Connecting Engineers and the Community: Collaborating with Social Workers to Identify Community-Based Transportation Needs

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Introduction

• Environmental Justice (EJ) Communities
  • Low Income People
  • Elderly
  • Minorities
  • Children
  • Persons with limited English proficiency
  • People with disabilities
  • Female head of household

• Main Goal: serve EJ communities in a more effective way.
Introduction

• Gap: Difference between needed and existing transportation services and systems.

• Presently transportation organizations try not to harm EJ communities.

• To understand the EJ communities needs, we need to hear their voices and those of different communities and professionals.
Project steps

- **Literature Review**
  - Identify transportation “Failures”
  - Resolve transportation gaps
  - Identify the consequences of these gaps

- Sample transportation and EJ-serving organizations

- Develop candidate transportation gap performance measures

- Design survey to solicit feedback of transportation professionals
Engineering perspective

• The service gap in EJ communities’ resulted from:
  - Transportation disadvantage
  - Social exclusion
  - Well-being

• Social exclusion defined by
  - Modeling the transportation
  - Mobility inequity
  - Associated social consequences
Engineering perspective

• Transit and human service agencies were surveyed and the result was a need in:
  - Facilities
  - Capacity
  - New services
  - Staff

• Methodology and index introduced to measure transportation inequity
Engineering perspective

• Public transit allows disadvantaged population to be more involved in social activities
  - Suburban areas experience a higher transit gap

• Level of income and residential area location cause a service gap for working women

• EJ service inequity includes poor bus transfer, lack of reliable and fixed network infrastructure, higher travel time and larger headway
Sample Transportation Gaps and Strategies

<table>
<thead>
<tr>
<th>Resource</th>
<th>Transportation Failure/Gaps</th>
<th>Strategies or Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mattson et al.</td>
<td>- Difficulties in finding qualified bus operators</td>
<td>- Longer hours of service, weekend service, and an expansion of currently available services</td>
</tr>
<tr>
<td>(2015)</td>
<td>- Inadequate vehicle storage facilities</td>
<td>- Replace vehicles and upgrade facilities</td>
</tr>
<tr>
<td></td>
<td>- Inadequate maintenance facilities</td>
<td>- Upgraded passenger facilities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Transfer hubs and passenger stations</td>
</tr>
</tbody>
</table>
Social worker perspective

Identify the consequences of transportation gaps on the well-being of EJ population in terms of:

• Health (both physical and psycho-social)

• Access to opportunities

• Community connectedness and social exclusion
Social worker perspective

Federal investments build healthy communities by:

• Provide more transportation choices
• Promote affordable housing options
• Enhance economic competitiveness
• Support existing communities
• Value neighborhoods and communities
Social worker perspective

Opportunities: employment, shopping, community and recreational services, and health

• Access to opportunities are directly linked to transportation planning and lack of transportation

• Rural communities struggle to fund and maintain public transportation services

• Those with major health concerns were found to have greater transportation deficiencies
Social worker perspective

• Public transportation operates in urban areas where those who travel outside the CBD receive poor or no services

• Low-income women and children experience disproportionate consequences

• Elderly service gaps include missed opportunities for health care, time spent with family, and opportunities for social inclusion
Social worker perspective

Community Connectedness/Social Inclusion may:

- Include:
  • School functions for children, youth and families
  • Social and disability services
  • Religious and community services
  • Participation in local senior centers

- Be achieved by access to opportunities, which is driven by access to transportation services
Interdisciplinary collaboration

- Must always consider Environmental Justice (EJ) communities
- Identify service gaps for EJ population and possible solutions
- In this research transportation engineers and social workers work together
Interdisciplinary collaboration

• Identify tools and techniques for assessing service gaps and solutions (State of Art)

• Identify the consequences of service gaps on EJ populations

• Identify interested organizations, agencies, and individuals

• Develop performance measures for service gaps
Organizations, Agencies, and Individuals

• A sample of transportation organizations such as MPOs, transit agencies, cities were identified

• More than 100 professionals were selected from these organizations

• Recipients distributed across the US
Develop service gap performance measures

• Identify service gaps and potential solution strategies
• Categories for defining service gap performance measures were determined
• Gap performance measures
  • Accessibility
  • Affordability
  • Operation
  • Service Quality
Develop service gap performance measures

• Identified performance measures for each category

• The potential PMs are included in the survey for feedback from the professionals

• The survey includes questions related to demographic and PMs
Develop service gap performance measures

Table 2: Accessibility candidate Performance Measures

<table>
<thead>
<tr>
<th>Accessibility</th>
<th>Ideas &amp; Policies</th>
<th>Performance Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVT</td>
<td>Waiting time, Transfer Time</td>
<td></td>
</tr>
<tr>
<td>Stop Location</td>
<td>Distance to the nearest station to your house</td>
<td></td>
</tr>
<tr>
<td>Walking Distance</td>
<td>Number of employment and other activities within 0.25 miles</td>
<td></td>
</tr>
<tr>
<td>Biking Facility</td>
<td>Existance of bike lanes, Bike rack, bikeshare program</td>
<td></td>
</tr>
<tr>
<td>Walking Facility</td>
<td>Existance of suitable and convinient sidewalk, pedestrian traffic sign and signals, Quality level of sidewalk</td>
<td></td>
</tr>
<tr>
<td>Rideshare Program/Co-op Vehicles</td>
<td>Number of vehicles/EJ household, Presence of rideshare program</td>
<td></td>
</tr>
<tr>
<td>Access to the Family Doctor</td>
<td>Distance to the family doctor, Available options to access to family doctor, Ave time to access to the family doctor</td>
<td></td>
</tr>
<tr>
<td>Route Connectivity</td>
<td>Level of route connectivity</td>
<td></td>
</tr>
</tbody>
</table>
Develop service gap performance measures

<table>
<thead>
<tr>
<th>Ideas &amp; Policies</th>
<th>Performance Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subsidy per ride (for low income zones)</td>
<td>Existance of Subsidy per ride (for low income zones), How many trips can you afford per week? Total subsidy per communities?</td>
</tr>
<tr>
<td>Special Pass Program</td>
<td>Existance of Special Pass Program</td>
</tr>
<tr>
<td>Dynamic Fare based on Socio-Demographic Data</td>
<td>Existance of Dynamic Fare based on Socio-Demographic Data</td>
</tr>
<tr>
<td>Dynamic Fare or Subsidy for Different Trip Purposes</td>
<td>Existance of Dynamic Fare or Subsidy (Via, Uber,..)</td>
</tr>
<tr>
<td>Special Program for Emergancy Situations</td>
<td>Cost for an ambulance service</td>
</tr>
<tr>
<td>Ride Promotions for EJ Populations</td>
<td>Existance of Ride Promotions for EJ Populations</td>
</tr>
</tbody>
</table>
# Develop service gap performance measures

## Ideas & Policies Performance Measures

<table>
<thead>
<tr>
<th>Service Quality</th>
<th>Performance Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-Vehicle Convenience</td>
<td>Capacity of transit vehicle, # of seats for disabled people, Existence of route guidance and stop locations</td>
</tr>
<tr>
<td>Station Convenience and Comfort</td>
<td>Average number of seats in each station, Existence of roof on stations, Availability of spaces for disabled people</td>
</tr>
<tr>
<td>Route Facility (Light, Sign, etc.)</td>
<td>Number Satisfaction of route facility</td>
</tr>
<tr>
<td>Service Coverage</td>
<td>Percentage of community or neighborhood routes covered by public transit?</td>
</tr>
<tr>
<td>Enough Staff during 24/7</td>
<td>Number of Staff &amp; Customer service 24/7</td>
</tr>
<tr>
<td>Easyness/Suitability of Payment</td>
<td>Availability of any kind of facility or method to ease the payment for EJ populations</td>
</tr>
<tr>
<td>Board &amp; Alight Comfortability</td>
<td>Boarding and Alight Comfortability</td>
</tr>
<tr>
<td>Assign trip travel counselor</td>
<td>Number of Trip travel counselor in EJ community</td>
</tr>
</tbody>
</table>

| Table 4: Operation Candidate Performance Measures |
Develop service gap performance measures

<table>
<thead>
<tr>
<th>Ideas &amp; Policies</th>
<th>Performance Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Frequency</td>
<td>Service Frequency</td>
</tr>
<tr>
<td>In-vehicle travel time</td>
<td>In-vehicle travel time</td>
</tr>
<tr>
<td>Vehicle Mile Traveled</td>
<td>VMT to important destinations</td>
</tr>
<tr>
<td>Service Availability</td>
<td>Hours of Service (24/7)</td>
</tr>
<tr>
<td>Fixed Route</td>
<td>Existance of Fixed Route</td>
</tr>
</tbody>
</table>

Table 5: Service Quality Candidate Performance Measures
Importance of measuring service gaps

The main outcome of surveys:

• Transportation organizations confidence in the candidate tools

• The importance of identifying and considering service gaps when developing comprehensive local and regional transportation plans

• Feedback on the identified performance measures
Social workers help Engineers by

• Providing a different viewpoint in resolving problems
• Conducting qualitative studies tools and techniques such as:
  - Running focus groups
  - Surveys
  - Interviews
  - Communicating with different communities
Social workers help Engineers by

• Presenting the required skill in terms of social connectedness to become engaged in the communities

• Presenting the approach for connecting with partner companies and agencies which enhance the research outcomes

• Connecting with other experts to assist in developing and assessing new performance measures
Future Roadmap

• Evaluate the performance measures based on reliability, validity, availability, complexity of interpretation, costs related to collection and use, and timeliness

• Evaluate the modeling based on reliability, validity, repeatability, cost, and complexity

• Select the performance measures and models that score high on criteria for the final round of feedback in a survey
THANK YOU!