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Trip generation and distribution modelling in Budapest

Dr. Zsolt Berki*, Dr. habil. Janos Monigl

37 Lövőház utca, Budapest 1024, Hungary

Abstract

The last decades brought social and economic changes. Together with the technical developments and more conscious mobility planning and travelling of people called for a new transport model for Budapest. Additionally, for the sake of coherent project appraisal a strategic, macro level decision supporting and project appraisal tool was developed based on open and transparent methods to give more insight for users and accommodate the best practice for all professionals. In order to reflect person-specific influence factors of the travel behaviour, based on the latest observations and house-hold surveys, 20 population segments and 14 trip purposes were identified. The numerous demand strata led to pretty realistic trip generation figures. The destination choice behaviour model is tour based instead of the most common home-based trip-pair practice. Trip distribution functions implies a gravity approach by logit functions applying general utility. The tour based model works with non-symmetric generation – attraction matrices and the distinction between home zone and non-home zone made the use of area specific variables (e.g. parking fee for non-residents) possible. The aim of the paper is to describe the model structure but also explaining what observations were made, what were the key finding in terms of transportation characteristics and what decisions led to the applied model components. The fitting to the observed volumes and the sensitivity and validity of the model is fairly good, thus against the preceding model set-ups the direct use of observed matrices was not necessary.

Keywords: four step modelling; demand modelling; trip generation; trip distribution

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* Corresponding author. Tel.: +36-1-3459-745; fax: +36-1-3459-501.
  E-mail address: berki@fomterv.hu

1. Overview

The Ex post evaluation of Cohesion Policy programmes 2007-2013 transport report found that *"The quality and accuracy of forecasts has ... been inconsistent across projects"*, *"The programming period of 2007–2013 corresponded very closely with the global economic crisis. As a consequence, the short to medium term demand forecasts generated prior to or during the crisis cannot be expected to fully account for the impact of the macro economic situation on travel demand."* and *"inaccurate approaches to demand forecasting could produce considerable variation in the short to medium term travel demand forecasts".* (EC, 2016)

The mentioned issues were raised in context of Hungarian projects too, especially projects in Budapest. Therefore, BKK Centre for Budapest Transport and its subcontractors (including FOMTERV) developed an integrated multimodal transport model. (Mátrai, Ábel, Kerényi, 2015).

The model set up and its components were presented (Berki, 2015) but that paper focused on the reconciliation between Sustainable Urban Mobility Plan of Budapest objectives and the forecast assumptions used in the model.

However, going in depth of trip generation and distribution gives an insight of the analytic works behind the model and the formulas used thus increasing the transparency of the demand strata and its drivers.

1.1. Budapest Transport Model

The Budapest Transport Model (BTM) is a conventional four-step model consisting of the following four steps: trip generation, trip distribution, modal split and trip assignment.

On Figure 1. the colored zones show the boundary of the modelled area.
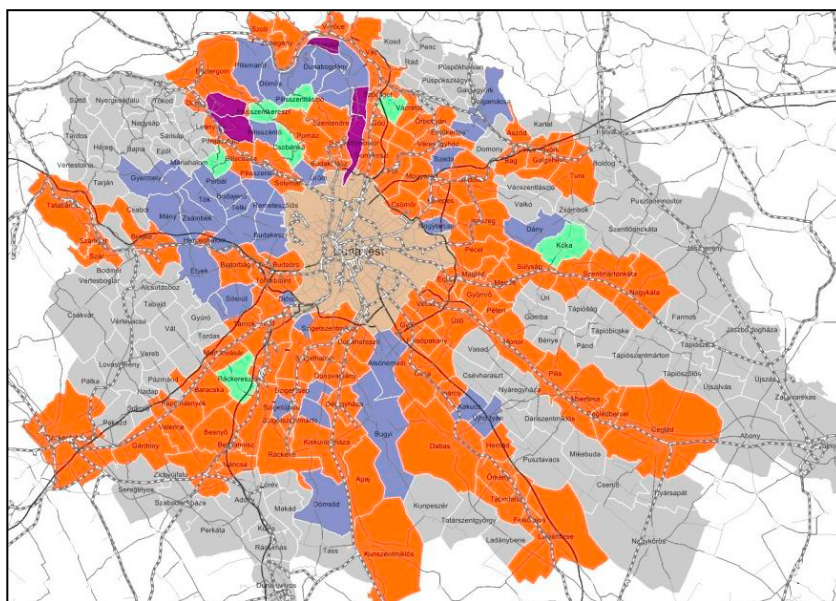

Fig 1. Modelled area

1. Budapest model: handles the traffic inside the city boundary in 922 zones.
2. Agglomeration model: handles the traffic between agglomeration zones, traffic towards Budapest and traffic that leaves the Capital.
3. The traffic that comes from or goes to the not modelled area comes from our former model that was made for the Hungarian National Transport Strategy.