URBAN SUBURBAN PERCEPTIONS OF TRANSIT STOP BUILT ENVIRONMENT

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WORLD SYMPOSIUM OF TRANSPORT AND LAND USE RESEARCH
SESSION: TRANSIT STATIONS
INTRODUCTION

- Transit stops have the potential to develop into community centers which rejuvenate and strengthen community life.

- Well established transit can foster the creation of livable neighborhoods and communities.

- Public transit is perceived wrongly.

- Quantifying the value of public transit attributes and identifying trade-offs is essential for transit planning.
RESEARCH OBJECTIVES

• Quantify the Key mobility and Non Mobility attributes of public transit
  - Determine willingness to pay for new public transit services
  - Identify tradeoffs between service attributes
  - Determine the value, placed on placemaking at transit
RESEARCH QUESTIONS

VS

Ben Akiva and Morikawa (2002)
PREVIOUS STUDIES

Transits’ Impact On Land Value

Willingness To Pay
Molins and Timmermans (2006), Das et al. (2009), Ben Akiva and Morikawa (2002)

Transit and Urban Form

Transit and Placemaking In Stop Environment
Yannes et al (2010)
RESEARCH METHODOLOGY

• Previous Research

• Choice Modeling

• Experimental Design

• Stated Preference Survey

• Focus Groups

• Pilot Testing
**Selection Service Type Attributes**

Survey Attributes vs

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Type</td>
<td>0</td>
<td>Express Bus</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Commuter Rail</td>
</tr>
</tbody>
</table>

Note: Level ‘0’ Refers to Reference/Base Level
## PLACEMAKING

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placemaking</td>
<td>0</td>
<td>Poor Place Making</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Fair Placemaking</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Good Place Making</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Very Good Placemaking</td>
</tr>
</tbody>
</table>

Note: Level ‘0’ Refers to Reference /Base Level
Place Making-Poor

Increased Building Setbacks
Placemaking-Fair
Placemaking-Good
Placemaking-Very Good
Service Reliability

What are the characteristics of this service? Arrived within 5 minutes of scheduled time?

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Reliability</td>
<td>0</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>85%</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>95%</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>99%</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>100%</td>
</tr>
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</table>

Note: Level ‘0’ Refers to Reference/Base Level

Defined using LOS measures for on time performance
# Parking

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parking</td>
<td>0</td>
<td>Free</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Not Free</td>
</tr>
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</table>

Note: Level ‘0’ Refers to Reference / Base Level
## Comfort

<table>
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<th>Description</th>
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<tbody>
<tr>
<td>0</td>
<td>High</td>
</tr>
<tr>
<td>1</td>
<td>Low</td>
</tr>
</tbody>
</table>

*Note: Level ‘0’ Refers to Reference /Base Level*

*Less than that of a personal automobile*
# Cost to Household

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$0</td>
<td>$0 per year</td>
</tr>
<tr>
<td>1</td>
<td>$100</td>
<td>$100 per year</td>
</tr>
<tr>
<td>2</td>
<td>$175</td>
<td>$175 per year</td>
</tr>
<tr>
<td>3</td>
<td>$240</td>
<td>$240 per year</td>
</tr>
<tr>
<td>4</td>
<td>$275</td>
<td>$275 per year</td>
</tr>
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</table>

Note: Level ‘0’ Refers to Reference/Base Level
EXPERIMENTAL DESIGN

- D optimality criterion
- 64 different choice questions were included in final survey
- 4 different choice questions per survey
- 16 versions of survey
- Respondents assigned a random number to determine which choice questions they answered
Stated Preference Survey

• Delivered by electronic means
• In person intercept survey
• Tested through focus groups
• Locations selected from the New Haven-Hartford-Springfield corridor
• Conducted at 5 locations; Meriden, Wallingford, Enfield, Harford, and Springfield
SURVEY FLOW

Service Introduction

Trip Description Interface

Choice Experiments

Demographic Information

2010 Transportation Survey

Question 4

Project A

Project B

Stop Environment

Vehicle Type

Express Bus

Express Bus

Parking at Destination

Not Free

Not Free

Service Reliability

95%

75%

Comfort

High

Low

Cost to Your House Hold

$145 per year

$240 per year

If you were able to use either option for YOUR TRIP, how would you vote?

- I would vote for Project A, and pay $145 per year
- I would vote for Project B, and pay $240 per year
- I would not vote for either program, with no increase in State/Town taxes and fees
MODEL ESTIMATION

- Survey response- total of 299 responses resulting in 1196 observations

- Conditional logit models were estimated

- NLOGIT 4.0 software was used
MODEL ESTIMATION

• Conditional Logit Model:
  - Based on utility theory
  - Uses characteristics of alternatives rather than individuals’
  - Probability that respondent $i$ chooses alternative $j$:

$$P_{ij} = \frac{\exp(\beta \cdot Z_{ij})}{\sum_{n=1}^{J} \exp(\beta \cdot Z_{ij})}$$

Where:

$\beta =$ vector of utility co-efficient or parameters for $Z_{ij}$ attributes
# Geographic Interaction Model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Abbrev</th>
<th>$\beta$</th>
<th>t-stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commuter Rail Service</td>
<td>ST</td>
<td>0.2342</td>
<td>2.07</td>
</tr>
<tr>
<td>Service Reliability</td>
<td>SR</td>
<td>1.6656</td>
<td>3.40</td>
</tr>
<tr>
<td>Low Comfort</td>
<td>C</td>
<td>-0.2597</td>
<td>-3.23</td>
</tr>
<tr>
<td>Parking Fee at destination</td>
<td>P</td>
<td>-0.4497</td>
<td>-5.65</td>
</tr>
<tr>
<td>Cost to Household</td>
<td>T</td>
<td>-0.0067</td>
<td>-10.28</td>
</tr>
</tbody>
</table>

Note: Model significant at the 5% level ($\chi^2 = 182.249$, $df = 11$)
WILLINGNESS TO PAY (WTP)

- Calculated using:

\[ WTP_{\text{Attribute}} = \frac{\beta_{\text{Attribute}}}{\beta_{\text{Cost to household}}} \]
WTP For Service Attributes

Willingness to Pay for Service Attributes (Annual in Tax $)

- $395

- $67
## Geographic Interaction With Placemaking

<table>
<thead>
<tr>
<th>Interaction Term</th>
<th>Abbr.</th>
<th>Co-efficient</th>
<th>t-stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fair Placemaking</td>
<td>FP</td>
<td>0.7553</td>
<td>4.83</td>
</tr>
<tr>
<td>Good Placemaking</td>
<td>GP</td>
<td>0.5491</td>
<td>3.43</td>
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<tr>
<td>Very Good Placemaking</td>
<td>VP</td>
<td>0.5519</td>
<td>3.35</td>
</tr>
<tr>
<td>FP * Geographic Indicator</td>
<td>FP*GI</td>
<td>-0.8004</td>
<td>-3.905</td>
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<tr>
<td>GP * Geographic Indicator</td>
<td>GP*GI</td>
<td>-0.7534</td>
<td>-3.55</td>
</tr>
</tbody>
</table>

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WTP for Placemaking

WILLINGNESS TO PAY FOR PLACEMAKING (ANNUAL TAX $)

Urban Areas
Suburban Areas

FP
$113

GP
$82

VP
$82

FP
-$7

GP
-$30

VP
-$26

$73
CONCLUSIONS

- Survey tool developed provides a means of assessing the value of transit projects in a community.
- The public displayed a significant preference for rail over bus.
- Service attributes like comfort, service and cost are very valuable to users and should ultimately be considered in transit planning and policy.
- Urban areas have a higher value for placemaking at transit stops.
AKNOWLEDGEMENTS

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• Thanks to Kelly Bertolaccini and Nicholas Hart for their efforts in data collection.
QUESTIONS