

A GIS based Methodology to redistribute Macro-Level Origin Destination Data based on the Landuse

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Abstract

The Origin-Destination (OD) data are often collected for the transport infrastructure planning projects to study the travel patterns. Conducting OD surveys are expensive and time consuming. Therefore, the practitioners tend to collect OD data according to a macro level zoning system. In Sri Lankan context; OD surveys are conducted based on Divisional Secretariat Division (DSD) boundaries. Further, OD surveys within major towns, such as Colombo, Kandy were conducted, considering the smallest administrative boundaries in Sri Lanka; the Grama Niladhari Division (GND).

Since the trip production and attraction is related to the landuse pattern of an area, the landuse can be considered as an independent variable in estimating the trip generation. Two models were developed to demonstrate the relationship between landuse (landuse floor area in m²) and the trip generation as follows;

$$\begin{aligned} \text{Trip production} &= 9117.980 + 1.425 (\text{Private offices}) + 0.792 (\text{Educational}) \\ &+ 0.174 (\text{Commercial}) + 0.466 (\text{Tourism}) + 0.007 (\text{Residential}) \end{aligned} \quad \text{-----(1)}$$

$$\begin{aligned} \text{Trip attraction} &= 6914.287 + 0.201 (\text{Commercial}) + 0.730 (\text{Educational}) + \\ &0.189 (\text{Health}) + 0.010 (\text{Residential}) + 0.551 (\text{Tourism}) \end{aligned} \quad \text{-----(2)}$$

The research leads to redistribute the macro-level OD data into a modified zoning system based on its landuse character; specifically, DSD level OD data are redistributed among more than 100 zones. The research is based on both spatial and statistical analysis and spatial software, such as ArcMap, QGIS and statistical software, such as SPSS and MS Excel were utilized.

The Colombo DSD was considered as the study area and subdivided into 179 modified zones. The number of trips attracted to Colombo DSD from other 330 DSDs was divided proportionately to the trip attraction factor of the modified zones. Likewise, also the trip production was calculated. There were 59,070 OD pairs between 330 DSDs and 179 modified zones. The passenger trip assignment was done assuming that all the passengers travel via the shortest route between origin and destination.

Keywords: Trip Generation, Trip production and Trip attraction, Landuse floor area, Divisional Secretariat Divisions, Modified zones

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