Modal Analysis of Activity-Travel Patterns and Tour Formation of Transit Users

Investigate the daily activity pattern and tour formation of transit users.

WHAT IS THE NEED?

The activity based approach is recognized as a new paradigm to understand the complex activity-travel behavior, improve travel demand forecasting model and understand the impacts of emerging transportation policies. The core concept of this approach is that travel demand is a derived demand, which implies that the demand for travel is created to participate in out-of-home activities. That means, travel is only made when the net utility of the activity and travel exceeds the utility from activity participation that involves no travel.

The activity-based approach differs from the conventional four-step model (FSM) in the sense that, FSM considers time as the cost of making a trip, whereas the activity based approach treats time as a finite element in which individuals try to allocate their sequence of activity-travel participation decisions to form their daily activity-travel patterns. Therefore, in the activity based approach, the activity-travel pattern of people becomes the reflection of their time-use decisions within a finite time boundary depending on their socio-demographic, spatial, temporal and other contextual constraints.

As mentioned, the basic unit of analysis of activity based approach is the activity-travel pattern of people, in detail, the revealed pattern of activities (in-home and out-of-home) of people and their associated travel over a specified time period. Activity pattern represents the summary of characterization of all attributes of an individual’s daily activities and trips. These characteristics include the timing, duration, location, who they traveled with, sequence of activities, trip chains/tours, travel time, and distances of trips. It shows how an individual allocate his/her responsibilities with environmental, transportation and household constraints and more importantly with their time constraints.
WHAT ARE WE DOING?

In this study, the activity-travel pattern and tour formation of transit users will be explored. By the term ‘tour’, the study will consider home based tours; those that both start and end at home. Tours can be constructed with a different degree of complexity based on how many different activities are involved in a tour, more precisely how many non-home locations a tour entails.

Tour Definitions:

• **Simple Tour:** Starts at home, includes a single non-home activity, and ends at home
• **Simple Work Tour:** Starts at home, single non-home activity is work, and ends at home
• **Simple Non-Work Tour:** Includes a single non-home activity that is not work.
• **Complex Tour:** Contains more than one non-home activity location
• **Complex Work Tour:** All non-home activities are work
• **Complex Non-Work Tour:** All the non-home activities are non-work
• **Work-Non-Work Mixed Tours:** Combines work and non-work activities in the same tour

WHAT IS OUR GOAL?

To better understand the activity-travel behavior of people, it is important to understand how people allocate their time to pursue different activities and travel subject to time constraints (24 hours a day) and how they connect different activity purposes as well as travel (trip chain/tour) over the whole day. The analysis of activity-travel pattern and tour formation helps to understand the travel needs of people, their mobility constraints, and how people can modify their activity-travel participations under different policy constraints.

WHAT IS THE BENEFIT?

The results of this study will help to formulate necessary policies to improve mobility and to reduce access barriers for the target groups. This research will also help identify what policy directions will best address all transit user when considering supply strategies such as pricing, subsidization, alternative modes, and service levels.

WHAT IS THE PROGRESS TO DATE?

Project work began in May 2020 and as of August 2020, the research team has completed the following:

• **Task 1:** Literature review draft
• **Task 2:** Utilized National Household Travel Survey (NHTS) data to conduct data analysis and establish national level statistics.

Next Steps: Conduct a data analysis of California Household Travel Survey (CHTS) data to develop the California focus.

IMAGES

Image 1: Defining Simple and Complex Tours

Image 2: Defining Work-Nonwork Mixed Tours