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A Practitioner's Guide to Urban Trip Generation

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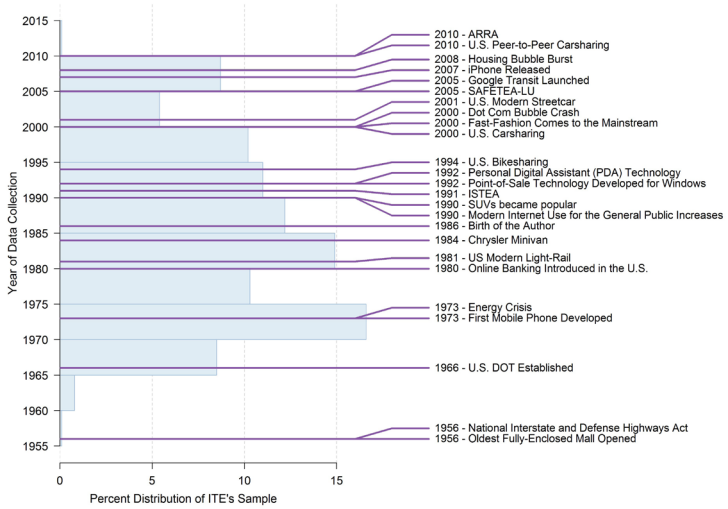
A PRACTITIONER'S GUIDE to URBAN TRIP GENERATION

The Issue

In 1976, the Institute of Transportation Engineers (ITE) compiled their first Handbook of guidelines for evaluating development-level transportation impacts. Decades later, these methods are still ubiquitously used across the US and Canada. Only recently, with the third edition of the ITE Trip Generation Handbook, have new data and approaches been adopted. In this study NITC researcher Kristina Currans takes aim at understanding issues inherent in the collection and application of ITE's data and methods in various urban contexts. This technology transfer guide touches on the main findings from this work.

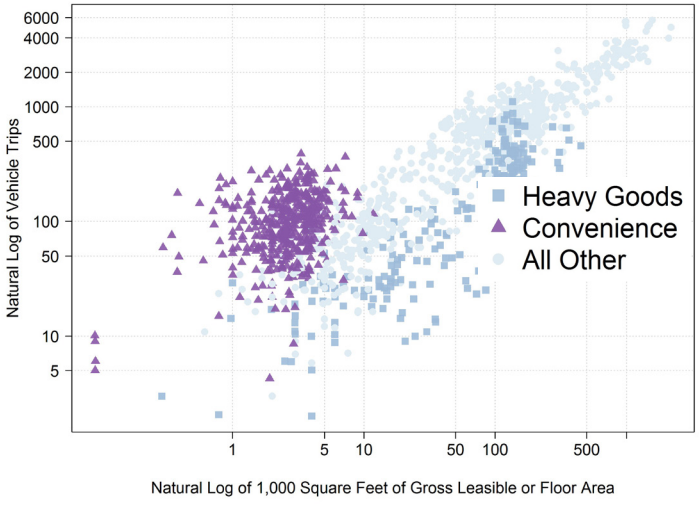
Age of Data

The age of the data used, according to the findings, can explain certain variation in trip rates. For eight retail and service land uses, a 1 percent increase in the age of the data relates to as much as a 2.4 percent increase in estimated vehicle trip rates. Findings from this portion of the analysis should be interpreted with caution. This does not imply causality—it could be a result of changing land uses or sampling strategies. However, it does suggest that the use of older data may result in inaccurate estimates. Given the vastly changing transportation landscape (see the figure on the right), protocols should be considered to decommission older data and invest in more comprehensive data collection in the future.



Cost/Benefit Analysis of Land Use Taxonomy

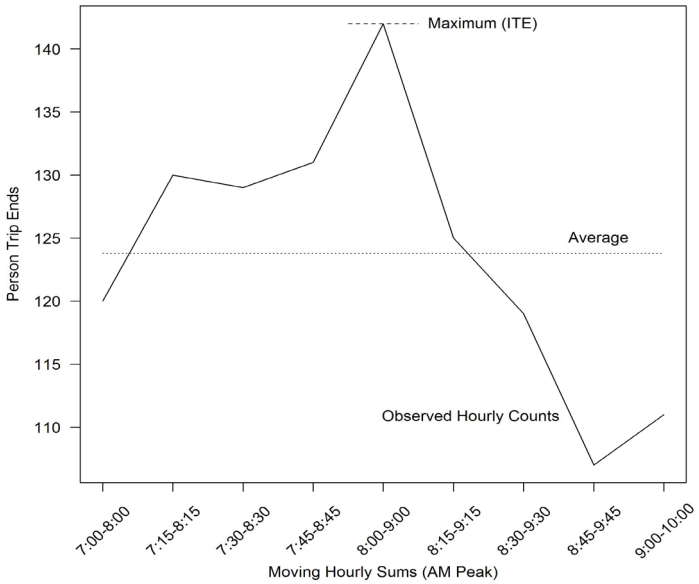
In an analysis of the performance of the ITE Handbook's land use taxonomy, focusing specifically on the 67 retail and service land uses, the results indicated minor loss of information when aggregating the land use categories down to three (see the figure on the right). The three categories explained approximately 97 percent of the variation accounted for using ITE's taxonomy. Given the expensive nature of the data—Currans estimated the cost of ITE's taxonomy would result in an investment of 2.1–2.7 million dollars every ten years to maintain a data set of four observations per land use—the recommendation here is to simplify down to three land uses so that more complexity can be added where it is of more value: contextual variables, additional metrics, and site-level attributes (e.g., transportation demand strategies, parking, pricing).



Overall Activity, Accessibility and Income

Transaction counts were analyzed, as proxy for person trips, to understand how overall activity levels differed in locations with varying accessibility and income levels. On a weekly and daily basis, person trip counts often don't vary much from ITE's expectations. The results for the peak hour, however, indicate a significant relationship between income and peak hour counts.

There are two important conclusions to draw from this: A) the most substantial variation between activity and contexts, for food and retail, may be in how the trips are distributed throughout the day, not how many trips are observed each day. B) socio-demographics, a long forgotten factor in transportation impact analysis for development review, would likely be a stronger explanatory variable for estimating trips at retail. More work is needed to identify the best way to incorporate B into practice, but practitioners can make use of A by estimating trip rates based on peak hours.



How do you define "peak hour"?

How does ITE determine its peak hour trip rate? Fifteen-minute counts are aggregated into moving hourly sums. The maximum moving hourly sum is retained as the "peak hour count" for that data collection. All observed maximum peak hour counts are then averaged into a peak hour rate; thus, the "average" is an average of maximums. This is an intentional data processing step to provide some redundancy in the analysis method—to make sure facilities are less likely to fail. As a safety factor, trip demand is overestimated. One problem with that is, these data are also used for other things – estimating impact and development fees, for example – that don't need the same safety factor. As agencies aim to introduce multiple-objective methods for evaluating development, these data become only one metric among several. How does ITE's definition differ from an actual average? This study examined two existing public datasets—made available at the 15-minute count increment—to find out. ITE's definition of "average peak hour" turned out to be approximately 20–25 percent higher than the actual average, varying between 4 to 60 percent. While this artifact of the data is well known across common users of the data, the extent of this 'factor of safety' has rarely been examined. As agencies look to evaluate facilities on a broader suite of metrics, the built-in bias in these data may cause issues when trying to balance vehicle travel among other objectives.

Conclusions for Practice

If half of the metropolitan organizations (approximately 200) invest $4,000 per year, over 100 locations could be sampled annually—maintaining an evolving data set, adjusting for new research and findings. This study recommends a pooled study, in lieu of donated samples, to provide more strategic sampling. Additionally, the researchers recommend incorporating additional variables for future data collection protocols, including:

- **Built environment characteristics**
- **Demographics of the customer base**
- **Demand management practices**
- **Multiple travel outcomes**
- **New means for assessing impacts**
- **Region, spatial structure, and location within the region**
- **Age of data and related characteristics (e.g. price of gas)**
- **Date of data collection and related characteristics (e.g. temperature and precipitation)**
- **Access to, and cost of, alternative modes**

If the data in ITE's database are not too old, post-processing the data for these types of information can be useful. If this information can't be found, the decision to include these data in applications becomes an ethical one. As ITE notes in their 3rd edition Handbook, "an example of poor professional judgment is to rely on rules of thumb without understanding or considering their derivation or initial context." If masking location information is to remain the standard in practice, analysts must be able to consider the initial context of the data before attempting to make use of it. Without the information necessary to understand this context, anyone who applies these data may be guilty of poor professional judgment.