

2 Model Overview

2.1 Key Concepts and Parameters

SACSIM is a *typical weekday* model. It represents travel demands for a typical weekday, defined as a mid-week day (Tuesday, Wednesday or Thursday) during a Spring or early Fall month (March, April, May, September or October). Mid-week days are used because Mondays and Fridays are often affected by holiday or weekend activities or events. Spring or Fall months are used because those are months when schools are normally in session, weather does not often affect peoples' activities or travel, and a lower percentage of workers are on vacation. Activities and travel in late Fall and Winter months (November through February) are strongly affected by major holidays (Thanksgiving, Christmas, New Years Day, etc.) and inclement weather. Where required, typical weekday performance measures are annualized to represent travel through the course of the year, rather than only for a typical weekday. Figure 2-1 provides a high-level overview of the SACSIM model.

The term *simulation* is used in so many ways related to transportation modeling and analysis, that its use causes confusion, even to transportation professionals. The dictionary definition of *simulation* which is applicable to SACSIM is "...the imitative representation of the functioning of one system or process by means of the functioning of another <a computer ~ of an industrial process>; examination of a problem often not subject to direct experimentation by means of a simulating device..."¹ This general definition fits SACSIM, but also fits many other four-step travel demand models. Two characteristics of *transportation simulations* which apply to SACSIM, and distinguish SACSIM from four-step travel demand models are: 1) disaggregate application; and 2) explicit treatment of time.

In truth, only one key submodel which makes up SACSIM is truly a simulation, and that is DAYSIM. DAYSIM is disaggregate in its application—its units of analysis, or agents, are people. The units of analysis for conventional four-step models are TAZs. DAYSIM applies models estimated on a household travel survey of individual people to a representative population file with one record per person, and all person-level variables in the estimation accounted for explicitly in the model. Calibration aside, the model estimated is the model applied. For conventional four-step models, many of the key variables included in the estimated model are aggregated and simplified, with true distributions of behavior represented by the averages for groups of individuals.

DAYSIM also explicitly treats time. Durations of activities and travel times are constrained by the length of a day, and travel choices as modeled account for time explicitly in 30 minute blocks. Most conventional four-step models actually model a complete day's travel as a number of trips, with those trips blocked into times post-hoc, using fixed time factors or aggregate "choice" models.

No other submodel within SACSIM is a true simulation. The airport passenger ground access model is a pseudo-simulation, with the model applied by enumerating the actual passenger survey

¹ Webster's Ninth New Collegiate Dictionary, Merriam-Webster, 1987.

database. The remaining submodels (commercial travel, external travel) are applied to TAZ's as the unit of analysis, and treat time post hoc through fixed factors.

When many transportation professionals hear *transportation simulation* what they think of is one of the increasingly prevalent *traffic operations simulations*, which show cars, or in some cases, cars, transit vehicle, and pedestrians, in animations. Some of the animations have vivid detail, e.g. three-dimensional vehicles and people, set in a world with buildings, streets, and even street fixtures and furniture shown in 3-D. SACSIM is NOT this sort of simulation. In fact, SACSIM skims and assigns trips in same old, TAZ-based, static way that is used by conventional four-step travel demand models. DAYSIM simulates the demand for travel, but the actual assignment of that demand to highway and transit networks is not simulated.

Figure 2-1 SACSIM Model System

