DOES TRANSIT ACCESSIBILITY AFFECT MODE SHARE?

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INTRODUCTION
On an aggregate level, personal mode choice can neither exacerbate or mitigate on many municipalities. Understanding the factors that govern an individual’s mode of travel is central to solving these problems and can lead to more sustainable and responsible development. This research aims to analyze the different variables which may serve as determinants in personal mode choice; it is based on a 2011 survey of 10,278 households in the Atlanta Metropolitan Region.

METHODLOGY

Data Acquisition
Land Use Diversity
Accessibility Index
Analysis of Socioeconomic Variables
Impact Analysis

LAND USE DIVERSITY

Land Use Diversity
Low - Low
High - Low
Low - High
High - High

ACCESSIBILITY

Area Served by Transit
0%
0 - 15.7%
15.8% - 50.9%
51% - 87.6%
87.6% - 100%

1. The connectivity of each TAZ was determined by whether or not the origin and destination zones for each trip were directly linked by bus or rail lines. A score of 1 indicates connectivity between TAZs, whereas a score of 0 indicates the TAZs were not connected by transit
2. Also included in the accessibility analysis was the ratio of transit intensive area to the total area of each TAZ, where transit intensive area is the area in a half-mile radius around each rail station and a quarter-mile radius around each bus stop
3. These variables were calculated for bus and transit separately and later were aggregated together

IMPACT ANALYSIS

Correlation Results

Regression Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Effect</th>
<th>Metro Region</th>
<th>City of Atlanta</th>
</tr>
</thead>
<tbody>
<tr>
<td>DirectConnectivity</td>
<td>0.1112</td>
<td>2.853*</td>
<td>0.1132*</td>
</tr>
<tr>
<td>Land Use Diversity (Origin)</td>
<td>0.0353</td>
<td>6.081</td>
<td>0.1132*</td>
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<tr>
<td>Land Use Diversity (Destination)</td>
<td>0.0376</td>
<td>2.656*</td>
<td>0.1132*</td>
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<tr>
<td>Transit Accessibility at Origin</td>
<td>0.1069</td>
<td>2.441*</td>
<td>0.1132*</td>
</tr>
<tr>
<td>Transit Accessibility at Destination</td>
<td>0.1071</td>
<td>1.245*</td>
<td>0.1132*</td>
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<tr>
<td>Employment Density (Origin)</td>
<td>0.1255</td>
<td>0.608</td>
<td>0.1132*</td>
</tr>
<tr>
<td>Employment Density (Destination)</td>
<td>0.1286</td>
<td>0.690*</td>
<td>0.1132*</td>
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<tr>
<td>Income</td>
<td>-0.1522</td>
<td>1.003*</td>
<td>0.1132*</td>
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<tr>
<td>Household Size</td>
<td>-0.0895</td>
<td>0.658*</td>
<td>0.1132*</td>
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<tr>
<td>Vehicles Owned</td>
<td>-0.1741</td>
<td>0.091</td>
<td>0.1132*</td>
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<tr>
<td>Crime at Origin</td>
<td>0.0066</td>
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<td>0.1132*</td>
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<tr>
<td>Crime at Destination</td>
<td>0.0035</td>
<td>0.1255</td>
<td>0.1132*</td>
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<tr>
<td>Age</td>
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<tr>
<td>Disability</td>
<td>-0.0038</td>
<td>0.690*</td>
<td>0.1132*</td>
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</tbody>
</table>

DISCUSSION

This research was bound by several limitations:

- Over-sampling of people in the outer counties which do not have good transit connectivity, which results in better fit of the model for the City of Atlanta
- The lack of complete survey data Although the sample size was substantial, gaps and incomplete records limited the analysis and results
- Future work may also continue with a focus on equalizing geographies of scale to facilitate comparison between variables, or with the inclusion of more intricate variables in the regression model such as sidewalk conditions or amount of lighting around transit stops

Most of the variables considered in the models for regional and City level were found to be significant, with the exception of income. Impact factors for accessibility variables such as direct connection and access to transit at origin and destination were found to have larger impacts. High impact values for land use diversity indicate preference for transit when the trip is linked with a TAZ with diverse land use.

The model for predicting mode choice between a bus or a train seems to result in substantial pseudo R-squared values. However, the extreme odds values may be explained by the fact that the analysis was performed only on the trips completed by transit. In the current analysis, the significant variables include access to train and bus stops at origin and destination, direct connectivity between the two TAZs by train or a bus, and trip distance.

All of these models were found to fit the data decently, given its limitations. As the pseudo R squared value such as Cox and Snell, does not have an upper bound of 1, which explains its lower value for region.

ACKNOWLEDGEMENTS
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REFERENCES
5. Atlanta Regional Information System (ARIS) Dataset, from Georgia GIS Data Clearinghouse. https://www.georgiaspatial.org/
6. AIC Household Travel Survey Dataset (2013)