Vertical Equity Statewide Pilot, Data Inventory, and Guidelines for Performance Based Planning

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Project Objective

Existing accessibility indicators and destination attractiveness indicators fail to capture the character of destinations where people participate in activities. One reason this happens is due to computation of accessibility and destination attractiveness at aggregate levels. We test in this project the feasibility and usefulness of fine spatial and temporal resolution and develop a new set of performance and behavioral indicators that capture timing and duration of activities as well as commuting travel time

Problem Statement

This study is a feasibility proof that finer spatio-temporal resolution can lead to a new family of key performance indicators for an integrated land use-transportation system. These indicators can be used to test policies of changing land use and assessing their impacts on daily travel behavior. We also show that timing of activity participation and travel times to work are very different among jobs of different industries and these are heavily influenced by the type of centers surrounding them. This in turn shows we need to introduce a fine grade definition of jobs and their distribution in space to gain insights about the impact of policies that are at the intersection of land use and transportation. For example, employer-based demand management strategies (e.g., staggered work hours, telecommuting) will have different impacts on different job types depending on the opportunities offered around home and job sites. This in turn also implies the mix of job types at a location will determine the impact of these policies in space. Recording the number and type of jobs in different locations will then allow us to assess the impact of policies with higher precision and accuracy.

Research Methodology

We apply spatial clustering methods to a business establishments dataset in order to identify commercial centers and demonstrate a method to parameterize clustering of business establishments (forming a center) and develop destination attractiveness indicators. Many of these commercial centers are located along major infrastructure links, which means the activity opportunities they present would be poorly modeled by aggregating to census units or Traffic Analysis Zones (TAZs), which are often divided by these infrastructure links. We find that these different types of centers attract different kinds of activities at different times of day, and we confirm the significance of these differences using bootstrapping.

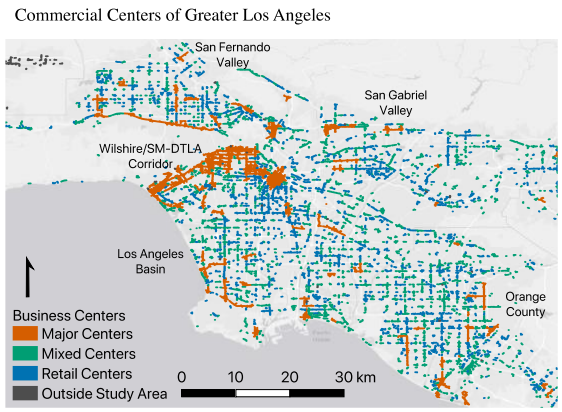

Figure 1 Centers

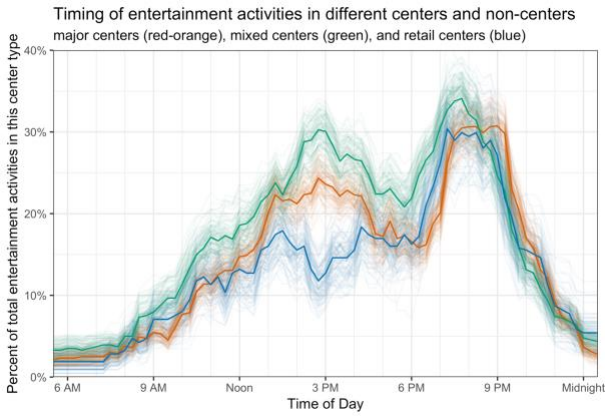

Figure 2 Timing of Activity

Results

Figure 1 shows an example of the spatial clustering and identification of the commercial centers. Figure 2 shows the differences in arrival and departure patterns among the centers for entertainment. This is a sample of the substantial differences in the duration of shopping activities in different types of centers, as well as in the timing of work, eating, and entertainment. In most cases, people spend more time on ostensibly similar activities in centers that present a larger and more diverse range of opportunities, and these activities tend to extend later into the evening. Smaller centers that spread throughout the region's suburbs seem to attract shorter duration and earlier evening activities. Since many of these timing differences occur around major congestion times of day in the region, spatial differences in activity scheduling are important for travel behavior modelers and transportation planners to understand. The commute travel time analysis shows fundamental differences in travel time among people working in different industries but also differences across California. This analysis also demonstrates clearly the need to identify centers of activity in proximity of home and work locations separately. It also shows the presence of these centers in proximity of home and work are associated with both a higher travel time and lower travel time depending on the type of center. This is the single most important indication that we need a different taxonomy than the simpler density and diversity of environments around home and work. Although we demonstrate here spatial heterogeneity in behavior for activity participation and work travel time, the study is not a complete representation of behavioral determinants. In terms of substantive policy findings, timing of activity participation and travel times to work are very different among jobs of different industries and these are heavily influenced by the type of centers surrounding them. This in turn shows we need to introduce a fine grade definition of jobs and their distribution in space to gain insights about the impact of policies that are at the intersection of land use and transportation. For example, employer-based demand management strategies (e.g., staggered work hours, telecommuting) will have different impacts on different job types depending on the opportunities offered around home and job sites. This in turn also implies the mix of job types at a location will determine the impact of these policies in space. Recording the number and type of jobs in different locations will then allow us to assess the impact of policies with higher precision and accuracy.