VI. Measures and Standards

Public Transport
Planning and Regulation:
An Introduction
# Planning and Analysis Building Blocks

## Focus of Discussion

## Measures & Standards
- Network and Route Design
- Market Factors and Demand Analysis

## Cost Analysis and Financial Planning
- Service Monitoring and Data Collection
- Fares and Revenue: Policy, Analysis, and Collection
- Terminology and Basic Relationships

## Performance Analysis
- Schedule Building
- Cost Analysis and Financial Planning
Relationship Between Measures and Standards

Measure

The Quantitative Degree of Attainment of An Objective

*Example:* Operating ratio (total revenues/costs) helps assess financial performance

Standard

The Lowest or Highest Level of Performance Which Is Acceptable

*Example:* The operating ratio for each route (or system) should be greater than 1.00
Why Are Measures and Standards Needed for Public Transport?

• Public transport resources are limited
  – Must ensure resources put to most effective and efficient use in design and operation of services

• Standards needed to define government expectations for private operators
  – Regulation: Competition *in* the market
  – Tendering: Competition *for* the market
Key Development Criteria for Measures and Standards

- Reflective of government policies and community needs
- Understandable to government decision makers and private companies/operators
- Measurable
  - Quantifiable
  - Replicable
Note

• The examples in the following slides reflect measures that are consistent with best professional practice

• However, standards should reflect local policies, operating conditions, and financial resources
  – The standards in the following slides may not be applicable to all situations
Design Measures and Standards

- Often define the minimum criteria for a bus service, e.g.,
  - Geographic Coverage
  - Stop Spacing
  - Policy Headways
  - Service Span
  - Transfers

- Generally address user concerns
# Geographic Coverage

<table>
<thead>
<tr>
<th>Measure</th>
<th>Walking Distance to Bus Stops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>Network</td>
</tr>
<tr>
<td>Standard</td>
<td>Maximum Walking Distance</td>
</tr>
</tbody>
</table>

**Maximum of 500 meters**

*Bangalore Metropolitan Transport Corporation*
Stop Spacing

Measure Distance between Designated Bus Stops

Application Route

Standard Maximum Distance

Trunk 500 meters
Feeders 300 meters

*Megabus Pereira*
Policy Intervals

Measure: Minutes between Bus Arrivals

Application: Route

Standard: Maximum Interval

<table>
<thead>
<tr>
<th>Route Type</th>
<th>Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trunk</td>
<td>8</td>
</tr>
<tr>
<td>Feeder</td>
<td>15</td>
</tr>
</tbody>
</table>

MetroCali, Colombia
# Service Span

**Measure**: Clock Hours During Which Service is Operated  
**Application**: Route  
**Standard**: Minimum Hours

<table>
<thead>
<tr>
<th>Day</th>
<th>Service Span</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Work</strong></td>
<td>Cover work travel (Longest span)</td>
</tr>
<tr>
<td><strong>Non-Work</strong></td>
<td>Cover main shopping hours</td>
</tr>
<tr>
<td>(weekend)</td>
<td></td>
</tr>
</tbody>
</table>
Transfers

Measure: Percent of Passengers Making One or More Transfers

Application: Route

Standard: Maximum Depends on Network Design
- Grid: 50-70%
- Radial: 20-30%
Quality of Service

• Attributes important to users
  – Some measures may be used in contacts as incentives or penalties

• Examples
  – Vehicle Reliability
  – On-Time Performance
  – Occupancy Rate
Vehicle Reliability

Measure: Average Kilometers between Mechanical Breakdowns
Application: Company/Type of Service
Standard: 10,000 to 20,000 KM
Depends on local street conditions

Méjico DF
Schedule Dependability (Regularity)
Low Frequency Routes

Measure: Percentage of Trips Operated On-Time

Application: Network/Company/Route

Standard:
- On-time = 0 to 5 Minutes Late
- Minimum of 80% to 95%
- Depends on local traffic conditions
- Measure used when passengers rely on published schedule
**Schedule Dependability (Regularity)**

**High Frequency Routes**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Percentage of Trips Within ± 90 Seconds of Scheduled Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>Network/Company/Route</td>
</tr>
<tr>
<td>Standard</td>
<td>Minimum of 80%</td>
</tr>
</tbody>
</table>

*Bogotá TransMilenio*
<table>
<thead>
<tr>
<th>Occupancy Rate/Load Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measure</strong></td>
</tr>
<tr>
<td><strong>Application</strong></td>
</tr>
<tr>
<td><strong>Standard</strong></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Financial Performance

• Measures used to:
  – Evaluate current or new services
  – Revise fare levels

• Examples
  – Passenger Volumes
  – Operating Ratio
## Passenger Volumes

<table>
<thead>
<tr>
<th>Measure</th>
<th>Daily Passengers per Operating Bus</th>
<th>Application</th>
<th>Network/Company/Route</th>
<th>Standard</th>
<th>Minimum Daily Passengers/Bus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Bus</th>
<th>Crush Capacity</th>
<th>Daily Passengers per Bus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-deck</td>
<td>80</td>
<td>1,000-1,200</td>
</tr>
<tr>
<td>Single-deck</td>
<td>100</td>
<td>1,200-1,500</td>
</tr>
<tr>
<td>Single or Double-Deck</td>
<td>120</td>
<td>1,500-1,800</td>
</tr>
<tr>
<td>Articulated or Double-Deck</td>
<td>160</td>
<td>2,000-2,400</td>
</tr>
</tbody>
</table>

World Bank Technical Paper 68  *Bus Services: Raising Standards and Lowering Costs*

*Highly dependent on local experience*
Daily Passengers per Bus Colombia and Morocco Examples

<table>
<thead>
<tr>
<th>Country</th>
<th>City</th>
<th>Passengers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colombia</td>
<td>Armenia</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>Bogotá</td>
<td>432</td>
</tr>
<tr>
<td></td>
<td>Bucaramanga</td>
<td>407</td>
</tr>
<tr>
<td></td>
<td>Manizales</td>
<td>409</td>
</tr>
<tr>
<td></td>
<td>Medellín</td>
<td>392</td>
</tr>
<tr>
<td>Morocco</td>
<td>Casablanca</td>
<td>700</td>
</tr>
</tbody>
</table>
# Operating Ratio

**Measure**
Total Revenue Divided by Cost (Operating + Capital Depreciation)

**Application**
Network/Company/Route

**Standard**
Minimum of 1.05 to 1.08

Sufficient to cover costs, stimulate investment and growth

*World Bank Technical Paper 68  *Bus Services: Raising Standards and Lowering Costs*

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*Total revenue can be viewed in different ways*

- **Company** — All revenues *including* subsidies
- **Government** — All revenues *excluding* subsidies

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*Some public transport systems (e.g., Bangalore) allow individual routes to be lower than 1.00 and are cross-subsidized by other profitable routes*
Summary

• Defined and provided examples of measures and standards.

• *Remember*, many transport systems use similar measures.

• *However*, there is less commonality among standards since they depend on local conditions, available funding, and public policy.