

An Imputation Method and Evaluation for Determining Alighting Location in On-board Transit Surveys

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Overview of Presentation

- Introduction
- Purpose for Developing Imputation Method
- Elements Required for Imputation Method
- Example, Central Ohio Transit Authority
- Conclusion

Introduction

- Objective
 - Continue to improve data completion in OB studies
 - Improve data quality
 - Minimize respondent burden
- Data Elements (for TDM / TP)
 - Origin / Destination addresses / Trip Purposes
 - Boarding and Alighting locations
 - Route Sequence
 - Access and Egress Modes

Introduction

- TDM / TP – more “hungry for data”
 - Data Accuracy
 - Weighting at the trip (route) level
 - Data Quality
 - Additional requested addresses, more potential error
 - Data Completeness
 - Origin and Destination, Home address
 - Boarding and Alighting locations

Purpose for Imputation Method

- Data Accuracy
 - Limitations with Previous Methods
 - Weighting (response factor) options limited
 - Boarding counts collected at the trip level
 - Trip segments under and over represented
 - Short trip bias

Purpose for Imputation Method

- Data Quality
 - Limitations with Previous Methods
 - Requesting four / five different addresses
 - Limited rider comprehension
 - Misinterpreting O/B and D/A
 - Lack of understanding “one-way trip”
 - Lack of understanding of transit network
 - Incorrect / illogical location data

Purpose for Imputation Method

- Data Completeness
 - Limitations with Previous Methods
 - Prone to missing address information
 - Questionnaire intimidation
 - Lack of time to complete entire questionnaire
 - Unit response rate
 - Item response rate

What is the solution???

Use technology to increase data accuracy, quality and completeness and minimize respondent burden in the process.

Application of Technology

- GPS equipped PDAs
 - Precise boarding time / location
 - GPS
 - Bus stop drop down list
 - Precise passenger volume
 - Boarding and Alighting counts by stop

Develop Imputation Method

- Imputation Method - Alighting Location
 - Variables and other items used
 - Trip information (route, time, direction)
 - Transit network
 - Destination address
 - Future transfer information
 - Egress mode

Example of Alighting Imputation

- Central Ohio Transit Authority (COTA)
 - Conducted in Columbus in 2008
 - Pilot - Comparing 3 alighting locations
 - Respondent provided
 - Imputed
 - 3rd person collected

Example of Alighting Imputation

- Pilot Study Alighting Imputation Test
 - Preliminary results
 - Direction of trip issues – 35%
 - Unique riding patterns (A, B trips)
 - PDA auditing issues
 - Riders reversing O/D
 - Transfer info issues – 45%
 - Either / Or route selection
 - Reverse Order
 - Destination location geocode issues – 20%

Example of Alighting Imputation

- Full-Scale Study Alighting Imputation Results
 - Total records – 5,747 records
 - Rider provided alighting – 4,243 (74%)
 - Records with Imp and Rider provided alighting within 200 ft – 4,161 (98%)

Conclusion

- Imputation increases unit and item response (alighting location)
- Accurate estimation of alighting location
- Validates other questionnaire inputs (destination address)

Additional uses of GPS data

- **Additional value for surveyed trip**
 - Respondent trip length (distance)
 - Respondent trip time
- **Additional value for transit agency**
 - Schedule adherence
 - Transit speeds
 - Bus load peak levels
 - APC Corroboration

Thank You!
