Background

Various approaches have been used to understand travel behavior - trip based approach, trip chaining based approach, and activity based approach. It is not only determined by the activities in which someone participates, but also the characteristics of the location of these activities.

Multiplicity of factors that influence travel behavior have been constantly highlighted. It has been argued that changing the three dimensions or 3D’s of the built environment - density, diversity and design can help achieve the objectives of trip generation. Destination Accessibility and Distance to Transit have also been added as significant. This research is an attempt to analyze trip duration for work trips and shopping trips in the Boston Metropolitan Area.

The focus is on below median income households and the analysis takes into consideration both the elements of the built environment and socio-economic characteristics of households that can impact travel behavior.

Research Questions:
What are the variables of the built environment and socio-economic characteristics of households, that are significant to the duration of work trips and shopping trips for below median households in Boston?
What are the patterns observed for trip duration of work and shopping trips for below median income households in Boston?

Results

What factors influence trip duration of work trips and shopping trips in Boston?

Interpreting work trip durations for the Boston Metropolitan region show that below median income households from the suburban areas in the north west spend the highest time on their work trips. For shopping trips for the same subset of people, it is seen that the households that are located south of Boston, around Ashmont, Dorchester, Milton, spend the highest time on shopping trips, as compared to households from other regions in the area.

Regression Analysis was conducted in Geoda, for all variables considered, the results show that out of the socio-economic variables, for work trips, household size and the number of household trips are observed to be significant. Similarly, for shopping trips, the socio-economic variables that are seen to be significant are Education, Household Size and Household Trips.

From the smart location database variables which measure the characteristics of the built environment, for work trips, jobs per household and the variable of regional diversity based were seen as significant. Areas where high regional diversity is observed in terms of jobs and total employment (Map 2), are areas where people spend less time getting to work. Map 2 illustrates the regional diversity, and trip duration illustrates households which spend more time/less time on work trips (Illustration 1). Another significant variable of measure, is the number of jobs per household, being the ones with high trip duration (Map 1).

For shopping trips, it can be seen that employment and household entropy, and total road network density are the variables that are significant (Map 3 & Map 4).

Discussion

Total Population and Total Employment by CBG being a variable that is a proxy of regional diversity, which means higher densities in mixed used setting, with good regional accessibility, is associated with less time spent on work trips. This holds true for the case of Greater Boston Area.

For this subset of below median income population, relatively weak relationships are seen for the trip generating variables of the density and design metrics, like gross residential density, population density, network density and street intersection density, which have shown high significance in previous studies. These are not significant to the trips of work by below median income households living in the Boston Metropolitan Area.

Conventional wisdom holds that high road network density, leads to less time spent on trips. This doesn’t hold true for the case of Greater Boston Area. Below median income households, residing in areas with medium road network density that spend relatively high time in the region on shopping trips.

Below median income households, residing in areas with medium road network density and total employment seen as significant. Areas where high regional diversity is observed in terms of jobs and total employment (Map 2), are areas where people spend less time getting to work. Map 2 illustrates the regional diversity, and trip duration illustrates households which spend more time/less time on work trips (Illustration 1). Another significant variable of measure, is the number of jobs per household, being the ones with high trip duration (Map 1).

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Conclusion

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