BENCHMARKING PERFORMANCE OF INTERCITY PASSENGER RAIL OPERATIONS: CHALLENGES & STRATEGIES

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Introduction

Performance is a relative concept. Without comparison it is void of meaning. In addition, without measurement it is abstract and subjective.

Understanding the performance of intercity passenger railway operators likewise requires comparison and specific metrics. No operator could truly be assessed as performing well or poorly without an appreciation of their performance relative to other comparable operators, on the basis of specific and comparable performance indicators.

Comparing the performance of intercity passenger rail operators, however, is no easy task. The dynamics and realities of the intercity passenger rail industry pose a number of challenges to the evaluation of operator performance. This paper outlines the most significant of these challenges and puts forward a number of strategies to help undertake a meaningful comparison of performance.

Background

The authors were part of the CPCS team that recently completed a study for Transport Canada, entitled "Comparison of VIA Rail Key Performance Indicators (KPIs) to International Intercity Passenger Rail Service Providers" (KPI Study). The aim of the study was to compare VIA Rail's performance relative to international intercity passenger rail operators, taking into account the influence of different

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governance models and operating environments, and drawing out related lessons vis-à-vis VIA Rail.

Though the results of the study are confidential, the key challenges in benchmarking intercity passenger rail performance and the approaches used to interpret related performance are presented below with the aim of informing similar research in future.

The discussion in this paper is specific to intercity passenger railway performance but many related lessons and tools are also applicable to benchmarking performance in other transportation sectors.

Benchmarking as a Tool to Evaluate Performance

Benchmarking is the practice of comparing business processes and performance metrics with an industry standard and/or with businesses active in a similar environment. Benchmarking can provide a useful reference of where a company stands in relation to its peers, as well as in relation to its own past performance. More importantly, benchmarking can provide meaningful insight into what drives performance and how to improve or otherwise influence performance.

Drawing the correct insights or conclusions from any benchmarking exercise, however, is contingent on a reliable and robust benchmarking methodology and related outputs. Without these, a misdiagnosis of performance and associated performance drivers is likely. This in turn can lead to incorrectly informing actions and public policy aimed at improving performance.

Central to the benchmarking process is comparison of performance on the basis of metrics that quantify specific elements of performance. Key performance indicators (KPIs) provide a useful basis for these metrics. KPIs are quantifiable measures of an organization's performance vis-à-vis the factors that are critical to its success and the success of its industry. They often involve the use of ratios, which can facilitate comparison of organizations of different sizes. For example, a KPI considering total expenditure per full-time

employee will almost always lead to more meaningful comparison between different organizations than total expenditure on all full-time employees. Simply put, using KPIs can facilitate a more common basis for comparison. As the old adage goes, apples should be compared to apples. Failure to do this can yield questionable if not meaningless results.

The benchmarking process is also dependent on obtaining data which is comparable. Without data, the process would likely be stillborn. And without comparable data, the usefulness of the results would be greatly reduced.

Lastly, the meaningfulness of any benchmarking exercise requires a robust framework for correctly evaluating the drivers of performance. KPIs and related benchmarks are mere snapshots of specific parameters of performance at a point in time. They do not on their own explain why or how good performance is to be achieved. This assessment requires that KPIs be contextualized with an in-depth understanding of the context in which the different organizations are operating, including their mandate, governance, ownership, physical operating environment, and financial situation, among other factors.

Challenges of Benchmarking Intercity Passenger Rail Operations

Benchmarking intercity passenger railway operations presents a number of unique challenges, including the comparability of operating environments, operating characteristics and data. These are outlined below.

Comparability of Operating Environments

The performance of passenger railways is significantly influenced by the socio-economic and physical environments in which they operate. An intercity passenger rail operation in India for instance, can only with great care and appropriate qualification be compared to a passenger railway operation in Germany given the significant disparity in passenger incomes and cost structures. Similarly, intercity passenger rail operations on a short and heavily populated

corridor in Western Europe would be difficult to compare to the performance of the service on a long haul VIA Rail corridor. Other differences in operating environment include physical terrain and varied climates.

Market, industry structure, funding and regulatory considerations can also significantly influence the performance of intercity passenger railway operations. For example, the degree of public and private involvement in ownership of a railway system is highly influential on performance; railway operators will face very different constraints if operating within a fully public 'monolith' infrastructure system where government controls all rail infrastructure and operations (e.g. China), as opposed to a system where some components are privatised (e.g. Canada) or effectively all components are privatised (e.g. UK). Where operating environments are influenced by public policy, benchmarking performance can offer valuable insight on the implications of market, industry structure and /or regulatory differences, all other things being equal.

Though no two intercity passenger railways operate in exactly the same environment, a benchmarking process should seek to maximize comparability, where possible, and allow for interpretation of the impacts of different environmental factors.

Comparability of Operating Characteristics

The operating characteristics of intercity passenger railways can also differ greatly, and have the potential to skew any comparison of performance and KPI benchmarks if not appropriately controlled. For instance, a high speed, electrified passenger rail operation, such as Japan's Shinkansen or France's TGV would not be an appropriate comparator to a conventional diesel passenger train, such as that operated by Amtrak or VIA Rail. Similarly, a short suburban commuter style service would yield very different KPIs than a true intercity passenger train service.

Unless the aim of a benchmarking exercise is to assess the influence of train technology or service type on performance and related KPIs,

it is preferable to compare operations which are more or less similar in terms of operating characteristics.

It is recognized, however, that no two intercity passenger operations are in fact perfectly comparable given differences in operating environment and operating characteristics. Such is the nature of the international intercity passenger railway industry. The challenge in benchmarking the performance of intercity passenger railways is to promote the greatest level of comparability. The best case scenario is therefore to compare Macintosh apples to Granny Smith apples.

Comparability of Data

Data comparability presents the most significant challenge to a benchmarking exercise of intercity passenger railway operations.

The availability of data is the first and most significant barrier. Most intercity passenger railway operators (with the exception of Amtrak) do not publish or otherwise make available to the public the level of data required to benchmark performance in any great detail. While company level data is available from some intercity railway operators (e.g. total passenger revenues and total passenger-km), as highlighted later in this paper, company level comparisons rarely provide the needed granularity to draw meaningful comparisons of performance. Without disaggregation of data at the service or route level, the data can be difficult to use.

Obtaining non-public data from international operators can lead to a host of challenges. These include confidentiality limitations, limited information on the methodology used in generating the data provided, limited time to respond to detailed data requests, language barriers and a general lack of incentive to provide information. Data gathering in a common format can require significant time commitment.

The second barrier to data comparability is that data is often calculated in different ways, or using different methodologies across operators. For example, the on time performance (OTP %) metrics

may be defined differently between organization; a train might be considered late after only 10 minutes for one organization and 20 minutes for a second organization. This means that if the OTP% were identical between the organizations, the performance of the first one is actually significantly better than the latter.

Some of the most complex data comparability challenges arise in relation to different accounting and financial reporting standards. For example, it is not enough to know that a certain amount was spent on employees; one also needs to understand what the types of employees and also what aspects of employment are perhaps outsourced to a third party and therefore not included in employee cost line items. In addition, railways will often use different financial reporting methods for reporting direct costs (linked only to one service/route), shared costs (e.g. a shared train station on two different routes), and corporate overhead costs.

Other challenges hindering the comparability of data include changing exchange rates (particularly for time-series benchmarking), changes in internal data reporting and standards over time, and major changes in operations of a railway within a particular time series (e.g. privatization of UK Rail) and related impacts on the consistency and quality of data. Maximizing the comparability of data requires significant data processing to reconcile data, and to the degree possible, using a common standard as a basis for comparison.

Strategies to Effectively Benchmark Intercity Passenger Railway Performance

The objective of the KPI Study was to benchmark VIA Rail's performance vis-à-vis comparable international intercity passenger railway operators over a period of about 10 years (subject to data availability). Our strategy to address the noted challenges was based on four pillars: establishing a clear basis for comparison; establishing a common basis for comparison; selecting relevant KPI metrics; and developing a robust framework for understanding the factors underlying KPIs.

Establishing a Clear Basis for Comparison

As a point of departure the study had to first define VIA Rail's operations. Only then could suitable comparable intercity passenger operators be selected for the purposes of comparison to VIA Rail.

Though it is one company, VIA Rail operates three distinct types of services:

- Higher density "Corridor" services (generally < 600km, e.g. Toronto-Montreal);
- Long-haul services (>1000km, e.g. Montreal-Halifax); and,
- Remote or regional services (serving remote communities, e.g. Winnipeg to Churchill).

Each service type has very different market and operating characteristics, and in turn performs very differently. We recognised very early on in the study that to review and benchmark VIA Rail's performance as a company would dilute these very significant operating differences and confuse any related performance benchmarks.

To address this, our strategy was to disaggregate VIA Rail's operations to the service level (Corridor, Long Haul, and Remote), with the aim of benchmarking each service type independently. We then further disaggregated the performance at the service level into comparison of individual routes (e.g. Toronto-Montreal).

Though segmentation of VIA Rail's operations into more homogenous service and route types was critical to a meaningful basis of assessing and comparing performance, it increased the study's data requirements exponentially.

Establishing a Common Basis for Comparison

Central to the study was the identification of comparable international intercity passenger railway operators, to each VIA Rail's service type (Corridor, Long Haul, and Remote) and routes. According to the 2008 Railway Directory[2], there are over five hundred railway operating companies providing passenger transport across the world, from inner-city suburban rail services to international cross-border long-haul services.

Establishing the best comparators was a challenging process and our strategy to do so involved a three step screening process, addressing each of the three challenges discussed above: comparable operating environments, comparable operating characteristics and comparable data availability.

The exercise involved a top-down process aimed at filtering the 500+ international intercity passenger railway operators into three sets of operators, most comparable to each VIA Rail service. We used the screens, and related criteria, set out in the table below.

Screen	Criteria
1	Reasonably comparable country-specific **operating environment** to that of Canada (socio-economic situation, geographic size, existence of passenger rail)
2	Reasonably comparable **operating characteristics** for the passenger rail lines (inter-city, longer route distance, etc.) to one or more VIA Rail service categories
3	**Availability of data and information (quantitative and qualitative)** comparable to that for VIA Rail. Quantitative information included time-series data disaggregated to specific passenger service or route level, with appropriate allocation of costs, resources, etc, in a consistent format. Qualitative data included information on prevailing governance model, market dynamics, operating environment and other key factors that influence KPIs.

[2] Railway Directory 2008, Reed Business Information Ltd.

The application of the first screen and its criteria resulted in the short-listing of 24 countries with intercity passenger railways and similar socio-economic, size and environmental conditions as Canada. These were largely European countries, as well as Australia and the United States.

The second screen was applied to all passenger railways in the noted 24 countries, and led to exclusion of railway operators that only offer inner-city / suburban commuter rail services, have total network km across all routes of less than 300km, have no individual routes above 160 km, are highly context-specific tourism-related railway lines or airport – city links, or have a rail network that consists primarily of international / cross-border traffic. The result of this second screen was a shortlisting of 42 intercity passenger railway operating companies, providing one or more routes that were comparable to one or more of VIA Rail's routes.

The third and last screen, intended to screen out railways for which the team was not able to obtain data, was the most time consuming. This involved a detailed scan of publicly available information for each of the shortlisted 42 railways, followed by direct contact with the majority of these railways in order to request any outstanding required data (as per data request discussed in the next section).

This third screen reduced the number of comparable railways to less than 10, which was not surprising given some of the challenges in obtaining comparable data note above. However, in several cases, the team entered successfully into data sharing and confidentiality agreements to access the required data. This third screening process identified a total of 7 routes comparable to VIA Rail's Corridor routes, 6 routes comparable to VIA Rail's long-haul routes, and 5 routes comparable to VIA Rail's remote routes for which data was available.

A few railways for which only company level data was available to the team were also included in our analysis to provide some high-level company level comparisons.

Establishing Performance Metrics: KPIs

Prior to requesting data, our strategy required development of KPI metrics to help achieve the aim of the KPI Study, namely, to benchmark VIA Rail's operating and financial performance against international operators and establish the influence of different policy levers and market environments on performance.

CPCS identified over 30 KPIs which could provide a useful measure of the performance parameters of interest to this study. A selection of these is outlined in the figure below.

Operating Performance
Traffic and Service
• Ridership (Passenger volume and Passenger-Km) • Load factor (Occupancy rates) • Seat density • On Time Performance % (end points)
Productivity & Asset Utilization
• Passenger Km per full time equivalent (FTE) employee • Passenger Km per locomotive Km • Passenger Km per passenger car Km
Customer Satisfaction
• Customer Satisfaction Survey Results
Financial Performance
Revenues
• Ticket revenue per passenger Km • Total revenue per passenger Km • Total Revenue per FTE employee
Operating Costs
• Operating cost per passenger and train Km • Administrative and shared costs as a % of total costs • Track access fees (per train km) and average fuel cost, etc.
Contribution from Rail Service
• Cost Recovery Ratio • Contribution per passenger (rail service) • Contribution per passenger km (rail service)

Financial Support

- Government contribution per track km
- Government contribution per passenger km
- Capital spending per track km

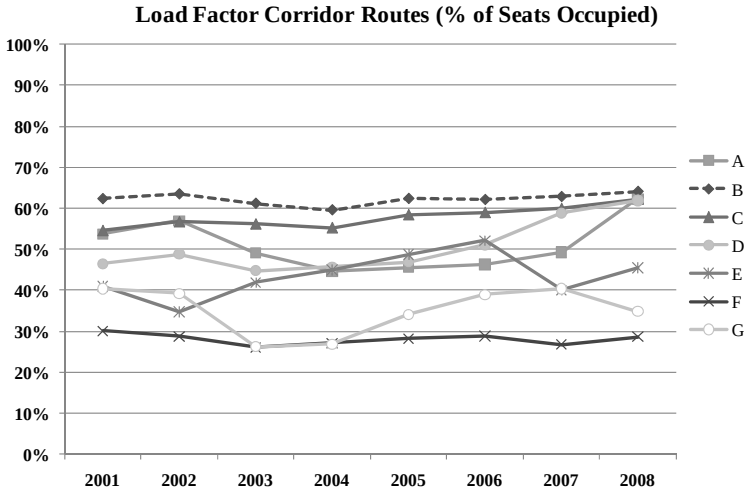
The data inputs necessary to calculate these KPIs were set out in a list of 36 data points, which was used as the basis for the data requests to VIA Rail and comparable international operators.

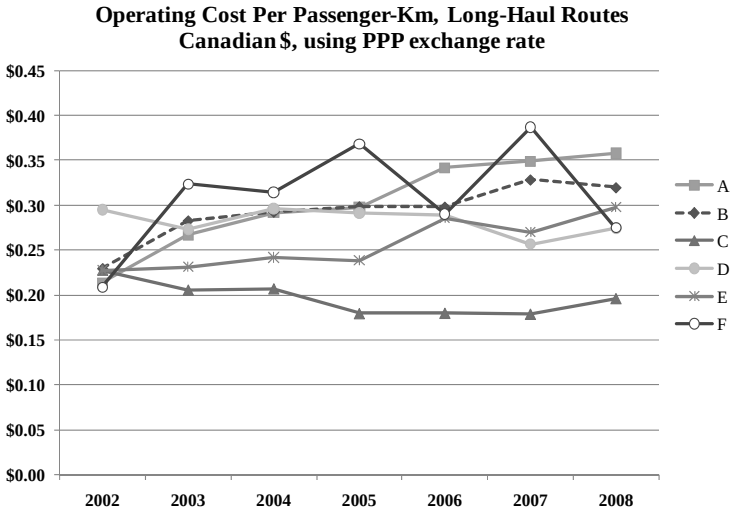
The data received from VIA Rail and other operators was disaggregated to the extent required to generate route-level KPIs (with supporting assumptions and/or caveats noted throughout) and organized in a database.

The process of generating the KPIs was largely mechanical. Formulas were pre-set using a spreadsheet platform, to produce the more than 30 KPIs of interest in benchmarking VIA Rail's performance. The outputs were a series of comparative graphs and figures depicting the comparative performance of each selected railway, by route, over a specified time series (typically 10 years) for each service type.

Financial KPIs used Purchasing Power Parity (PPP) as the exchange rate, to avoid any distorting effects of international price differentials. The PPP method was deemed more appropriate than a straight exchange rate approach because PPP better reflects price differences in non-tradable goods, and railway passenger tariffs are a perfect example of a non-tradable good.

Two examples of our KPI comparisons are provided below illustrating the outcomes of the KPI exercise. The names and routes of the railway operators have been removed to protect confidentiality.


Load Factor Corridor Routes (% of Seats Occupied)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2001
2002
2003
2004
2005
2006
2007
2008
A
B
C
D
E
F
G


Operating Cost Per Passenger-Km, Long-Haul Routes
Canadian $, using PPP exchange rate
$0.45
$0.40
$0.35
$0.30
$0.25
$0.20
$0.15
$0.10
$0.05
$0.00
2002
2003
2004
2005
2006
2007
2008
A
B
C
D
E
F

Interpreting Performance of KPI Benchmarks

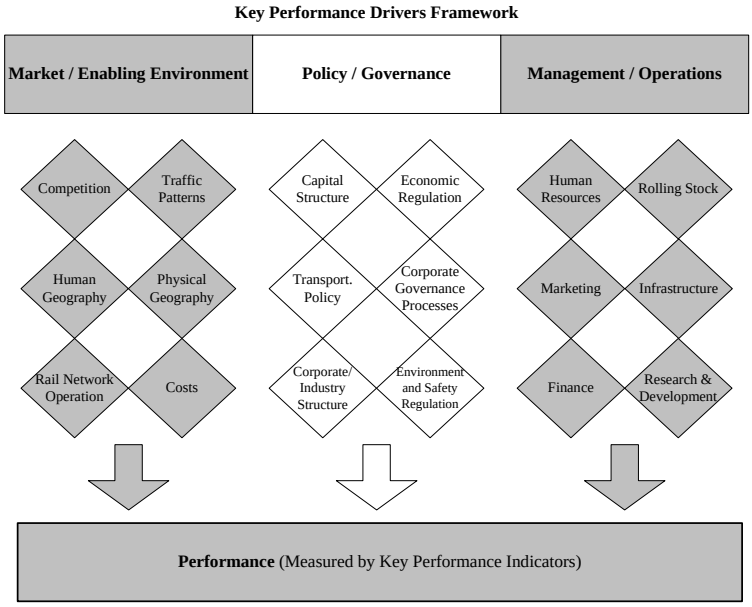
The final component of any benchmarking analysis is perhaps the most difficult one - interpreting KPI results in order to draw meaningful conclusions. The relative performance of an intercity passenger railway operator vis-à-vis specific KPIs is interesting. But this only provides information about an operator's position relative to others. What is more interesting and indeed more meaningful are the reasons and factors influencing performance.

A number of approaches can be used to try to determine the key factors influencing performance. The first is to link and correlate a number of KPIs for one operator. For instance, load factor KPIs for one railway can be correlated to a cost recovery KPI for the same railway to assess the relative impact of load factor on profitability or contribution requirement. This can be done for any combination of KPIs that might have a causal relationship, and can also be done over time to observe any patterns in performance. The magnitude of the influence of one KPI over another can provide useful insights on the most important causal relationships driving performance.

Another approach is to compare the contexts in which performance took place, gauging the potential relevance of various external factors on performance. For instance, one can compare KPIs of intercity passenger railways that operate under different industry structures or regulatory environments to assess the likely impacts of same on performance. Some care is required when undertaking such an analysis as it is impossible to control all factors to definitively confirm a causal link to performance.

A similar and perhaps more reliable approach is to assess swings in KPIs over periods where major changes were introduced to a railway's operating environment. For instance, an assessment of the financial KPIs of British intercity passenger railways before and after their privatization in the late-1990s would certainly yield some interesting findings.

The CPCS strategy to address these challenges was to develop a framework for mapping the underlying factors that influence the operating and financial performance of railways. We refer to these influencing factors as key performance drivers (KPDs). KPDs can be broadly grouped into three categories: market/external environment, policy/governance and management/operations. The figure below shows 18 specific KPD factors that influence performance, grouped into these three categories.



Using the KPD framework above, for each railway under analysis we determined what specific factors were the most relevant to the individual KPIs of the railway in question. For example, we considered how competition from other modes of transport (road, alternate rail, and air travel – a market KPD) might impact ridership-related KPIs over time. In practice, the KPD framework could be usefully applied – with a few modifications – to benchmarking studies across a wider range of transportation sectors.

Applying Lessons Learned and Future Benchmarking

Benchmarking intercity passenger railway performance can offer extremely useful insights for governments and railway operators, helping to inform both public policy and business decisions, and ultimately to promote better performance.

Research in this area, however, is relatively limited. The authors are aware of only a handful of other studies which undertook intercity passenger railway benchmarking analysis to the degree done in the CPCS KPI Study. This lack of similar work is perhaps due to the challenges noted in this paper but the KPI Study shows that these challenges can be overcome.

Certainly, more can be done to promote a sharing of data among intercity passenger railway operators. Indeed, governments and railways should be encouraged and incentivized to gather, maintain and publicise performance statistics, as does Amtrak in the US. This could establish a platform for future information exchange, benchmarking, sharing of best practice, and ultimately, promote performance improvements across the international intercity passenger rail industry.

To build on the lessons of the KPI Study and to realize the full value benchmarking intercity passenger rail performance, the authors encourage governments and operators to establish a forum to share relevant data in a way that will allow for a clear and common basis for benchmarking performance. From this, researchers, policy makers and rail operators will be in a strong position to draw out key lessons on performance drivers, and to set the stage for actions to bolster intercity passenger rail performance, to the benefit of railway service, operators, and end users.