

C7
Travel Demand Modeling

INCORPORATING ADVANCED MODELS IN SMALL AND MEDIUM SIZE MPO TRAVEL MODELS

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This paper discusses the development, estimation, and application of advanced travel models that replace traditional four-step aggregate models commonly found in small and medium sized MPO travel models. The advanced models consisted of population synthesis, population-based trip generation, and two-step destination choice. The models were estimated and applied to the Association of Monterey Bay Area Governments (AMBAG) Regional Travel Demand Model (RTDM). The AMBAG region includes Monterey, San Benito and Santa Cruz County of the Central Coast of California. AMBAG serves as both a federally designated Metropolitan Planning Organization (MPO) and Council of Governments (COG).

Small and medium sized MPO travel models commonly consist of traditional aggregate four step procedures. In most cases, data and resource limitations restrict the development of more advanced travel models for these smaller regions. In the AMBAG regional travel demand model, several advanced models were developed that replaced traditional aggregate procedures but did not require any additional data.

For trip generation, a population synthesis procedure was developed to generate full population and household records for the AMBAG area. Population-based trip rates were then estimated instead of traditional household-based rates, and the rates were applied to the individual population records as compare to zonal base. Both the population-based trip rates and the population synthesis were estimated from commonly available data sources which included the 2011 California Household Travel Survey (CHTS), American Community Survey (ACS) block-group data, Public Use Micro-Sample (PUMS) datasets, and 2010 Census data. This disaggregate approach allowed much more detailed trip rate estimations based on both person and household socio-demographic characteristics, and effectively modeled intra-household interactions.

For trip distribution, a two-step destination choice model was developed instead of a more traditional gravity model. Destination choice models are generally considered to provide a better behavioral basis for trip distribution because they can include more behavioral variables compared to gravity models. Destination choice models are however limited by lack of data for estimation due to the sheer number of destination alternatives. This limitation was overcome by estimating the destination choice at the Census tract level rather than the transportation zone level. This pooled survey records into larger tracts and ensured that there was a sufficient number of survey records for each alternative. Once the destination tract was determined, the destination zone was estimated using a gravity model.

These advanced models required the same amount of data for estimation that are used for standard aggregate travel models but yielded superior estimation and forecasting results. The models were also inserted within the framework of a common aggregate four-step model. This paper describes the development process and the results of using these models within the AMBAG framework. This paper also summarizes the results from these models compared to an earlier estimated aggregate travel model.