

# Project Title: Freight Demand Estimation from Secondary Sources

Principal Investigator: Dr. José Holguín-Veras

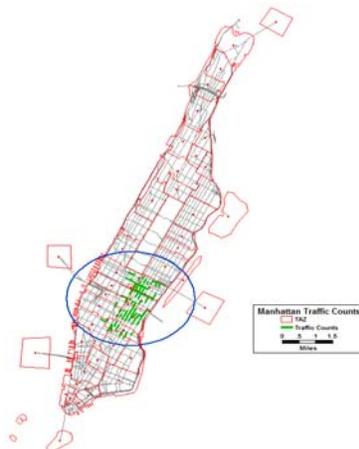
Freight origin-destination (OD) matrices are one of the most important data a planner could have, which is why a significant amount of effort, time and money is spent on their estimation. The estimation of OD matrices can be done by: (a) direct sampling methods; and, (b) using secondary data sources such as traffic counts. The latter techniques are referred here as origin-destination synthesis (ODS).

In ODS, the traffic counts are used to estimate the OD matrices. Since the number of unknowns (OD pairs) exceeds the number of independent traffic counts, the estimation problem is under-specified. This requires the use of analytical techniques to estimate the most likely OD matrix that fits the observed traffic counts. The research on ODS has concluded that, though not a replacement for actual data, it could produce fairly realistic estimates of freight OD matrices.

The research project reported here applies ODS to Manhattan. This city covers around 23 square miles with over 1.5 million inhabitants. There are over 40,000 freight related business establishments with more than 650,000 employees.

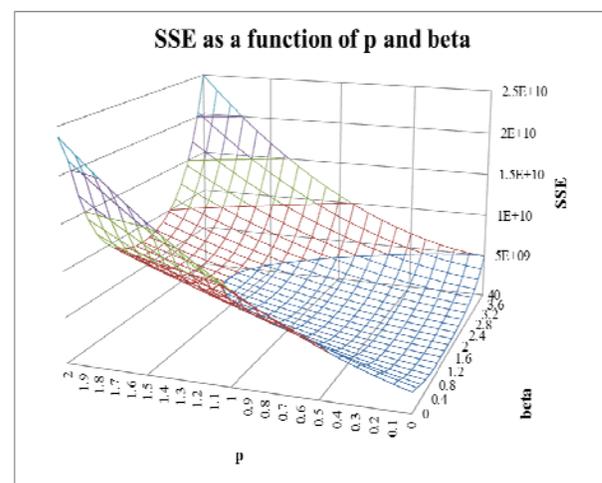
This research estimates that 37,045 freight related establishments generate 182,354 daily truck trips.

The secondary data sources consist of truck traffic counts from 97 intersections in Midtown Manhattan.



The ODS process makes use of these counts to estimate OD matrices taking into account the productions and attractions of the Transportation Analysis Zones.

The parameter  $\beta$  of the impedance function of the gravity model was estimated iteratively using a golden search procedure. The obtained value of  $\beta=1.82$  shows that the framework is producing good estimates. The parameter  $\beta$  is closely related to the average distance travelled. The greater  $\beta$ , the less is the average distance travelled. The Sum of Square Errors (SSE) between observed and estimated link flows was minimized. The SSE was a function of the proportion of empty trips and the parameter  $\beta$  of the impedance function of the gravity model.



The proposed ODS procedure allows to estimate freight OD matrices using secondary sources in Manhattan. Moreover the framework will make possible to seamlessly integrate freight planning into agencies' transportation system planning.

Sponsors: University Transportation Research Center

Completion Date: 2011

University: Rensselaer Polytechnic Institute

