Metro Benchmarking Yields Tangible Benefits

RICHARD ANDERSON, of Imperial College London, project manager for CoMET and Nova, reports on benchmarking successes for metros.

Two groups of metros have been engaged for over 11 years in a process of benchmarking, which can be defined as “a structured approach to identify actions that lead to superior performance”. The ultimate aim for many of the European metros engaged in the CoMET and Nova groups is to improve service and offer value for money to the taxpayer.

A structured work programme is undertaken every year by each group, delivering insights into all aspects of metro management from strategy and planning to engineering and operations. This annual process has delivered real, tangible benefits to the participants which have far outweighed the costs.

CoMET (the Community of Metros) began in 1994, and Nova followed in 1998. Together they embrace metros from 24 cities around the world, 10 of which are in Europe.

These metros have carried out some benchmarking exercises before, but with mixed results. They felt they had not had sufficient control over the process or the direction of the studies.

Moreover, the comparability of Key Performance Indicators (KPIs) had been lacking; it had not been possible to carry out the intensive work needed to bring the data supplied onto a truly comparable basis and make it immediately usable and relevant. It was felt that a fairly small group of metros of similar size, with a longer term approach to benchmarking, would be more effective.

The CoMET group currently has 11 members with Madrid, Mexico City, Moscow, São Paulo, Shanghai and Tokyo, in addition to the original five—Hong Kong (MTRC), New York, London, Paris and Berlin.

The Nova group comprises medium-sized metros, each with a total annual ridership of less than 500 million. Nova currently includes the metros of Buenos Aires, Glasgow, Lisbon, Montreal, Newcastle, Rio de Janeiro, Santiago de Chile, Singapore (SMRT), Toronto, and Taipei, plus the suburban commuter railways of Dublin and Hong Kong (Kowloon-Canton). In the near future, we hope to create a third group addressing the needs of suburban commuter railways.

There has been a strong focus on results that can be implemented, performance improvement, and on informing strategy. Benchmarking is not merely a comparison of performance data or a creation of league tables. KPIs, for example, deliver little benefit on their own, but they stimulate productive questions and lines of enquiry for more in-depth analysis and research.

For this reason CoMET and Nova undertake a variety of detailed case studies each year in wide-ranging but focused areas of metro management. Many studies identify best practices in operations and management; others offer key insights that can drive metro strategy and policy and provide information to support better dialogue with city governments, regulators, and other stakeholders.

Fundamentally, CoMET and Nova provide a forum for metros to share their experiences and exchange information. So what principles regarding the process have led to successful benchmarking?

Firstly, the benchmarking group is owned and run by its participants. This ensures that the focus is directed towards the highest priority needs of the metros and directs efforts towards the areas which will produce the greatest benefits.

Secondly, a long-term approach to benchmarking has paid off. It can take many years and iterative cycles to achieve benchmarking indicators that are comparable and reported on a consistent basis. One-off benchmarking studies are rarely successful for this reason.

Thirdly, and very importantly, the groups operate within a strict confidentiality agreement. This allows for full data and information exchange within the group but not externally. This overcomes political and commercial sensitivities.

To be really successful, whether at a strategic, engineering, maintenance or operational level, benchmarking has to be at the centre of an organisation’s business processes. Those railways which have integrated benchmarking into their internal process and systems have benefited most.

The CoMET and Nova process uses 32 KPIs, which measure the performance of the organisation through six categories: asset utilisation, efficiency, reliability, service quality,
safety, and financial performance. The indicators are comprehensive so as to represent all the different parts of the business, yet concise enough to be able to be used effectively by the organisation.

The data set behind this set of indicators is collected to standard definitions by all the metros of CoMET and Nova, on an annual basis.

Figure 1 shows a few examples of the set of 32 KPIs used.

The performance of a railway is driven by factors both within and outside management control. It has therefore been important to understand external effects on metro performance and the KPIs are often normalised to account for the local cost of labour, for example, or the density of the city. Statistical analyses have been used to provide a greater understanding of the results.

So how do European metros perform relative to their Asian or American peers? The answer is not surprising, but the scale of the difference in performance is sometimes astonishing.

Figure 2 shows the average distance that metro cars travel before there is an incident causing a delay of 5 minutes or more. Incidents are commonly caused by passengers, staff, or equipment (predominantly rolling stock). Asian metros clearly perform significantly better than European metros. It is true that some metros are inherently more reliable due to the levels of past investment, and the age of their assets, but there are also strong managerial influences. The highest performing railways implement reliability-centred maintenance, employ predictive techniques, root cause analysis and so on.

Time series analysis has allowed for trends in reliability to be identified. This helps identify which metros are changing their practices and shows what improvements are relatively achievable.

In many cases best practice may lay outside the railway industry, so other industries are reviewed for relevant practice. Workshops involving functional experts from each of the participants are particularly useful in enabling reasons for superior performance to be identified.

Studies are not always focused on operations and engineering but also strategy and policy. A recent study has examined the impact of fares policies on metro performance. The study showed that decision makers have lost sight of what objectives are being met by the level of fares, and at what price. It was found that most metros could finance operating costs through fare revenue, but social and political objectives often drive the fare, particularly in Europe and America. Figure 3 shows that European metros tend to cover less of their operating costs through the fare and commercial income. A key determinant of this performance is fares policy.

The study concluded that there can be sound economic arguments for low fares, but fare policies are inseparable from the need to fund a public transport system to meet a desired level of capacity and quality. The relationship between price charged and the need to invest to achieve a sustainable and acceptable level of quality is poorly understood by both metros and stakeholders. The study provided metros with the information and understanding of fare, funding, and financing issues that are needed for an informed dialogue with government, transport authorities, regulators and other stakeholders.

When benchmarking studies have identified best practices, it is critical that the metros consider whether they can adapt or adopt any elements of best practice which have been identified.

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**Figure 1: Some Key Performance Indicators**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Formula</th>
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<tbody>
<tr>
<td><strong>Background</strong></td>
<td>Operating capacity-km / Passenger journey-km</td>
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<tr>
<td><strong>Asset Utilisation</strong></td>
<td>Passenger-km/capacity-km / Proportion of cars used in peak hours</td>
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<tr>
<td><strong>Reliability/Service Quality</strong></td>
<td>Revenue operating car-km / percentage of journey-km between incidents causing a delay of 5 minutes or more / Total number of journeys</td>
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<tr>
<td><strong>Efficiency</strong></td>
<td>Revenue car-km / total staff + contractor hours</td>
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<tr>
<td><strong>Financial</strong></td>
<td>Total commercial revenue / operating cost / Total operating cost / car-km / Fare revenue / passenger journey-km</td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td>Total fatalities / total passenger journeys / Illegal activity / total passenger journeys</td>
</tr>
</tbody>
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**Figure 2: Car-km (000s) Between Incidents Causing Delay of 5 Mins or More (2004)**

- **Eu** – European
- **NA** – North American
- **SA** – South American
- **As** – Asian

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FIGURE 3: THE FUNDING GAP

<table>
<thead>
<tr>
<th>Income / Operating Costs</th>
<th>Key:</th>
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<tbody>
<tr>
<td></td>
<td>Farebox revenue</td>
</tr>
<tr>
<td></td>
<td>European Metro</td>
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<tr>
<td></td>
<td>American Metro</td>
</tr>
<tr>
<td></td>
<td>Asian Metro</td>
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<tr>
<td></td>
<td>Non-farebox commercial revenue</td>
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However, this also offers the opportunity for a change in culture and attitudes. At least one improvement team, initially convinced that their internal target of 90 seconds between trains was impossible, went to look at another metro’s practices. Every member came back not only converted to the belief that the target was achievable, but also with a clear idea of what needed to be done.

Nearly 50 case studies have been carried out through CoMET and Nova, covering all aspects of metro performance. Some examples of such case studies and their benefits are as follows:

- Drivers productivity—a reorganisation of drivers’ shifts in one metro has allowed for a 10% improvement in productivity
- Station management—rationalisation in Hong Kong achieved a 12% reduction in station staff
- Ticketing—benchmarking analysis on fare evasion was used by one metro to justify the imposition of higher penalty fines to the local media
- Line capacity—station dwell times were improved on one line which led to a 6% increase in capacity, and
- Fare regulation—the study above was used to successfully argue for fare autonomy in Hong Kong.

When these case studies have achieved good results and best practices have been identified, the right information needs to be made available to the right people. It is an important role of the benchmarking process to facilitate contacts between like-minded engineers and operators at all levels.

For example, Hong Kong MRTC has built the CoMET system of measures into its normal management procedures, so that performance can be monitored and managed both internally and externally to the same standards. The process is invaluable in providing information to government bodies and the media.

Membership of Nova has been beneficial to Montreal Transport (STM). The available information has facilitated work on efficiency improvements and day-to-day operational issues, as well as the opportunity to better argue the case for appropriate funding.

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