High Speed – KPI & Benchmarking

Results of a UIC study

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Background of the project

> Survey on KPIs used in High Speed and benchmarking
> Initiated by the High Speed Committee of UIC
> **Focus on three key questions:**
  - What is measured?
  - What KPIs are used to measure?
  - Which KPIs could be useful for an international benchmarking?
> Input from 7 Asian and European railways
> Covers train operators and infrastructure managers
The need to manage cost and performance

Government

Infrastructure Provider

Investments  Maintenance

Operator

Rolling Stock  Operations

Clients (passengers and freight)
... and what should be measured

**Finance**
Provide a self-sustainable railway

**Reliability**
Ensure an appropriate level of reliability of technology in use

**Safety**
Provide a safe transport service and environment

**Utilisation**
Best exploit the capacity of existing assets

**Quality**
Deliver on-time and high quality transport services

**Staff**
Create a safe and motivating working environment

**Efficiency**
Improve productivity

**Environment**
Produce environmentally friendly, low emission services
Focus is on finance, quality and reliability

> Focus is on finance, quality and reliability
# Benchmarked KPIs

<table>
<thead>
<tr>
<th>KPI category</th>
<th>TOC</th>
<th>INT</th>
<th>IM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural data</td>
<td>&gt; Train frequency</td>
<td>&gt; Train frequency</td>
<td>&gt; Track / switch density</td>
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<tr>
<td></td>
<td>&gt; Train utilisation</td>
<td>&gt; Track / switch density</td>
<td>&gt; Infrastructure utilisation</td>
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<tr>
<td></td>
<td>&gt; Capacity utilisation</td>
<td></td>
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<tr>
<td>Finance</td>
<td>&gt; Revenue to cost-ratio</td>
<td>&gt; Cost per track-km</td>
<td>&gt; (Revenues per train-km)</td>
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<td></td>
<td>&gt; Cost per train-/ pax-/ seat-km</td>
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<tr>
<td>Efficiency</td>
<td>&gt; Staff hours per train-km</td>
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<td>&gt; --</td>
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<tr>
<td>Quality</td>
<td>&gt; Punctuality</td>
<td></td>
<td>&gt; Speed restrictions</td>
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<tr>
<td></td>
<td>&gt; Travel speed</td>
<td></td>
<td></td>
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<tr>
<td>Reliability</td>
<td>&gt; Train related failures/ MDBF</td>
<td></td>
<td>&gt; MTBF</td>
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<tr>
<td></td>
<td>&gt; Cancelled service hours</td>
<td></td>
<td>&gt; Cancelled service hours</td>
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<tr>
<td>Safety</td>
<td>&gt; Accidents per year</td>
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<td>&gt; --</td>
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<tr>
<td></td>
<td>&gt; Derailments per year</td>
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1) Network, trains, utilisation, supply & demand
Benchmarking needs a robust methodology

Phase 1: Set-up
- Commitment of participants
- Agreement on KPIs
- Definition of KPIs
- Comparability/methodology

Phase 2: Data collection
- Collection of data from peers
- Validation and quality assurance

Phase 3: Evaluation
- Normalisation
- Analyses and feedback
- Reporting & presentation
In total, the peer group consists of 7 companies.

Overview on participants:

- Train operating company: A, F, G
- Integrated company = both operator and infrastructure manager: B, C, D
- Infrastructure manager: E

Data is mainly relating to high speed services with speed above 250 km/h.
Performance related data cover utilisation of trains and networks

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<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
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<tbody>
<tr>
<td><strong>Train frequency</strong> [k train-km/ line-km$^1$)]</td>
<td>46</td>
<td>39</td>
<td>8</td>
<td>45</td>
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</tbody>
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<thead>
<tr>
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<th>C</th>
<th>D</th>
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</thead>
<tbody>
<tr>
<td><strong>Train utilisation</strong> [passenger-km/ train-km]</td>
<td>373</td>
<td>423</td>
<td>278</td>
<td>484</td>
</tr>
</tbody>
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<tr>
<td><strong>Capacity utilisation</strong> [passenger-km/ seat-km]</td>
<td>0.71</td>
<td>0.47</td>
<td>0.66</td>
<td>0.49</td>
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1) Line-km provided by IM
Farebox revenues will be used to demonstrate the degree of cost coverage

Revenues per seat-km [US$/k seat-km]
- 85
- 102
- 29
- 101

Revenues per passenger-km [US$/k passenger-km]
- A: 120
- B: 217
- C: 44
- D: 207

Revenues per train-km [US$/train-km]
- A: 45
- B: 92
- C: 12
- D: 100
Total cost are not available, so focus is on maintenance cost

### Maintenance cost per seat-km
[$/ k seat-km]

- **D**: 4.9
- **C**: 9.0
- **B**: 5.6

### Maintenance cost per passenger-km
[$/ k passenger-km]

- **D**: 10.1
- **C**: 13.5
- **B**: 11.9

### Maintenance cost per train-km
[$/ train-km]

- **D**: 4.9
- **C**: 3.8
- **B**: 5.0

The benefits of benchmarking

> Show own position in an international context
> Identify trends over time
> Promote critical questioning
> Regularly monitor results
> Provide a basis for target setting
> Have a basis for negotiation and funding
> Launch initial steps for improvement
Conclusion

> Complex contractual relationships require measurement
> Objectives to be measured cover numerous areas
> Infrastructure managers and operators use a number of KPIs
> There is a focus on finance, quality and reliability
> Based on these insights an international benchmarking exercise has been started
Thank you for your attention

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