Tangible and Intangible Service Attributes: Quantifying the Importance of Image and Perception to Bus Rapid Transit

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Study Background

• In order to attract discretionary riders, transit must:
  – Offer competitive travel times
  – Provide high-quality service
  – Convey an attractive image

• BRT: create an image separate from local bus

• Bus-based public transit in the U.S. suffers from a severe image problem (inferiority complex)
  – Unreliable
  – Time-consuming
  – Inaccessible
  – Inconvenient
  – Crowded
  – Dirty
  – Unsafe
Conventional Industry Wisdom

• Rail is a necessity to convey image of premium service

• Rail is inherently more attractive than bus service, even if all quantifiable service attributes are equal
  – This advantage is explained by qualitative factors for which rail is assumed to be superior

• Premise: difficult-to-measure, subjective factors underlie an innate preference for rail
  – Bias constants in mode choice modeling
  – Capture unmeasured impact of qualitative factors
The Conventional View of Ridership Attraction across Different Transit Modes

- **BRT Lite**
- ‘Full Service’ BRT
- Express bus
- Local bus
- Use of existing medians
- Use of shoulders
- Heavy rail
- Light rail

Diagram axes:
- **Investment Cost**
- **System Performance**
Lessons from the Literature

• When functional service characteristics and infrastructure are comparable, high-quality bus alternatives should attract riders at a level similar to rail (Ben-Akiva and Morikawa, 2002; Currie, 2005)

• Similar to rail, a significant portion of BRT ridership gains cannot be explained by quantifiable service improvements (Henke, 2007)

★ Jointly, these studies lay the theoretical framework for our research
Theoretical Framework of Our Research

• Service attributes (both tangible and intangible), not an innate mode preference, explain the relative passenger attractiveness of alternative rapid transit modes

• If BRT is to attract riders at a level similar to rail, it must be comparable to rail in terms of both functionality (tangible attributes) and image (intangible attributes)

• To investigate these issues, we designed a study to:
  – Assess BRT’s ability to convey the high-quality image typically associated with rail-based transit
  – Examine and quantify the tangible/intangible factors that drive perceptual differences between alternative transit modes
Can BRT capture the quality image typically associated with rail-based modes?

- **Tangible Service Attributes**
  - Functional
  - Objectively quantifiable
  - Typically used in mode choice models

- **Intangible Service Attributes**
  - Abstract
  - Subjective
  - More difficult to measure and quantify
Core Research Questions

- Do people perceive alternative rapid transit modes differently?
- If differences exist, where do they originate?
- Can ridership attraction be attributed to specific tangible and intangible service attributes?
- What variations exist with regard to socio-economic / geographic factors?
Study Methodology

- Literature Review
- Los Angeles selected as case study location
- Focus groups in 2007
- Attitudinal survey in 2008
- Final report in 2009
Focus Groups

• Objectives:
  – Identify different tangible and intangible factors
  – Understand the issues that influence the relative attractiveness of different rapid transit modes vs private auto
  – Inform survey design process

• Group composition:
  – Mostly choice users with some potential users
  – Users of local bus, Metro Rapid, Orange Line, Gold/Blue Line, Red Line

The “Shame Factor”

“And last, but not least, there is another factor called the shame factor. I would be very embarrassed to tell my friends who know what kind of living I make ... I’m ashamed to tell that I am taking buses ... they would think, ‘Did he lose his job? Has he gone mad?’”

-Male, 43, Metro Rapid user
Tangible Service Attributes

- Travel Cost – transit fares, plus related costs like parking
- Door-to-door travel time
- Frequency of service – how often the service runs
- Hours of service – how early or late service runs, and/or weekend hours
- Convenience of service – goes where you need to go/parking availability
- Reliability of service – does the service run on time?
Intangible Service Attributes

- Safety while riding – safety from accidents and/or crime
- Comfort while riding – seats available, temperature, smooth ride, cleanliness, etc.
- Safety at the station/stop – safety from accidents and/or crime
- Comfort at the station/stop – shelter from weather, amenities, etc.
- Customer service – provided by drivers and other transit service staff
- Ease of service use – clear service info, routes easy to figure out, etc.
- Other riders – feeling secure/at ease with others using the service
- Avoid stress/cost of car use – traffic, parking, accidents, tickets
Attitudinal Survey

- **Survey objectives:**
  - Quantify the relative importance of each tangible and intangible factor
  - Compare average overall ratings across each mode
  - Assess impact of socio-economic / geographic factors
- **Redhill Group hired to collect and analyze data**
- **Data Collected in Fall 2008**
  - Telephone survey sampled approx. 400 non-transit users
    - Auto captive
    - Potential users
  - Hybrid on-board / telephone survey sampled approx. 400 users of each transit mode
    - Regular bus
    - Orange Line (“Full BRT”)
    - Gold Line (LRT)
    - Metro Rapid (“BRT Lite”)
    - Blue Line (LRT)
    - Red Line (HRT)
Do people perceive alternative transit modes differently?

<table>
<thead>
<tr>
<th>Local bus</th>
<th>Metro Rapid - &quot;BRT Lite&quot;</th>
<th>Orange Line - &quot;Full service&quot; BRT</th>
<th>Blue Line (LRT)</th>
<th>Gold Line (LRT)</th>
<th>Red Line (HRT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 1</td>
<td>Tier 2</td>
<td>Tier 3</td>
<td>Tier 4</td>
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</tbody>
</table>

Average Overall Modal Ratings

- Total Sample
- Non-Transit Users
Overall Rating vs. Capital Cost per Mile

![Graph showing overall rating vs. capital cost per mile for various modes of transportation. The x-axis represents capital cost per mile ($M, 2005 dollars) ranging from 0 to 350, and the y-axis represents overall rating ranging from 3.6 to 4.3. The graph includes categories such as Red Line HRT, Tier 4; Orange Line BRT, Gold Line LRT, Tier 3; Metro Rapid 'BRT Lite', Tier 2; Blue Line LRT, Tier 1; Local bus. The capital cost per mile for each category is marked accordingly.]
**Where do the modal differences originate?**

<table>
<thead>
<tr>
<th>Modal Comparisons</th>
<th>Summary Analysis</th>
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| **Gold Line LRT vs. Blue Line LRT**         | Higher overall ratings achieved by Gold Line compared to Blue Line were primarily due to *intangible attributes*:  
- safety at station, safety while riding, and other riders |
| **Orange Line BRT vs. Blue Line LRT**       | Higher overall ratings achieved by Orange Line compared to Blue Line were primarily due to *intangible attributes*:  
- safety at station, safety while riding, and other riders |
| **Gold Line LRT vs. Orange Line BRT**       | Similar overall ratings were due to comparable *tangible and intangible attribute* ratings |
| **Orange Line BRT vs. Metro Rapid BRT**     | Higher overall ratings achieved by Orange Line compared to Metro Rapid resulted from higher *tangible and intangible attribute* ratings:  
- Most significant difference related to station/stop comfort |
| **Metro Rapid BRT vs. Local Bus**           | Higher overall ratings achieved by Metro Rapid compared to Local Bus were due primarily to higher *tangible attribute* ratings like travel time, frequency, and reliability |
Relative Importance of Different Tangible and Intangible Service Attributes

Average Attribute Ratings

- Service reliability
- Service frequency
- Ride safety
- Service span
- Station/stop safety
- Service convenience
- Ease of service use
- Avoiding stress/cost of car use
- Travel Cost
- Travel Time
- Ride Comfort
- Customer Service
- Station/stop comfort
- Other riders

Total Sample vs. Non-Transit Users
What are the variations across socio-economic / geographic factors?

- Overall average rating of each transit service was generally consistent across socio-economic / geographic variables.
- Overall average rating of each transit service was positively correlated with level of familiarity with that service.
- Travel cost more important for transit captive users.
- Travel time more important to transit choice users.
- Transit users (choice and captive) put more weight on service frequency, travel cost, station comfort, and other riders.
- Non-transit users (potential and auto captive) put more weight on reliability, safety while riding, safety at station/stop, convenience, and customer service.
Findings

1. Do people perceive alternative rapid transit modes differently?
   - Yes, analysis separated the modes into 4 statistically distinct tiers

2. If differences exist, where do they originate?
   - Level of investment
   - Urban context
   - A mixture of tangible and intangible service attributes
     - Reliability and service frequency are most important tangible attributes
     - Safety is the most important intangible attribute, particularly for non-transit users
Findings (continued)

3. Can ridership attraction be linked to specific tangible and intangible service attributes?
   - Tangible attributes (functionality) more important in determining attractiveness of lower-investment bus-based modes
   - Intangible attributes more important in determining attractiveness of higher investment BRT and rail modes

4. What variations exist across socio-economic/geographic factors?
   - Limited variation across different socio-economic/geographic groups
   - Transit market segmentation showed that some differences exist across the transit choice, transit captive, auto potential, and auto captive groups
Conclusions

• Differences in perception of alternative transit modes
  – Appear to be independent of any particular mode or technology
  – Are driven largely by the urban context in which they operate
• Full-service BRT can replicate both the tangible and intangible attributes normally associated with rail, but in return for lower capital cost investments
• Even a lower-investment BRT Lite service performs remarkably well in terms of overall rating achieved per dollar of investment
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Full report can be download at www.nbrti.org/research.html

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