MEASURING THE PERFORMANCE OF PUBLIC TRANSIT

Prepared By: Jacki Murdock
Transportation and Environmental Planner
Recent newspaper report claimed that California public transit systems were “underperforming” despite ridership gains.

Metrics Used:
1. Total subsidy/revenue vehicle hour of service
2. Unlinked passengers/revenue vehicle hour of service
3. Total subsidy/unlinked passenger

There are many ways to measure transit performance.
Overview

- Purpose of Transit
- Measuring Performance
- Measures to Include
- National Trends in Transit
- How LA MTA Compares

**Conclusion**

- Newspaper metrics are valid but do not account for variation between systems or the quality of service provided
Purpose of Transit

- Transportation Authorities have a growing number of responsibilities
  - Provide mobility for those without
  - Provide service in all areas
  - Increase access to desirable destinations
  - Reduce congestion
  - Decrease emissions
  - Symbolize progress for cities

- The purpose of transportation is to provide accessibility and mobility (Pucher, 2004)

Source: Taylor, 2012
Why Measure Transit System Performance?

- Performance indicators operationalize our understanding of how well our system is working.
- Help to understand larger trends.
  - Example: Increasing costs of paratransit.
- Allows for internal and external comparison.
  - Provides accountability.
  - Understand best practices.
- However, it is important to remember that different system’s service priorities, populations, and geography vary.

Source: Taylor, 2012
Transit Performance Measures Typically Assess:

- **Cost-effectiveness**: inputs or outputs to consumption
  - How well service is utilized compared to its costs

- **Cost-efficiency**: inputs to outputs
  - Reveals increasing costs

- **Service Effectiveness**: inputs or outputs to consumption
  - Capacity used versus available capacity

- **Service Efficiency**: inputs to outputs
  - Comparison between operators in different cost environments

Source: Taylor, 2012
Measuring Performance—The Three E’s

- **Effectiveness:**
  - How well the project achieves its intended goals

- **Efficiency:**
  - Costs in relation to benefits

- **Equity:**
  - Dispersal of the costs and benefits across:
    - Users of the system and non-users
    - Direct costs (capital, labor) and indirect costs (emissions, noise)

Source: Wachs, 2004
Metrics for Performance

- Measuring transit performance is necessary to compare service across modes and across geographies
  - Is transit achieving its goals?
  - Comparison to other systems
  - Communicate to decision-makers the trade-offs
  - Funding

- There are a plethora of metrics to measure the success of a transit line

- Depends on the goals of the line/system

Source: Lewison Lee Lena, Jian-Ling Li, Martin Wachs; 1994
Measurement Results are Variable

We can change the results by altering the metrics....

- Reference unit
  - Per mile, per passenger, per vehicle, per seat

- Types of costs included
  - Operating, capital

- Unit of analysis
  - Money, vehicles, employees, ridership

- Alterations in any of these metrics changes the results of system performance
### What the Newspaper Measured

<table>
<thead>
<tr>
<th>Newspaper Metrics Measured</th>
<th>Newspaper Metrics Don’t Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Total Subsidy/Revenue Vehicle Hour of Service</td>
<td>□ Ignores other transportation goals</td>
</tr>
<tr>
<td>▪ Cost efficiency</td>
<td>□ Equity</td>
</tr>
<tr>
<td>2. Unlinked Passengers/Revenue Vehicle Hour of Service</td>
<td>□ Length of the trip</td>
</tr>
<tr>
<td>▪ Service effectiveness—how well used</td>
<td>□ Capacity of the vehicle</td>
</tr>
<tr>
<td>3. Total Subsidy/Unlinked Passenger</td>
<td>□ If agency is meeting their coverage goal</td>
</tr>
<tr>
<td>▪ Cost effectiveness</td>
<td>□ Serving all areas</td>
</tr>
</tbody>
</table>

Source: Walker, 2011
Trends in Transit Nationally

- Transit costs have increased
  - Across all modes, but especially for rail
  - Financed through subsidies

- Transit underperforming nationally
  - Service growing faster than ridership
  - Costs growing faster than inflation

- Transit has conflicting goals
  - Increased pressure on transit to have better performance, be everywhere, and be cheap

- Public transit
  - 20% of government surface transportation expenditures
  - 3% of metropolitan person trips

Source: Taylor, 2012
Transit Trends in Los Angeles

- Public transit
  - 60% of local government surface transportation expenditures through 2030
  - Transit’s share of travel project to increase from 3% to 4%
  - Second largest ridership
    - New York is first
  - 11th largest market share out of the 50 largest metropolitan areas
    - Passenger transit miles as a share of all miles traveled

Source: Taylor, 2012; Morris, 2009
What We Propose to Measure

- Actionable measures: focus on operations, costs and service deployment
- Use a cost and service measure for efficiency and effectiveness
  - Operation focused
  - Be able to compare LA to lower-cost systems
- Measures Specific to Los Angeles:
  - High-cost, high-density area with low speeds in the peak hour, high auto-mobility and high transit ridership spread out over a large area.
Measures to Include—Cost Effectiveness

- Operating Expense per Passenger Mile
  - Costs of operation (precludes capital costs) over total passengers
  - MTA is outperforming the national average

<table>
<thead>
<tr>
<th></th>
<th>Mode</th>
<th>2002</th>
<th>2011</th>
<th>% Increase in Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>LACMTA</td>
<td>Bus</td>
<td>$0.49</td>
<td>$0.64</td>
<td>31%</td>
</tr>
<tr>
<td></td>
<td>Light Rail</td>
<td>$0.37</td>
<td>$0.52</td>
<td>41%</td>
</tr>
<tr>
<td>Average of Top 50 Transit Agencies</td>
<td>Bus</td>
<td>$0.70</td>
<td>$1.00</td>
<td>43%</td>
</tr>
<tr>
<td></td>
<td>Light Rail</td>
<td>$0.60</td>
<td>$0.60</td>
<td>0%</td>
</tr>
</tbody>
</table>

Source - National Transit Database
Measures to Include - Service Efficiency

- Vehicle Revenue hour per vehicle operating
  - LA MTA is performing at the national average for bus
  - Light rail is underperforming

<table>
<thead>
<tr>
<th>LACMTA</th>
<th>Mode</th>
<th>2002</th>
<th>2011</th>
<th>% Change in Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus</td>
<td>4,469</td>
<td>4,005</td>
<td>-10%</td>
<td></td>
</tr>
<tr>
<td>Light Rail</td>
<td>6,883</td>
<td>4,671</td>
<td>-32%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average of Top 50 Transit Agencies</th>
<th>Mode</th>
<th>2002</th>
<th>2011</th>
<th>% Change in Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus</td>
<td>3,782</td>
<td>4,004</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>Light Rail</td>
<td>5,335</td>
<td>7,726</td>
<td>45%</td>
<td></td>
</tr>
</tbody>
</table>

Source - National Transit Database
In Conclusion

- The three newspaper metrics should be included
  - Focus on cost-effectiveness, maximizes mobility while containing costs
  - However, varies by location
- Should also include operating expense per passenger mile and vehicle revenue hour per vehicle operating
  - Accounts for the size of the system (operating costs) and how well utilized (passengers and vehicles operating)
- Should include qualitative measures that capture the quality of service provided
  - User satisfaction, on-time arrivals
References


