Understanding the Market of Metro Transit's Ridership and Services and How Technology Can Help

Kevin J. Krizek
Ahmed M. El-Geneidy
University of Minnesota
1. Enter your starting point in one of the following ways:

   - **ADDRESS**
   - **INTERSECTION**
   - **LANDMARK**

   Optional drop down menus:
   - **Street Address**
   - **Directional City**
   - (605 7th St., E, St. Paul)

2. Enter your destination in one of the following ways:

   - **ADDRESS**
   - **INTERSECTION**
   - **LANDMARK**

   Optional drop down menus:
   - **Street Address**
   - **Directional City**
   - (605 7th St., E, St. Paul)

3. Enter a Date and Time:

   - **Date:** Nov 18, 2005
   - **Time:** Depart at 9 AM

4. Customize your trip:

   - How far are you willing to walk?
   - 1/2 mile

   - Would you prefer?
   - Faster Trip
   - Fewer Transfers
   - Less Walking
   - Wheelchair Access

For help planning your trip, call Metropolitan Transit Information, 612.373.3333.
Understanding the Market of Metro Transit's Ridership and Services and How Technology Can Help

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1. All travelers in an urban area

- Transit riders
- Non-transit riders

- Captive transit
- Choice transit
- Potential riders
- Captive auto

- What do we know of these populations?
- What are the prospects for increasing these populations?
- What role can technology play in attracting these populations?
Types of Riders

• Captive Riders
  – Portland (OR) 23% of the total riders
  – Chicago (IL) 32% of the total riders

• Choice Riders
  – Portland (OR) 77% of the total riders
  – Chicago (IL) 68% of the total riders
Rider Survey

• 4408 Onboard Surveys
• 83 Questions
• Conducted in 2001 by Periscope (Metro Transit)
<table>
<thead>
<tr>
<th>Question</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Seats are comfortable</td>
<td></td>
</tr>
<tr>
<td>Buses are clean</td>
<td></td>
</tr>
<tr>
<td>You are likely to recommend Metro Transit bus service to family, friends, or co-workers</td>
<td></td>
</tr>
<tr>
<td>Buses run on schedule</td>
<td></td>
</tr>
<tr>
<td>Trip length is satisfactory</td>
<td></td>
</tr>
<tr>
<td>Buses are comfortable</td>
<td></td>
</tr>
<tr>
<td>You feel safe while waiting for the bus during the day</td>
<td></td>
</tr>
<tr>
<td>You feel safe while riding on buses during the day</td>
<td></td>
</tr>
<tr>
<td>Overall, you are satisfied with Metro Transit bus service</td>
<td></td>
</tr>
<tr>
<td>Buses are reliable</td>
<td></td>
</tr>
<tr>
<td>Reduction in time spent waiting to get bus information by phone</td>
<td></td>
</tr>
<tr>
<td>Clear, accurate information: Bus Line</td>
<td></td>
</tr>
<tr>
<td>Courteous customer service on MT info line</td>
<td></td>
</tr>
<tr>
<td>You are able to access route or schedule information using the MT Information Line</td>
<td></td>
</tr>
<tr>
<td>Clear, accurate information: Info Line</td>
<td></td>
</tr>
<tr>
<td>Faster ways to pay your fare</td>
<td></td>
</tr>
<tr>
<td>Express bus hours of operation are sufficient</td>
<td></td>
</tr>
<tr>
<td>Park &amp; Ride lots are conveniently located</td>
<td></td>
</tr>
<tr>
<td>Park &amp; Ride amenities such as a convenience store, daycare facility, or dry cleaner</td>
<td></td>
</tr>
<tr>
<td>Coach buses for longer express commutes</td>
<td></td>
</tr>
<tr>
<td>More express bus routes</td>
<td></td>
</tr>
<tr>
<td>Longer bus service hours</td>
<td></td>
</tr>
<tr>
<td>Drivers call out street names at transfer points and intersections with stop lights</td>
<td></td>
</tr>
<tr>
<td>Drivers operate buses in a safe and responsible manner</td>
<td></td>
</tr>
<tr>
<td>Drivers present a professional appearance</td>
<td></td>
</tr>
<tr>
<td>Drivers are helpful</td>
<td></td>
</tr>
<tr>
<td>Drivers are courteous</td>
<td></td>
</tr>
<tr>
<td>Approximately what was your family's total income last year?</td>
<td></td>
</tr>
<tr>
<td>How many working automobiles do you have available for your use?</td>
<td></td>
</tr>
<tr>
<td>Time waiting for transfer buses is not excessive</td>
<td></td>
</tr>
<tr>
<td>You are comfortable transferring from one bus to another to complete your trip</td>
<td></td>
</tr>
<tr>
<td>What is your age?</td>
<td></td>
</tr>
<tr>
<td>How long have you used our bus service?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety &amp; Satisfaction</td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td></td>
</tr>
<tr>
<td>Travel Time &amp; Service Type</td>
<td></td>
</tr>
<tr>
<td>Drivers Attitude</td>
<td></td>
</tr>
<tr>
<td>Service Matter</td>
<td></td>
</tr>
<tr>
<td>Personal</td>
<td></td>
</tr>
</tbody>
</table>
Rider Survey Cluster Analysis

Choice Riders 57.5%
Captive Riders 42.5%
Main Points

• Choice Riders
  – Reliability
  – Travel Time
  – Convenience of Service
  – Stop Announcements

• Captive Riders
  – Safety
Automatic Vehicle Location

- GPS Location Data
- Global Positioning Satellite System
- Voice communications
- Differentially corrected location, vehicle, route and message data
- data messages
- Field Supervisor and Maintenance
- Dispatch Center
- Bus or Light Rail Vehicle
Transit Trackers & Next Arrival
London Countdown

- Multi-Line LED Displays
- Countdown in Minutes
- 400 Signs (4,000 Planned)
- 3 Phases Over 4 Years
All travelers in an urban area

Transit riders

Captive transit

Choice transit

Potential riders

Non-transit riders

Captive auto

2.

- What do we know of these populations?
- What are the prospects for increasing these populations?
- What role can technology play in attracting these populations?
Non-Rider Survey

- 515 Phone Surveys
- 75 Questions
- Conducted by Periscope (Metro Transit) in 2001
<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of service or time between buses</td>
<td>0.61</td>
<td>-0.06</td>
<td>0.10</td>
<td>0.05</td>
</tr>
<tr>
<td>On-time performance</td>
<td>0.61</td>
<td>-0.05</td>
<td>0.37</td>
<td>0.05</td>
</tr>
<tr>
<td>Clarity of the bus stop announcements</td>
<td>0.77</td>
<td>-0.03</td>
<td>0.05</td>
<td>0.00</td>
</tr>
<tr>
<td>Visibility of route numbers or names on the outside of the bus</td>
<td>0.67</td>
<td>0.01</td>
<td>-0.07</td>
<td>-0.01</td>
</tr>
<tr>
<td>Ease of paying fare or purchasing bus passes</td>
<td>0.56</td>
<td>0.01</td>
<td>0.29</td>
<td>-0.02</td>
</tr>
<tr>
<td>Driving competency of the bus drivers</td>
<td>0.56</td>
<td>0.04</td>
<td>0.38</td>
<td>-0.14</td>
</tr>
<tr>
<td>Helpfulness of the bus drivers</td>
<td>0.67</td>
<td>0.04</td>
<td>0.30</td>
<td>-0.20</td>
</tr>
<tr>
<td>Accuracy of the bus stop announcements</td>
<td>0.76</td>
<td>0.05</td>
<td>0.14</td>
<td>0.00</td>
</tr>
<tr>
<td>Courteousness of the bus drivers</td>
<td>0.65</td>
<td>0.05</td>
<td>0.33</td>
<td>-0.16</td>
</tr>
<tr>
<td>More amenities such as day care, coffee shops, cleaners, drug stores at Park-and-Ride lots</td>
<td>0.10</td>
<td>0.67</td>
<td>-0.09</td>
<td>0.16</td>
</tr>
<tr>
<td>Employer-provided car for work purposes or emergencies while at work</td>
<td>-0.03</td>
<td>0.69</td>
<td>-0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>Personalized help finding bus routes or scheduling information</td>
<td>-0.06</td>
<td>0.69</td>
<td>0.06</td>
<td>0.04</td>
</tr>
<tr>
<td>Discounted or reduced fares</td>
<td>-0.09</td>
<td>0.73</td>
<td>0.22</td>
<td>-0.10</td>
</tr>
<tr>
<td>Guaranteed ride home available if there were an emergency during work hours or if you had to work</td>
<td>0.03</td>
<td>0.73</td>
<td>0.15</td>
<td>0.12</td>
</tr>
<tr>
<td>Shuttle or van service to shopping centers or stores during lunch breaks</td>
<td>0.06</td>
<td>0.76</td>
<td>-0.03</td>
<td>0.04</td>
</tr>
<tr>
<td>The buses are not clean</td>
<td>-0.10</td>
<td>-0.03</td>
<td>0.68</td>
<td>0.11</td>
</tr>
<tr>
<td>Comfort of the bus such as seating and temperature inside</td>
<td>0.49</td>
<td>-0.04</td>
<td>0.53</td>
<td>-0.04</td>
</tr>
<tr>
<td>Safety at the bus stops</td>
<td>0.35</td>
<td>-0.02</td>
<td>0.59</td>
<td>0.07</td>
</tr>
<tr>
<td>How appealing, overall, is the idea of using the bus?</td>
<td>-0.01</td>
<td>0.38</td>
<td>0.61</td>
<td>-0.02</td>
</tr>
<tr>
<td>Cleanliness of the buses</td>
<td>0.37</td>
<td>0.04</td>
<td>0.70</td>
<td>-0.04</td>
</tr>
<tr>
<td>Safety from crime on buses</td>
<td>0.30</td>
<td>0.03</td>
<td>0.74</td>
<td>0.03</td>
</tr>
<tr>
<td>Approximately how far is it from your home to the nearest bus stop or shelter?</td>
<td>-0.03</td>
<td>0.10</td>
<td>-0.12</td>
<td>0.58</td>
</tr>
<tr>
<td>How long do you think it would take you to commute to work or school using a bus?</td>
<td>-0.05</td>
<td>-0.05</td>
<td>-0.01</td>
<td>0.65</td>
</tr>
<tr>
<td>How long does it take you to commute to work or school one way in a typical day?</td>
<td>-0.04</td>
<td>0.14</td>
<td>0.04</td>
<td>0.87</td>
</tr>
<tr>
<td>How many miles do you typically commute to work or school one way?</td>
<td>-0.03</td>
<td>0.12</td>
<td>0.02</td>
<td>0.90</td>
</tr>
</tbody>
</table>
Non-Rider Survey Cluster Analysis

Potential Riders
- Reliability and Level of Service
- Amenities
- Trip Environment
- Travel Time

Auto Captives
- 51%
- 49%
Main Points

• Potential Riders
  – Access to Service
  – Travel Time
  – Waiting Time
  – Reliability
  – Trip Environment
Technology Applications & Impact

Transit Trackers and Next Arrival
Internet Applications
Metro Transit Trip Planner

1. Enter your starting point in one of the following ways:
   - ADDRESS
   - INTERSECTION
   - LANDMARK

2. Enter your destination in one of the following ways:
   - ADDRESS
   - INTERSECTION
   - LANDMARK

3. Enter a Date and Time:
   - Date: [Select Date]
   - Time: [Depart at: ] [Arrive by: ]

4. Customize your trip:
   - How far are you willing to walk?
     - [1/2 mile]
   - Would you prefer?
     - Faster Trip
     - Fewer Transfers
     - Less Walking
     - Wheelchair Access

For help planning your trip, call Metropolitan Transit Information, 612-373-3333.
Online Transit Trackers

![Image of online transit tracker](image-url)

**5th & Salmon Southbound**
Find out when your bus is coming

This page will refresh automatically within 40 seconds.

<table>
<thead>
<tr>
<th>Route and destination</th>
<th>Arrival</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 HOLGATE TO 136TH AVE</td>
<td>2 min</td>
</tr>
<tr>
<td>17 HOLGATE TO 136TH AVE</td>
<td>15 min</td>
</tr>
</tbody>
</table>

show other arrivals

Additional arrivals:
- 9 POWELL TO GRESHAM TC
  - 1 min
- 14E HAWTHORNE EXPRESS TO 39TH-HAWTHORNE
  - 2 min
- 14 HAWTHORNE TO 97TH-FOSTER
  - 6 min
- 4L DIVISION TO GRESHAM TC LIMITED
  - 10 min
- 14 HAWTHORNE TO 97TH-FOSTER
  - 11 min
- 4 DIVISION TO 145TH AVE
  - 12 min
Passenger’s Time

- Access Time
- Waiting Time
- Travel Time
- Egress Time
Waiting Time
Travel Time
Current Technologies at Metro Transit

• Transit Signal Priority
• Automatic Vehicle Location
• Automatic Passenger Counter
• Advanced Transit Management Center
Technology Savings in Portland (OR)

- **Findings:**
  - On-time performance: 9% improvement
  - Run-time variance: 18% improvement
  - Average run-time: 3% improvement
  - Headway variance: 4% improvement

- **Estimated annual benefits:**
  - Passenger waiting time: $1.6M
  - Passenger travel time: $1.9M
  - Operating costs\(^1\): $1.9M
  - Total: $5.4M

(1) Operating cost benefits depend on schedule adjustments
Future Projects

• Bus Rapid Transit

• Utilization of Archived ITS Data in Analyzing Transit Operations and Performance
Understanding the Potential Market of Metro Transit's Ridership and Services and How Technology can Help

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University of Minnesota

Pictures Credit
TriMet David Crout
Metro Transit website
Transit Ridership at Metro Transit (from federal reporting requirements)

- Between 2004 and 2005 Quarterly Report
  - Light Rail
  - Bus Service

- 48.6% Increase in Number of Trips
- 31.5% Increase in Number of Bus Trips