Utilising benchmarking to improve metro operations

Railway & Transport Strategy Centre at Imperial College London

Richard Anderson, Managing Director

Asia Pacific Rail 2013
RTSC: independent, comparable benchmarking for the CoMET and Nova groups since 1994, with >$500m benefits achieved.

Benchmarking is “The Search for Best Practices that Lead to Superior Performance”.*

30 metros >150 performance related data items + Best practice sharing
ISBeRG, the International Suburban Rail Benchmarking Group, established 2010 – 12 Member Railways

- Oslo (NSB)
- Copenhagen (S-Tog)
- London (Overground)
- Munich (S-Bahn)
- New York (Long Island Rail Road, Metro-North)
- Sao Paulo (CPTM)
- Barcelona (FGC)
- Hong Kong (MTR)
- Tokyo (JR East)
- Sydney (CityRail)
- Brisbane (Queensland Rail)
- Melbourne (Metro Trains)

Imperial College London
Why do major transport operators in large cities find benchmarking so valuable?

- CoMET and Nova metros have combined annual operating cost of US$25 billion and employ 240,000 people
- Growing expectations demand modern, safe, reliable and efficient networks
- Benchmarking is a key tool for operators to see if they are operating optimally, and if not, how to improve

**CoMET and Nova’s role:**

- analytical work to understand performance
- disseminate and advise organisations on best practice
Benchmarking facilitates improvement by measuring performance and sharing rich information confidentially

**KPI system** - to compare performance and show where to look for best practices

**Case Studies** - In-depth research on topics of common interest, to identify best practices, often with **Expert Workshops**

**Website with Online Forum** – metros consult to each other.

**2 meetings per annum**, attended by senior directors
Network Expansion and Economic Growth is Driving Rapid Passenger Growth in Asian Metros

Passenger Journeys

% Change 2006 - 2011

Network Expansion and Economic Growth is Driving Rapid Passenger Growth in Asian Metros

Passenger Journeys
### 2012 survey of CoMET and Nova metros’ strategic and technical / tactical challenges

#### Number of Metros with Top 3 Strategic Challenge

<table>
<thead>
<tr>
<th>Challenge</th>
<th>China / India</th>
<th>Established Asian Metros</th>
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<tbody>
<tr>
<td>Network Expansion</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Government support/funding</td>
<td>10</td>
<td>7</td>
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<tr>
<td>Reducing costs</td>
<td>5</td>
<td>5</td>
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<tr>
<td>Operational Improvement and reliability</td>
<td>5</td>
<td>5</td>
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<tr>
<td>Employee training/retention/recruitment</td>
<td>5</td>
<td>5</td>
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<tr>
<td>Long-term asset improvement / renewal</td>
<td>5</td>
<td>5</td>
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<tr>
<td>Securing fare increases, revenue, ridership</td>
<td>5</td>
<td>5</td>
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<tr>
<td>New governance framework</td>
<td>5</td>
<td>5</td>
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<tr>
<td>Overcrowding / Capacity</td>
<td>5</td>
<td>5</td>
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<tr>
<td>Leveraging new technology</td>
<td>5</td>
<td>5</td>
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<tr>
<td>Regional transport plans/ integration</td>
<td>5</td>
<td>5</td>
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<tr>
<td>Labour relations / staff ethos</td>
<td>5</td>
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Benchmarking has become essential to address strategic and technical challenges.

Technology can help address many challenges: benchmarking helps share experience.

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2012: Top Technical Challenges

Metros with Top 3 Technical / Tactical Challenge

- Rolling Stock (New, refurbishment,...)
- Cost Reduction, Operational Efficiency
- CBTC and Signalling
- Track, Civils, Possessions
- Safety & Security
- Crowding and Congestion
- Organisational Change
- Reliability
- Other M&E
- Driverless / Automation

0 5 10
Modern metros must have financial sustainability and sufficient funds for future reinvestment

Note: London picture from 1990s
A KPI which describes a lot about benchmarking

Large differences in performance - shows us where to look for best practices through large differences in performance

Consistent definitions essential: it takes time to reach comparability

Asian railways are often very high performers, but their future success is often at risk

Car Km Between Incidents Causing a Delay > 5 Minutes to Service (2011)

As = Asian    Eu=Europe    Am = Americas
Financial performance is declining for 88% of Asian metros and some may not have sufficient funds for reinvestment.

Key factors determining a positive position: fares policy, suitable network development, continuous productivity improvements.
Metros have to off-set wage growth with revenue growth and increased productivity

Metro Cost of Labour per Labour Hour (nominal: unadjusted for inflation: Index 100 = earliest data year)

Yet, fares have reduced in real terms for 88% of Asian metros!
Examples of technology to improve productivity / effectiveness

- Unattended Train Operation (UTO) (Paris Line 1 & 14)
- Self diagnosis of assets – increased maintenance effectiveness
- Automatic train turnaround (Hong Kong)
- Ticketing: station staff in more customer facing roles (Madrid)
- CBTC: Potential for much higher energy efficiency / regeneration
- Remote station equipment control with CCTV (Singapore)
- Remote signing on for train drivers (Berlin)
Mainland Chinese metros appear not to be designed to optimise capacity, hindering their ability to cover fixed costs.

Density is Key! Metros achieve returns to density...so should be designed big with lines in the right places.

Higher Frequencies
Bigger, Longer Trains

Lower Frequencies
Smaller, Shorter Trains

Ch = Chinese Mainland
Operating Policy and Design
Example considerations learned from benchmarking

- Design for capacity and foresee higher staff costs in the future in the design of stations
- Extensions can undermine a metros’ finances for all time yet can create CBD crowding if lines are too long (suburban rail might be better)
- From a customer perspective, crowding and capacity is at least as important as reliability (use hot spares?)
- Good dwell time (station stop time) management is critical to maximise capacity
Government and the operator jointly hold responsibility for ensuring long-term sustainability (financial and quality)

**Government / Policy and Planning**
- Sensible, sustainable network growth with high capacity where demand warrants it
- Distance fares that rise at least in line with inflation
- Dependable funding for reinvestment
- Sufficient autonomy to the operator

**Metro Management**
- Analytical, aware of risks, opportunities and best practices, customer facing with a continuous improvement culture
- Continuous growth in productivity and efficiency

Source: BSI
Conclusions

- **Technology** plays a key role in addressing metro challenges, improving efficiency.

- **Government policy** (e.g. fares) plays a critical role in determining the future quality and financial sustainability of a metro.

- **Benchmarking** is becoming an essential and highly cost effective tool for metros to meet their increasing and complex challenges.
Thank you for your attention

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Benefits (CoMET): The quantified benefits alone, to date exceed $500million and are currently >$45million annually

- **London Underground:** Escalator Study to save $150m on maintenance over 20 years, + potentially $100s of millions on new escalators

- **American Metro:** Review of station cleaning processes following study: 10% productivity gain

- **Asian Metro:** driver productivity study: 10% saved through shift reorganization

- **South American Metro:** $1mp.a. saved on turnstile maintenance as a result of a Forum question.

- **American Metro:** justified move from 2 car-pairs to through gangways: several million $, improving capacity by 10%
Asian metros’ financial performance is eroding

Data from Asian CoMET and Nova metros, 2006-2011

- Real Fares Falling 75% Metros
- Unit Labour & Energy Costs Up 100%
- Labour Productivity Improved 88% Metros
- Demand up for 100% of metros

Cost Recovery from Fare Income Falling 88% Metros