Economics of Travel Demand Management

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2006 Florida Commuter Choice Summit

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Measuring TDM Benefits...

TDM will ultimately be judged on its ability to change individual’s travel behavior from driving alone to more sustainable modes and do so while producing benefits economically comparable to those of other mobility solutions.
Overview

• Why estimate the benefits of TDM?
• How do you measure its value?
• TDM-ECON “Economic Benefits of TDM”
TDM Cost Effectiveness

• Why measure it?
  – Policy-makers ultimate demand accountability for public funds spent
  – Consistent evaluation methods and cost effectiveness benchmarking can provide this information
  – To allow TDM to be compared to traditional infrastructure investment on an “apple to apple” basis
Cost Effectiveness

• How do we measure cost effectiveness?
  – Program benefits (-)
  – Program costs

• How do we measure benefits?
  – Internal (directly to primary users)
  – External (to society as a whole)

• What benchmark measure to use?
  – Per trip net benefit
  – Per trip benefit to cost ratio
An Example

- National TDM Guidebook from 1993 estimated that it cost society (in US$):
  - $6.75 per one-way trip to accommodate an automobile with new road capacity;
  - $4.10 per trip with new public transport service;
  - But, it cost employers only $1.33 to reduce a trip via TDM.
About the Study

• Objective: to develop a standardized methodology for calculating the costs and benefits of TDM.
  – Development of theoretical approach
  – Sketch planning tool spreadsheet design and development
  – Selected Project(s) analysis and evaluation
1. Analytic Method
   • Social welfare: sum of costs and benefits

2. Measure of Effectiveness:
   • Net value per trip reduced
   • Per trip B/C ratio

3. Modeling Technique
   • Constant Elasticity Demand Model
The Approach

Input
- Travel Times
- Baseline Trips
- Baseline Mode Shares

Trip Demand Functions
(Constant Elasticity of Demand)

Model Output
- Change in trips
  - New
  - Diverted
- Vehicle-miles-traveled
- Final Mode shares

Social Welfare Analysis
- Added/reduced externalities

Value of Trip Reduced
- Gross or net of program cost
- Peak and off-peak values

- Health and Safety
- Congestion
- Emission Pollution
- Land Use Impacts
- Other
TDM Strategies Considered

The model estimates the impact of strategies related to travel time or cost savings:

- Parking pricing
- Modal subsidies
- Pay-as-you-go schemes
- Access and travel time improvements
## Model Interface

### Analysis Year
- 2006

### Description
- Transit Pricing Subsidy
- **Agency**: My Agency
- **Analyst**: Sergio Concas
- **Area Type**: Urban

### Program Details
- **Total Cost**: $34,000
- **Program Duration (Yrs)**: 3
- **Discount Rate**: 6.0%

### Employment Information
- **Full Time Employees**: 3,000
- **Part Time Employees**: 3,000

### Current Mode Share (%)
- **Auto-Drive Alone**: 78.3%
- **Auto-Rideshare**: 12.1%
- **Vanpool**: 0.5%
- **Public Transport**: 4.3%
- **Cycling**: 0.4%
- **Walking**: 3.8%
- **Other**: 0.8%

### Trip Length (miles)
- **Auto-Drive Alone**: 11.85
- **Auto-Rideshare**: 12.21
- **Vanpool**: 20.40
- **Public Transport**: 11.42
- **Cycling**: 2.90
- **Walking**: 0.90
- **Other**: 11.42

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**Instructions**

1) Enter information following steps 1 through 9.

2) Select the “Financial Incentives” or “Travel Time Improvements” buttons to move through sheets to conduct the analysis.

3) If you wish to modify the default model parameters, select the “Modify Parameters” button.
Results

- The model estimates:
  - Reduced per trip annualized benefits ($/trip)
  - Reduced per trip annualized costs ($/trip)
  - Program/policy benefit to cost ratio
  - Reduce net trip value ($/trip)
    - Peak, and
    - Off-peak value
**Model Output**

### Analysis Information

<table>
<thead>
<tr>
<th>Description</th>
<th>Transit Pricing Subsidy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performing Agency</td>
<td>My Agency</td>
</tr>
<tr>
<td>Analyst</td>
<td>Sisinnio Conces</td>
</tr>
</tbody>
</table>

| Total Employment | 6,000                   |
| Program Total Cost | $34,000                |

### Mode Share Impacts

<table>
<thead>
<tr>
<th>Mode</th>
<th>Baseline</th>
<th>Final</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto-Drive Alone</td>
<td>78.3%</td>
<td>78.2%</td>
<td>-0.1%</td>
</tr>
<tr>
<td>Auto-Rideshare</td>
<td>12.1%</td>
<td>12.1%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

### Travel Impacts

<table>
<thead>
<tr>
<th>Unit</th>
<th>Peak</th>
<th>Off-Peak</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline Trips</td>
<td>6,136</td>
<td>2,045</td>
<td>8,181</td>
</tr>
<tr>
<td>Final Trips</td>
<td>6,106</td>
<td>2,035</td>
<td>8,141</td>
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</table>

### Value of Trip Removed

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Peak</th>
<th>Off-Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per Trip--Annual Benefits</td>
<td>$931</td>
<td>$343</td>
</tr>
<tr>
<td>Per Trip--Annualized Cost</td>
<td>$490</td>
<td>$1,471</td>
</tr>
<tr>
<td>Per Trip--Net Value</td>
<td>$440</td>
<td>$(1,129)</td>
</tr>
<tr>
<td>Per Trip--Benefit to Cost Ratio</td>
<td>1.9</td>
<td>0.2</td>
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</tbody>
</table>
Results

• TDM-ECON provides a standardized approach that allows:
  - A consistent evaluation method and cost effectiveness benchmarking
  - A structured approach to policy-makers’ accountability needs for public funds spent
  - Based on sound economic principles
Remarks

- Expand model to include “Soft Program” benefit estimation
- Beta test among selected practitioners
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