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

- Heavy rail
- Light rail
- BRT
- Use of existing medians
- Use of shoulders
- Express bus
- Local bus

'BRT Lite' and 'Full Service' BRT are highlighted in the diagram.
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?

![Bar chart showing average overall modal ratings for different transit modes.](chart.png)

- **Local bus**: Tier 1
- **Metro Rapid - “BRT Lite”**: Tier 2
- **Orange Line - “Full service” BRT**: Tier 3
- **Blue Line (LRT)**: Tier 4
- **Gold Line (LRT)**: Tier 4
- **Red Line (HRT)**: Tier 4

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

- Local bus
- Blue Line LRT
- Orange Line BRT
- Gold Line LRT
- Red Line HRT
- Tier 4
- Tier 3
- Tier 2
- Tier 1
- Metro Rapid 'BRT Lite'

Capital Cost per Mile ($M, 2005 dollars) vs. Overall Rating

- 3.6
- 3.7
- 3.8
- 3.9
- 4
- 4.1
- 4.2
- 4.3

0 50 100 150 200 250 300 350

Tier 1
Tier 2
Tier 3
Tier 4
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 downloaded at www.nbrti.org/research.html

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