Transit Performance Measurement

This material is adapted from a NTI course "Improving Transit System Performance: Using Information Based Strategies" developed at the University of Wisconsin-Milwaukee 1996-98. This material was written by Jack Reilly then of the Capital District Transportation Authority (Albany, N.Y.), Edward Beimborn or UWM and Robert Schmitt of RTR Associates in Pittsburg.

Performance Evaluation Process

- Establish Goals and Objectives
- Select Functions to Evaluate and Select Indicators
- Collect and Tabulate Data
- Analyze Indicators
- Present Results
- Take Corrective Actions, Monitor Results
Reasons for Monitoring and Evaluating Transit Service

- Control Costs and Ensure Integrity
- Justify Service Changes
- Maintain or Improve Service
- Monitor Subcontractors
- Guide Marketing
- Report to Policy Boards
Financial Indicators

- **Expense**
  - Total Operating Expense (Cost) / Total Passenger Trips:
  - Total Operating Cost / Vehicle Miles (or Vehicle Hours):
  - Administrative Expenses / Total Expenses:

- **Revenue**
  - Total Revenue / Total Passenger Trips:
  - Total Fare Revenue / Total Revenue
  - Revenue / Expense (Cost):

- **Subsidy**
  - Total Subsidy / Total Vehicle Hours:
  - Total Subsidy / Total Passenger Trips:

Non-Financial Indicators

- **Ridership**
  - Total Passenger Trips / Total Vehicle Hours:
  - Total Passenger Trips / Total vehicle Miles:
  - Elderly Passengers / Total Passengers:
  - Passenger Trips / Population of Service Area

- **Service Quality**
  - Number of Complaints / Number of Drivers
  - Stops On-Time / Total Stops
  - Vehicle Miles / Road Calls
More Non-Financial Indicators

- **Safety**
  - Vehicle Miles / Vehicle Accidents:
  - Avoidable Accidents per Year:

- **Service Quality**
  - Revenue Miles / Revenue Hours:
  - Vehicle Miles / Year:
  - Vehicle Hours / Year:

---

Business Performance Measures

- Customer boardings per revenue mile or revenue hour
- Revenue to cost ratio
- Cost per customer transported
- Implications of different measurements
  - Do you manage system to get good scores on measures or to serve customers?
Social Performance Measures

- Proportion of households w/.25 mile access
- Public support per household
- Proportion of jobs in transit service territory
- Number of transfers necessary to arrive at main destinations
- Peer comparison measures
- Some systems conduct customer satisfaction surveys, say every six months to get feedback from customers

Example: Route Comparisons

CAPITAL DISTRICT TRANSPORTATION AUTHORITY
KEY INDICATOR SUMMARY
Saturday Total: Period: May 1997

<table>
<thead>
<tr>
<th>Route</th>
<th>Revenue/Cost</th>
<th>Passengers/Hour</th>
<th>Margin/Passenger</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>26</td>
<td>14.2</td>
<td>$1.60</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
<td>12.8</td>
<td>$1.98</td>
</tr>
<tr>
<td>3</td>
<td>37</td>
<td>21.4</td>
<td>$1.23</td>
</tr>
<tr>
<td>8</td>
<td>14</td>
<td>10.1</td>
<td>$3.15</td>
</tr>
<tr>
<td>14</td>
<td>28</td>
<td>16.1</td>
<td>$1.74</td>
</tr>
<tr>
<td>18</td>
<td>19</td>
<td>10.4</td>
<td>$2.24</td>
</tr>
</tbody>
</table>
Proportion of Population in Service Area

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total</th>
<th>Peak</th>
<th>Midday</th>
<th>Evening</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>100%</td>
<td>42%</td>
<td>39%</td>
<td>27%</td>
<td>37%</td>
<td>23%</td>
</tr>
<tr>
<td>Total households</td>
<td>100%</td>
<td>44%</td>
<td>42%</td>
<td>29%</td>
<td>39%</td>
<td>24%</td>
</tr>
<tr>
<td>Elderly population</td>
<td>100%</td>
<td>47%</td>
<td>45%</td>
<td>30%</td>
<td>42%</td>
<td>24%</td>
</tr>
<tr>
<td>Employment</td>
<td>100%</td>
<td>62%</td>
<td>62%</td>
<td>50%</td>
<td>60%</td>
<td>46%</td>
</tr>
<tr>
<td>Households (0 cars)</td>
<td>100%</td>
<td>73%</td>
<td>71%</td>
<td>58%</td>
<td>70%</td>
<td>52%</td>
</tr>
<tr>
<td>Households (0.1 car)</td>
<td>100%</td>
<td>57%</td>
<td>55%</td>
<td>41%</td>
<td>53%</td>
<td>35%</td>
</tr>
<tr>
<td>Workers</td>
<td>100%</td>
<td>44%</td>
<td>42%</td>
<td>29%</td>
<td>40%</td>
<td>24%</td>
</tr>
<tr>
<td>Area</td>
<td>100%</td>
<td>5%</td>
<td>4%</td>
<td>2%</td>
<td>3%</td>
<td>2%</td>
</tr>
</tbody>
</table>

Performance of Route 50 - Burnt Hills

**Business Measures**
- Passengers per hour: 8.5
- Cost per passenger: 6.55
- Public support cost (annual): $105,633

**Social Measures**
- Households in service area: 3,191
- Households without autos in service area: 270
- Public support cost per household: $33
- Public support cost per household without auto: $391
# Route Analysis - Route 50 Burnt Hills

<table>
<thead>
<tr>
<th></th>
<th>CDTA</th>
<th>Route 50 Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Indicators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population density (pop/sq.mi.)</td>
<td>4,105</td>
<td>2,116</td>
</tr>
<tr>
<td>Percent of households without autos</td>
<td>13%</td>
<td>2%</td>
</tr>
<tr>
<td>Percent of households with 0,1 auto</td>
<td>43%</td>
<td>12%</td>
</tr>
<tr>
<td>Percent of population over age 65</td>
<td>13%</td>
<td>4%</td>
</tr>
<tr>
<td>Households without autos per sq. mi.</td>
<td>415</td>
<td>26</td>
</tr>
<tr>
<td>Percentage of region’s workers living in route service area using transit</td>
<td>6%</td>
<td>0.2%</td>
</tr>
</tbody>
</table>

|                  |       |                |
| Supplemental Indicators |       |                |
| Total population       | 468,719 | 8,377          |
| Total area (sq. mi.)   | 264    | 7              |
| Total population over age 65 | 68,667 | 1,333         |
| Total households without autos | 30,310 | 270           |
| Total workers          | 187,283 | 3,190          |
| Population over age 65 per sq. mi. | 575    | 345            |
| Workers per sq. mi.    | 1,675  | 236            |
Implications of Indicators

- Indicators should include issues management can control and recognize factors beyond your control.
- Example: You may have little control over transit speeds and the effects of sprawl.
- Vehicle hours and revenue vehicle hours may give very different results.
- Recognize that speeds and deadhead ratios can be very different between transit systems.
- Combination of paratransit and fixed route transit service into one set of indicators can distort results when doing peer comparisons.

Paratransit Performance Indicators

- Operating Efficiency
  - Operating expense per vehicle hour.
  - Administrative expense as a percentage of total operating expense.
  - The percentage of live hours to total paid driver hours.
- Effectiveness
  - One-way passenger trips per vehicle hour.
  - One-way passenger trips by senior citizens.
More Paratransit Performance Indicators

- **Service Quality**
  - Service-related complaints per 1,000 one-way passenger trips.
  - Percent of all pickups will be made within +/- 15 minutes of the promised time.

- **Financial**
  - Expense per one-way passenger trip
  - Revenue per one-way passenger trip

- **Safety**
  - Avoidable accident per 100,000 vehicle miles.

Acknowledgements

- Some of this material was developed as part of work being conducted by the Great Cities University consortium under the lead of the University of Alabama at Birmingham using funds provided by the Federal Transit Administration of the U.S. Department of Transportation.

- The opinions expressed are the product of independent university work and not necessarily those of the sponsoring agencies or of the agencies supplying data for the project.