THE NEXUS OF LIVABILITY, TRANSIT, AND PERFORMANCE MEASUREMENT

CALACT SPRING CONFERENCE 2013
MAY 17, 2013 FRIDAY MORNING SESSION

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Learning Objectives

At the end of this session you will be able to...

- Define livability
- Define livability in relation to your agency’s work
- Recall basic performance measurement information
- Evaluate current performance measurement practices
- Plan to improve performance and livability
What is performance measurement?

- General definition?

Performance measurement is the use of statistical evidence to determine progress toward specific defined organizational objectives.

(http://ops.fhwa.dot.gov/perf_measurement/fundamentals/)
Why measure performance?

“Performance measures are used by transit agencies for three main reasons:

• Because they are required to do so;
• Because it is useful to the agency to do so; and
• Because others outside the agency need to know what is going on”

What are some examples of transit performance measures?

- Common measures?

- Measures used by your agency?
**RIDER AGE INFORMATION**

Average Age by Category:
- Age 0 to 64: 38
- Age 65 and over: 76
- Combined: 53

Age Status:
- Age 65 & over: 39%
- Age 0 to 64: 61%

**TRIP PURPOSE**

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Avg. Distance (mi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shopping</td>
<td>27.2</td>
</tr>
<tr>
<td>Other</td>
<td>9.5</td>
</tr>
<tr>
<td>Medical</td>
<td>15.1</td>
</tr>
<tr>
<td>Dialysis</td>
<td>4.3</td>
</tr>
<tr>
<td>Work</td>
<td>11.0</td>
</tr>
<tr>
<td>Workshop</td>
<td>11.0</td>
</tr>
<tr>
<td>Education</td>
<td>NA</td>
</tr>
</tbody>
</table>

**TO HOME** 47%

**NOT TO HOME** 53%

**TRIP O/D VICINITY MAP**

- Counties: Rains, Wood, Upshur, Marion, Harrison, Smith, Gregg, Rusk, Panola, Anderson, Cherokee

**VEHICLE 543**

**WEEKLY RIDERSHIP**
- Number of Unlinked Trips: 199
- Number of Unique Riders: 47
- Average # of Trips per Rider: 4.24
- Average Trip Length: 46 minutes 13 miles
- Average Vehicle Speed: 17 mph

**PRODUCTIVITY MEASURES**
- Passenger Trips per Vehicle Rev. Hour: 3.81 (Max 6.41, Min 0.69, Avg 1.68)
- Passenger Trips per Vehicle Rev. Mile: 0.24 (Max 0.40, Min 0.04, Avg 0.08)

**COST ALLOCATION (TRIP AVERAGE)**
- Cost based on Pass. Hours (2011 rate): $12.83 (Max $70.45, Min $7.62, Avg $29.05)
- Cost based on Pass. Miles (2011 rate): $10.43 (Max $62.33, Min $6.28, Avg $30.60)

**AVERAGE RIDE-SHARE (SLACK TIME ANALYSIS)**

(5 Days: Mon-Fri, Week of March 5-9, 2012)

# of Concurrent Riders

- Maximum
- Mean
- Minimum

Time of Day: 15 minute Increments
How is performance measurement used in the transit industry?

- Internal reports
- Peer benchmarking (find better practices)
- Monitor contracted services
- Allocate funds/resources

- There are more . . . other uses?
Productivity vs. Cost-savings

- What is productivity?

  Typically, productivity is defined as the number of passenger trips per hour or mile carried by revenue vehicles.

- What is the impact of productivity?
Impact of Productivity

- Decrease resources needed to provide service
  OR
- Increase service level using same resources

Table 3-2. Increased Productivity Scenarios.

<table>
<thead>
<tr>
<th>Scenario &quot;A&quot; or &quot;B&quot;</th>
<th>Annual Revenue Hours</th>
<th>Annual Passenger Trips</th>
<th>Passengers per Revenue Hour</th>
<th>Operating Cost for Revenue Hours</th>
<th>Operating Cost per Revenue Hour</th>
<th>Operating Cost per Passenger Trip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Service and Productivity</td>
<td>62,500</td>
<td>125,000</td>
<td>2.00</td>
<td>$2,250,000</td>
<td>$36.00</td>
<td>$18.00</td>
</tr>
</tbody>
</table>

- **A**
  - Save Money
  - Productivity = (↓ Revenue Hrs)
  - 60,680 | 125,000 | 2.06 | $2,184,466 | $36.00 | $17.48

- **B**
  - Serve More Passengers
  - Productivity = (↑ Pass Trips)
  - 62,500 | 128,750 | 2.06 | $2,250,000 | $36.00 | $17.48

*Transit Livability Performance Measures*
What is livability?

- General definition?

  “A livable community is one that has affordable and appropriate housing, supportive community features and services, and adequate mobility options, which together facilitate personal independence and the engagement of residents in civic and social life.”

  American Association of Retired Persons, “Beyond 50.05”

- Specifically for your agency?
Partnership for Sustainable Communities (PSC): Six Livability Principles

- Coordinate and Leverage Federal Policies and Investment
- Value Communities and Neighborhoods
- Enhance Economic Competitiveness
- Provide More Transportation Choices
- Promote Equitable Affordable Housing
- Support Existing Communities
What is the role of transit . . .

- . . . in the economy?
- . . . in public health?
- . . . in education?
- . . . in livability of your service area?
Nexus of Performance Measurement and Livability

- Transit is one mode
- in one sector
- in a complex system

- Livability is everywhere
- varies by person
- needs/wants/desires

http://25.media.tumblr.com/tumblr_lorjgn5G9w1qb8pd0o1_500.jpg
What are some potential livability performance measures?
An exploration of livability and performance measurement

NATIONAL TRANSIT LIVABILITY PERFORMANCE MEASURES
FTA Funded Research: Identifying National Transit Livability Performance Measures

- Urban Performance Measures
- Rural Performance Measures

National Livability Measures

Sustainable Cities Initiative University of Oregon
OTREC Oregon Transportation Research and Education Consortium
CUTR Texas A&M Transportation Institute

Transit Livability Performance Measures
Why is the FTA interested in measuring transit’s contribution to livability?

- Budget and funding challenges
- Explore contribution of transit to livability
- Other reasons...
  - Identify data challenges, prepare for future
  - Define role of rural transit in livability (social, economic, quality of life, etc. impacts)
Initial Study Scope

- Develop Candidate Measures (TTI)
- Apply to 8 Case Study States (TTI)
- Provide Research Report and Guidebook (TTI)
- Create Dashboard to Share Results (CUTR)
What is “rural” in transit?

Census 2010 Urbanized Areas and Non-urbanized Areas (Rural)
What are some rural trends today?

- Aging populations
- Rapid growth in urban fringes
- Diversifying economic base
- Development in scenic or recreational areas
- Interest in preserving/creating town centers
- Concern about preserving agricultural, natural land
What types of existing or emerging opportunities exist?

- Provide transit mode choice for changing population
- Transit as linking mode in regional plans
- Provide targeted or tailored services for specific markets and locations
- Coordinate/collaborate with regional partners to meet livability goals
Think About ...

communicating and measuring how transit contributes to the livability of rural communities.
Partnership for Sustainable Communities (PSC):
Six Livability Principles

A framework for developing rural transit livability performance measures

- Coordinate and Leverage Federal Policies and Investment
- Value Communities and Neighborhoods
- Enhance Economic Competitiveness
- Provide More Transportation Choices
- Promote Equitable Affordable Housing
- Support Existing Communities
Challenge

It became apparent that we would have to identify the **conceptual links** between the Livability Principles and the rural transit industry before identifying balanced performance measures.
Revised Study Outline

- Craft Rural Transit Livability Relationship Statements
- Develop Candidate Measures
- Apply to 8 Case Study States
- Provide Research Report and Guidebook
- Create Dashboard to Share Results (CUTR)
Relationship Statements

PSC Livability Principle

Rural Transit Livability Relationship Statement

Rural Transit Livability Performance Measure
National Rural Transit Livability Performance Measures

Livability Principle

- Coordinate and Leverage Federal Policies and Investment
  Align federal policies and funding to remove barriers to collaboration, leverage funding, and increase the accountability and effectiveness of all levels of government to plan for future growth, including making smart energy choices such as locally generated renewable energy.

- Value Communities and Neighborhoods
  Enhance the unique characteristics of all communities by investing in healthy, safe, and walkable neighborhoods—rural, urban, or suburban.

- Enhance Economic Competitiveness
  Improve economic competitiveness through reliable and timely access to employment centers, educational opportunities, and services and other basic needs by workers, as well as expanded business access to markets.

- Provide More Transportation Choices
  Develop safe, reliable, and economical transportation choices to decrease household transportation costs, reduce our nation’s dependence on foreign oil, improve air quality, reduce greenhouse gas emissions, and promote public health.

- Promote Equitable Affordable Housing
  Expand location- and energy-efficient housing choices for people of all ages, incomes, races, and ethnicities to increase mobility and lower the combined cost of housing and transportation.

- Support Existing Communities
  Target federal funding toward existing communities—through strategies like transit-oriented, mixed-use development and land recycling—to increase community revitalisation and the efficiency of public works investments and safeguard rural landscapes.

Source: www.sustainablecommunities.gov

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Relational Statement

- Rural transit coordinates and leverages investment between federal, state, and local partners to meet community goals, mitigate duplication of transportation service, and operate service cost-effectively.

- Rural transit encourages value in communities and neighborhoods as a complementary element of local multimodal plans providing transit service for the general population, and particularly for populations with acute transit needs, is part of investing in healthy and safe rural communities where distances may be long between people and essential goods, services, and employment.

- Rural transit contributes to economic competitiveness in rural America by providing accessibility through span of service, service frequency, and service reliability to a variety of destinations in the service area to support worker commute needs and access to markets.

- Rural transit provides an alternative travel mode choice as services are designed and marketed to encourage individuals to choose a mode of travel other than driving alone.

- Rural transit connects participating households of all ages, incomes, races and ethnicities to work and community; thus potentially lowering the combined cost of housing and transportation expenses.

- Rural transit supports existing communities through collaboratively designed and planned services which promote efficient use of the existing built environment by supporting activities in nodes where transit service is most efficient and productive.

Measure

- Local Operating Investment per Operating Expense
- Ridership* per Index of Transit Need Population
- Revenue Vehicles per Total Rural Land Area
  Alternative: Revenue Miles per Total Rural Land Area
  Preferred: Rural Transit Accessibility Level
- % Workers that Did Not Drive Alone to Work
- Household Income after Transportation & Housing Expenses
- Ridership* per Developed Land Area
  * Annual Unlinked Passenger Trips

Rural Transit Livability Index (RTLJ)

Results shared with public via online data dashboard (not yet complete)

The authors gratefully acknowledge the FTA’s sponsorship of “Rural Livability Performance Measures Suitable for Use at a National Level”. A study commissioned to identify, test, and recommend a set of measures that leverage existing national data to characterize the contributions of transit to livability in rural areas of the United States.
Measure Requirements/Goals

- Use existing national data sources
- Transit directly influences livability measure
- Develop balanced measures that reflect broad range of issues (six PSC Livability Principles)
Data Challenges

- Less variety and frequency of data
- Service area boundaries not national data
- Urban/Rural agencies only report to Urban NTD
- Rural span of service, days of week unavailable

Recommendation to identify rural transit data collection needs
Rural Transit Livability Performance Measures

Livability Principle

- Coordinate and Leverage Federal Policies and Investment
- Value Communities and Neighborhoods
- Enhance Economic Competitiveness
- Provide More Transportation Choices
- Promote Equitable Affordable Housing
- Support Existing Communities

Performance Measure

- **Local Operating Investment per Operating Expense**
- **Ridership* per Index of Transit Need Population**
- **Revenue Vehicles per Total Rural Land Area**
  Preferred: Rural Transit Accessibility Level
  Alternative: Revenue Miles per Total Rural Land Area
- **% Workers that Did Not Drive Alone to Work**
- **Household Income after Transportation + Housing Expenses**
- **Ridership* per Developed Land Area**
  * Annual Unlinked Passenger Trips

Direction to Improve
Re-Revised Study Scope

- Craft Rural Transit Livability Relationship Statements
- Develop Candidate Measures
- Apply to 8 Case Study States
- Create Rural Transit Livability Index (RTLI)
- Provide Research Report and Guidebook
- Create Dashboard to Share Results (CUTR)
Why combine the measures in an index?

- Summarize complex research findings
- “Comparability” between agencies / states
- Create results for use by non-transit layperson
State & local operations funding per operating expense

Revenue vehicles per total rural land area
How was the index created?

1. Set unit of analysis
2. Establish “no-data” quality control solution
3. Standardize values
4. Determine weights
5. Classify performance
6. Calculate final index value
Steps One & Two

1. Set unit of analysis
   All measures calculated by agency

2. Establish no data quality control solution
   No data considered “blank”;
   No advantage or disadvantage for no data for a measure
Steps Three & Four

3. Standardize measure values
   Z-scores created normal distribution and common numerical scale (instead of mix of %’s and #’s)

4. Determine weights
   Equal weighting;
   Each measure represents a livability principle
Steps Five & Six

5. Classify performance
Percentiles 1 to 10 generalize agency’s performance

6. Calculate final index value
Average of agency’s 1 to 10 ratings

\[
4 + 1 + 7 + (\text{no data}) + 3 + 9 / 5 = 4.8 \text{ RTLI Value}
\]
Results for Pampa, TX
(service provided by Panhandle Community Services)

Support Existing Communities: 6.0
Coordinate and Leverage Federal Policies and Investment: 1.0
Value Communities and Neighborhoods: 7.0
Provide More Transportation Choices: 5.0
Enhance Economic Competitiveness: 3.0
Promote Equitable and Affordable Housing: 1.0

Score: 3.8 / 10

Texas: 4.3 Texas: 3.3 Texas: 5.1
Texas: 5.1 Texas: 4.5 Texas: 3.7
Rural Transit Livability Index (RTLI)
Case Study Analysis of Rural Transit's Contribution to Livability

Legend
Rural Transit's Contribution to Livability (No Data = White)
- Lower Contribution: 2.2 - 3.8
- 3.8 - 4.5
- 4.5 - 5.2
- 5.2 - 6.3
- 6.3 - 9.3
- Higher Contribution

Other State or Unincorporated Territory
Census 2010 Urbanized Area

Alaska (not to scale)
Hawaii (not to scale)
Puerto Rico (not to scale)
Statistical Checks

- No single measure drives RTLI
- All agencies treated equal
- No external variables explain RTLI

- Rural population
- Rural population density
- Median household income
- Median age
- Rural land area

- Significant
- Very small impact
- Not significant
Influence of Rural Population Density

Statistically significant
If rural population density increases by 10; RTLI increases 0.05 (out of 10)—very small impact.

- Rural Transit Livability Index
- Predicted Rural Transit Livability Index
Conclusion

- Statistical checks, good
- No one state, agency, or measure over-influences results, good
- External variables do not explain results, good

Observation:
The index is more than the sum of its parts.

Conclusion:
The RTLI leverages existing data to measure the contribution of transit to livability in rural America.
“Transit Livability Explorer”
“Transit Livability Explorer”, contd.
“Transit Livability Explorer”, contd.
Performance Measurement is a tool to learn and implement . . .

GOALS, OBJECTIVES, OUTCOMES, AND PERFORMANCE MEASURES
Framework for success

- Vision & Mission
- Goals
- Objectives
- Desired Outcomes
- Performance Measures
Purpose of Goals

- Describe what “--------” will accomplish
- Provide context for what “--------” is trying to accomplish
- Describe overall value of “--------” to transportation
- etc
What are Objectives?

- **Concrete statements**
- Describe what program is seeking to achieve
- Written in a measurable way
  - **Specific**
  - **Measurable**
  - **Attainable**
  - **Realistic**
  - **Time-oriented**
What are Outcomes?

- Describe impacts of activities
- Clear, measurable statements
- Determine “achievement”
- Describe the “reach” of activities
Reasons to Measure Performance?

- Evaluate
- Budget
- Control
- Motivate
- Promote
- Celebrate
- Learn
- Improve

SUCCESS!
Functions of Performance Measures

- Define what is important
- Provide current, baseline information
- Evaluate the success of the program
- Provide a metric for communication
- Serve as criteria for investment decisions
Qualitative vs. Quantitative

Quantitative = Hard measures (fact-based)

Qualitative = Soft measures (indirect, intangible)
Framework for success

Types of Measures

Performance Measures

Goals

Input

Process

Output

Outcome

Impact

Transit Livability Performance Measures
# Types of Performance Measures

<table>
<thead>
<tr>
<th>Input</th>
<th>Used to identify human and capital resources needed to generate outputs and outcomes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process</td>
<td>Used to distinguish the intermediate steps in the production process of the product or service.</td>
</tr>
<tr>
<td>Output</td>
<td>Used to measure the actual product or service completed by the agency/organization.</td>
</tr>
<tr>
<td>Outcome</td>
<td>Assess the expected, preferred, or actual result(s) by which the outputs of the activities of the agency/organization meet the desired results.</td>
</tr>
<tr>
<td>Impact</td>
<td>Evaluate the direct or indirect effects as a result of attaining the goals of the program.</td>
</tr>
<tr>
<td>GOAL:</td>
<td>Focus on the individual</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>OBJECTIVE:</td>
<td>Provide customer-driven transportation services</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DESIRED OUTCOMES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• More service options in the regional service area.</td>
<td></td>
</tr>
<tr>
<td>• Fewer passenger trip refusals.</td>
<td></td>
</tr>
<tr>
<td>• Greater dependability of service and decrease in wait time.</td>
<td></td>
</tr>
<tr>
<td>• Greater access to jobs.</td>
<td></td>
</tr>
<tr>
<td>• Greater opportunities for social and recreational trips.</td>
<td></td>
</tr>
<tr>
<td>• Increase in transit ridership.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>QUALITATIVE MEASURE</th>
<th>Expanded transit service area to include destinations where individuals need to go (retail, health services, etc.)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>QUANTITATIVE MEASURE</th>
<th>Expanded span of service (provide service earlier or later)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>WHO MEASURES?</th>
<th>Transportation providers or Lead agencies for regional transit coordination</th>
</tr>
</thead>
</table>
Basic Process

- Create goals, objectives, and outcomes that...
  *connect to agency vision, mission, and services*
- Identify performance measures
- Implement changes, collect data, measure
  *(consider peer comparison)*
- Report results
- Repeat
“When performance is measured, performance improves. When performance is measured and reported, the rate of performance accelerates.”

(Thomas Monson, http://www.goodreads.com/quotes/221276)
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QUESTIONS?