumbent DB (usually no tender on operating infrastructure) and service operators are only able to contract DB
- Several reports claim that (re-) investment and maintenance activities of DB diminished in recent years due to increased goals on profit
- Although providing infrastructure is a main task of DB (and the federal level), several regional PTAs have co-funded investments to improve quality of infrastructure in recent years
- Some states have even reopened stations and lines already closed before market reform (for example Schleswig-Holstein: 23 stations new or reopened and two lines reopened)

Vehicles and services: direct influence

- Tendering conditions usually foresee new vehicles and, compared to the incumbent DB, improved levels of service quality (punctuality, quote of train guards, air conditioning, cars accessible for disabled …)
- Since market reform supply, measured in train kilometres p.a., has increased by ~31%. A major part has been refunded by efficiency gains from introducing competitive tendering
- Furthermore, several operators introduced further quality improvements on their own, especially in case of net-cost contracts
- Such quality improvements will be described in more detail in a case study analysis in the next subchapter

1 Source: BAG-SPNV (2009 and 2006) and Netzwerk Privatbahnen (2006)
2 Source: SCI Verkehr (2006)
In Berlin-Brandenburg customer satisfaction is higher on networks tendered out to private operators than on those of DB

An example for customer marks: survey-results from Berlin-Brandenburg

### Customer satisfaction measured by marks

<table>
<thead>
<tr>
<th>Year</th>
<th>DB Regio (DB)</th>
<th>ODEG I+II (Arriva &amp; BeNex)</th>
<th>ODEG III (Arriva &amp; BeNex)</th>
<th>PEG (Arriva)</th>
<th>OLA-MR (Veolia)</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>2.07</td>
<td>1.56</td>
<td>1.57</td>
<td>1.44</td>
<td>1.57</td>
<td>1.56</td>
</tr>
<tr>
<td>2009</td>
<td>2.10</td>
<td>1.68</td>
<td>1.68</td>
<td>1.50</td>
<td>1.58</td>
<td>1.58</td>
</tr>
</tbody>
</table>

### Explanations

- Note: DB, the incumbent operator, still operates 80% of all 36 m Tkm (main and secondary-lines) in Berlin-Brandenburg region (including a small line section that has been tendered out)
- School grades used in survey:
  - Very good = 1 to
  - Defective = 6

1 Source: VBB (2009, p. 24)

Legend: Network (and affiliated operators)
- **DB Regio (DB)**
- **ODEG I+II (Arriva & BeNex)**
- **ODEG III (Arriva & BeNex)**
- **PEG (Arriva)**
- **OLA-MR (Veolia)**
- **NE 26 (Veolia)**
- **NE 27 (Veolia)**
- **Average**
Services tendered out to private operators in Berlin-Brandenburg show higher quality levels than those of DB

An example for quality of vehicles: evaluation results from Berlin-Brandenburg

Share of damage-free vehicles

<table>
<thead>
<tr>
<th>Year</th>
<th>DB Regio (DB)</th>
<th>ODEG I-II (Arriva &amp; BeNex)</th>
<th>NE 27 (Veolia)</th>
<th>NE 26 (Veolia)</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>99.78%</td>
<td>98.60%</td>
<td>98.19%</td>
<td>98.65%</td>
<td>98.53%</td>
</tr>
<tr>
<td>2009</td>
<td>99.99%</td>
<td>99.10%</td>
<td>98.18%</td>
<td>98.65%</td>
<td>99.60%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Share of damage-free vehicles</th>
<th>Share of clean vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>99.56% 99.60%</td>
<td>90.56% 94.82%</td>
</tr>
<tr>
<td>2009</td>
<td>99.78% 99.70%</td>
<td>97.26% 97.63%</td>
</tr>
</tbody>
</table>

Source: VBB (2009, p. 23)

Legend: Network (and affiliated companies)

1 DB Regio (DB), ODEG I-II (Arriva & BeNex), NE 27 (Veolia), NE 26 (Veolia), Average
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The case studies will present a detailed description of the Marschbahn and the Odenwaldbahn tender

Case studies – outline of main results

Schleswig-Holstein: Marschbahn

„Marschbahn“ tender (Hamburg – Westerland-Sylt)
- Main line operations (route length: 273 km, volume: 4.2 m tkm, start of operation: December 2005)
- Guarantee for reuse of rolling stock & net cost contract
- Strong quality increases e.g.
  - New rolling stock equipment (among others low floor access and suitable for the disabled)
  - Air-conditioning and audio system
- But: initial difficulties with teething troubles
- Net Savings realised by tendering authority through tender (despite strong quality increases)
  - Approx. 11.9 m GBP per year
  - Approx. 119 m GBP over the 10-year contract
- Net subsidies down by 42% to 3.71 £ per tkm, but Veolia experienced a winner’s curse due to over-estimated passenger figures (-73,4 m £ in 2006)

Hesse: Odenwaldbahn

“Odenwaldbahn” tender (Frankfurt/Darmstadt – Odenwald-area)
- Secondary line operations (route length: 210 km, 1.84 m tkm, start of operation: December 2005)
- Rolling stock pool owned by tendering authority and gross cost contract
- Strong quality increases, esp. new rolling stock
  - Allows for reduction of trip length up to 20 min.
  - Low floor and suitable for the disabled
  - Air-conditioning and noise-reduction
- Increase of demand by approx. 20% despite initial difficulties with infrastructure and teething troubles
- Effects of tender: Stabilization of price
- The operator Vias has reported a profit: 922 k £ in 2006, 53 k £ in 2007 and 350 k £ in 2008

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Despite a significant decrease in net subsidies introducing tendering in Germany has improved quality

Main results of competitive tendering in Germany

- German regional passenger rail services experienced numerous cases where competitive tendering was introduced by PTAs since market reform in the mid-1990s
- Subsidies were thereby reduced by an average of 26% per train kilometre, enabling authorities a.o. to increase train kilometres p.a. offered to passengers by 31% since market-reform in the mid-1990s
- Despite a strong increase in efficiency tendering conditions usually require a significant quality improvement (e.g. new vehicles, increased requirements on punctuality, higher service levels), what has supported an increase in passenger kilometres p.a. by around 14% since the mid-1990s
- DBs’ market share in train kilometres p.a. decreased to 80%, but their volume in real terms increased
- Main competitors of DB are Veolia and Arriva
- Usually half of the share of costs is determined by access charges for tracks and stations, while rolling stock shows a ~20% share, energy a ~14% share and staff a ~12% share
- Case studies analysed show a strong variation of net payments by state authorities to operators, with an average net subsidy level of 5.90 £ per train kilometre, and a spread of 0.64 £ to 10.63 £ per train kilometre

1) Source: Beck, A. (2010), DB (2010), KCW (2009, p. 34) and own research
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<th>page</th>
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<tr>
<td>3. Performance</td>
<td>61</td>
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<td>185</td>
</tr>
<tr>
<td>10. Conclusions</td>
<td>195</td>
</tr>
</tbody>
</table>
To compare costs a well proven normalisation process including an aggregation to cover whole industry costs will be applied.

**Overview on normalisation process**

**Raw data**
collected via questionnaire and cleaned e.g. from extraordinary effects and validated in visits etc.

**Normalisation topics**
- PPP
- Infrastructure
- Train operations
- Rolling stock

**Normalised costs per km**
- Infrastructure
- Train operating
- Rolling stock

**Aggregation process**
Normalised whole industry including train operation costs
Some of the possible key normalisation factors are indicated in the graph

<table>
<thead>
<tr>
<th>Railway system</th>
<th>Currency conversion with PPPs</th>
<th>Individual normalisation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Annual revenues</strong></td>
<td>Funding</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transport business</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ancillary business</td>
<td></td>
</tr>
<tr>
<td><strong>Annual costs</strong></td>
<td><strong>Infrastructure</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Renewal</td>
<td>Utilisation (train-/track-km)</td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td>Switch density</td>
</tr>
<tr>
<td></td>
<td>Traffic Control</td>
<td>Degree of electrification</td>
</tr>
<tr>
<td><strong>Freight train operation</strong></td>
<td><strong>Total costs</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Passenger train operation</strong></td>
<td><strong>Overhead &amp; management functions</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Train staff</td>
<td>Travel Speed</td>
</tr>
<tr>
<td><strong>Rolling stock</strong></td>
<td>Capital Cost</td>
<td>Running performance</td>
</tr>
<tr>
<td></td>
<td>Maintenance &amp; cleaning</td>
<td>Distance between stops</td>
</tr>
<tr>
<td></td>
<td>Energy</td>
<td>Fleet reserve</td>
</tr>
<tr>
<td><strong>Extraordinary costs</strong></td>
<td>Investment &amp; enhancement</td>
<td></td>
</tr>
</tbody>
</table>
International cost benchmarks need to be based on meaningful currency conversions

Comparative price levels based on OECD-Eurostat PPPs

- Often, income or Gross Domestic Product (GDP) levels across countries are compared by applying exchange rates only
- However, exchange rates only partly reflect relative prices of goods that are domestically consumed
- Purchasing Power Parities (PPPs) are currency conversion rates that convert to a common currency and equalise the purchasing power of different currencies. In other words, they eliminate the differences in national price levels
- PPP normalise the respective national cost level that cannot be influenced by the companies

<table>
<thead>
<tr>
<th></th>
<th>DK</th>
<th>CH</th>
<th>SE</th>
<th>UK</th>
<th>FR</th>
<th>NE</th>
<th>DE</th>
<th>AT</th>
<th>IT</th>
<th>SP</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPP-normalisation 2007</td>
<td>1,00</td>
<td>0,87</td>
<td>0,85</td>
<td>0,84</td>
<td>0,79</td>
<td>0,77</td>
<td>0,77</td>
<td>0,75</td>
<td>0,75</td>
<td>0,64</td>
</tr>
</tbody>
</table>
To make infrastructure costs internationally comparable different purchasing power parities could be used

**PPPs for different expenditure categories**

**Structure of PPP aggregation**

- GDP
- 31 categories
- Actual collective consumption
- Gross fixed capital formation
- 71 groups
- Machinery + equipment
- Construction
- 152 classes
- Civil engineering works

**Which PPP should be used?**

- Purchasing Power Parities (PPPs) are exchange rates taking into account that prices and volumes might differ between countries.
- 60 different PPPs are published by EUROSTAT and OECD.
- GDP as the main aggregate contains all expenditures being made in an economy.
- Which PPP should be used usually depends on the type of expenditure being compared
- Ideally the PPP should well cover the goods being compared
- We tested the application of the four PPPs highlighted in the left illustration

---

1Source: EUROSTAT/OECD 2006, Methodological manual on purchasing power parities, Ed. 2005, Luxembourg
The impact of using a more specific PPPs than GDP for infrastructure expenditures is not convincing

Example applying different PPPs

k GBP/main track km

Maintenance costs of five countries

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>A</th>
<th>NR</th>
<th>D</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>76</td>
<td>42</td>
<td>37</td>
<td>31</td>
<td>19</td>
</tr>
<tr>
<td>GFCF</td>
<td>73</td>
<td>42</td>
<td>40</td>
<td>34</td>
<td>19</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>A</th>
<th>NR</th>
<th>D</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>76</td>
<td>43</td>
<td>42</td>
<td>33</td>
<td>18</td>
</tr>
<tr>
<td>GFCF</td>
<td>92</td>
<td>45</td>
<td>42</td>
<td>37</td>
<td>20</td>
</tr>
</tbody>
</table>

Approach and recommendation

- We used the PPP for
  - Gross Domestic Product (GDP)
  - Gross fixed capital formation (GFCF)
  - Construction (C)
  - Civil Engineering Works (CEW)
to compare their impact on cost positions

- C and the CEW cover very limited baskets of goods and are therefore not usable to compare aggregated infrastructure costs

- Only the CEW PPP leads to significantly different results (NR compared to maximum, minimum and average) – all other concepts produce similar results

- For the best approximation it is recommended to continue using the GDP PPP
Normalisation of infrastructure costs is based on existing UIC practices

**LICB methodology**

### Current methodology

<table>
<thead>
<tr>
<th>Input data</th>
<th>Normalisation steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance cost</td>
<td>1 Purchasing Power Parities</td>
</tr>
<tr>
<td>Average renewal expenditures</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Infrastructure details</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Main track</td>
<td>2 Degree of electrification</td>
</tr>
<tr>
<td>Electrified main track</td>
<td></td>
</tr>
<tr>
<td>Single and multiple track</td>
<td>3 Single vs. multiple track</td>
</tr>
<tr>
<td>Switches in main track</td>
<td></td>
</tr>
<tr>
<td>Train frequency</td>
<td>4 Switch densities</td>
</tr>
<tr>
<td>Gross tonnage</td>
<td></td>
</tr>
</tbody>
</table>

The following LICB or commonly utilised structural parameters will not be normalised:

- Single versus multiple track (LICB-methodology)
- Built-up areas of stations incl. platforms
- SEU density
- Slab or ballasted track

- No data available
- Level too detailed
To generate a solid comparison, the costs of each analysed company will be allocated to the cost structure

Scheme of the cost structure

- The basis for qualified benchmarking is the classification of costs into a proven cost structure
- This guarantees a comparability of data from different transportation companies regardless of their organisational structure and their cost accounting system
For the train operating cost benchmarking a proven normalisation approach will be applied

Overview methodology

Methodology

<table>
<thead>
<tr>
<th>Input data</th>
<th>Normalisation steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Staff costs train operating and management</td>
<td>1 Purchasing Power Parities</td>
</tr>
<tr>
<td>- Maintenance vehicles</td>
<td>2 Travel speed</td>
</tr>
<tr>
<td>- CAPEX vehicles</td>
<td>3 Running performance</td>
</tr>
<tr>
<td>Structural details</td>
<td>4 Average distance between stops</td>
</tr>
<tr>
<td>- Train km</td>
<td>5 Fleet reserve</td>
</tr>
<tr>
<td>- Car-km</td>
<td></td>
</tr>
<tr>
<td>- Passenger-km</td>
<td></td>
</tr>
<tr>
<td>- Number of cars, locos, EMU, DIMU</td>
<td></td>
</tr>
<tr>
<td>- Number of workshops</td>
<td></td>
</tr>
<tr>
<td>- Number of ticket vending machines</td>
<td></td>
</tr>
</tbody>
</table>

Example on normalising driver service costs

Costs per train-km

Reference level
Stopping actions and annual running performance are dominant cost-drivers that need to be normalised.

Example

Average distance between stops [route km]

Average annual running performance [k vkm/year]

- Unit cost per km in favourable operating conditions
- Unit cost per km in unfavourable operating conditions
- Reference case ("norm")
- Degressive unit cost per km due to base-level of fixed cost per vehicle and year
<table>
<thead>
<tr>
<th>Content</th>
<th>page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction</td>
<td>3</td>
</tr>
<tr>
<td>2. Market development and structures</td>
<td>12</td>
</tr>
<tr>
<td>3. Performance</td>
<td>61</td>
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<td>195</td>
</tr>
</tbody>
</table>
In GB total system costs are higher than in other countries

Total System Costs (partly normalised<sup>1)</sup>)

<table>
<thead>
<tr>
<th>Country</th>
<th>[GBP / train km]</th>
<th>[GBP / k passenger-km]</th>
</tr>
</thead>
<tbody>
<tr>
<td>GBR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
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<tr>
<td>C</td>
<td></td>
<td></td>
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<tr>
<td>D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Infrastructure has been fully normalised, train operation and rolling stock has been normalised for the countries where normalisation factors were known.
Especially in infrastructure and rolling stock cost per train-km are higher

Total System Costs (partly normalised\(^1\))

<table>
<thead>
<tr>
<th>Country</th>
<th>Infrastructure</th>
<th>Rolling Stock</th>
<th>Passenger train operation</th>
<th>Track access charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>GBR</td>
<td>15.36</td>
<td>13.03</td>
<td>20.35</td>
<td>19.7</td>
</tr>
<tr>
<td>A</td>
<td>15.36</td>
<td>13.03</td>
<td>22.60</td>
<td>20.6</td>
</tr>
<tr>
<td>B</td>
<td>15.36</td>
<td>13.03</td>
<td>22.60</td>
<td>20.6</td>
</tr>
<tr>
<td>C</td>
<td>15.36</td>
<td>13.03</td>
<td>22.60</td>
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<td>22.60</td>
<td>20.6</td>
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</tbody>
</table>

\(^1\) Infrastructure has been fully normalised, train operation and rolling stock has been normalised for the countries where normalisation factors were known.

Numbers do not include track access charges.
Strong differences in ridership increase the gap between GB and comparators

Total System Costs (partly normalised$^1$)

[GBP / k passenger-km]

<table>
<thead>
<tr>
<th></th>
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<th>Track access charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>GBR</td>
<td>202</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>123</td>
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<tr>
<td>B</td>
<td>120</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>124</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>112</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Infrastructure has been fully normalised, train operation and rolling stock has been normalised for the countries where normalisation factors were known.
Numbers do not include track access charges.
Key findings (1/3)

• Among a sample (!) of European peer markets with modest (or none) progress in market opening, the UK has arguably achieved the highest degree of on-rail competition

• The overall cost-efficiency of passenger train operations in the UK shows a good competitive position in comparison with the European peers, however with the exception of rolling-stock lease expenditures

• Passenger train farebox revenues are "at the upper end" of peer group comparisons, this however is the somewhat "unhealthy" reason for low train utilisations on one hand, over-compensated by exceedingly above average tariff levels in the UK passenger market on the other ("high-end" positioning in a niche-market segment) – a repositioning of the UK passenger rail system, as successfully demonstrated by countries like Switzerland, looks appealing in a thrust to add more value to the system in the future

• The rail network utilisation in the UK ranges close to peer group average, which is equivalent to low infrastructure asset turnover, yet this may be partly attributable to the different travel and freight traffic geographies of the respective countries
System cost

Key findings (2/3)

• The industry set-up at the interface between infrastructure and train operations in the UK is geared towards very high levels of track access charging, which however does not appear to have any immediate, beneficial steering effects

• Network infrastructure costs in the UK are substantially above peer levels, which is a result of both, below standard cost-efficiency, but also a due recovery from historically accumulated investment backlogs

• As a grand total the overall "cash-intake" (or "resource consumption") of the UK railway system is clearly above European comparators in relative terms (compared by system size), an added benefit to the system from this extraordinary level of resources deployed cannot be detected

• In particular the total amount of tax-payer generated funding into the system, which is deployed for both, infrastructure and train operations, is by far the highest (again in relative terms) among the peers
System cost

Key findings (3/3)

• All in all, and given the relative proportions of costs for infrastructure ("high share") and train operations ("low share"), it can be concluded that the benefits of "on-rail" competition may well be playing out, they are however far less significant in absolute terms than the disadvantages that the UK system is burdened with regarding sub-standard value-for-money of network infrastructure provision.
Abbreviations

FOC: Freight Operating Company
FTE: Full Time Equivalent
IC: Intercity
LCR: London and Continental Railways
LSE: London South East
PPP: Purchasing Power Parities
ROSCO: Rolling Stock Company
TAC: Track Access Charges
TIR: Inter-Regional Express Trains (France)
TOC: Train Operating Company
TRE: Regional Express Trains (France)
TRN: National Express Trains (France)
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