

Modelling Shortest Path Decisions using an Activity-based Approach

Katrien Ramaekers, Mario Cools, Sofie Reumers, and Geert Wets

Hasselt University, Transportation Research Institute,
{katrien.ramaekers,mario.cools,geert.wets}@uhasselt.be

Abstract

The aim of this research is to identify the relationship between activity patterns and route choice decisions. The focus is turned to the relationship between the purpose of a trip and whether or not the shortest path is chosen for the relocation. The data for this study were collected in 2006 and 2007 in Flanders, the Dutch speaking and northern part of Belgium. To estimate the relationship between the choice for the shortest path or not and the corresponding activity-travel behaviour a logistic regression model is developed. The results point out that, when analyzing the relationship between the activities of the people and whether or not the shortest path is chosen, there is no significant influence by the activity-based segmentation. However, when the deviation from the shortest path is related to the activities people perform, a significant relationship is found. Furthermore, next to trip-related attributes (trip distance), also socio-demographic variables and geographical differences play an important role.

Keywords: Route choice modelling, Shortest path, Activity-based approach

To support policy makers, traffic and transportation models can be used to make better long-term decisions. On an international level, activity-based models have become the norm to model travel behaviour. The most important characteristic of these models is that the travel behaviour of persons or families is a product of the activities that they wish or have to perform, procuring a more realistic description and a better understanding of people's travel behaviour. Because of these advantages, researchers and policy makers in the United States have switched from conventional models to activity-based models. Although this trend is most visible in the United States, a similar evolution can be noticed in Europe.

An important issue that the models should account for is the decision process that one undergoes when conducting a trip. One of many considerations is the route choice. Therefore, it is important to examine to what extent route choice is related to the type of trip. The term 'type of trip' indicates the purpose of the trip and submits a link to

the pattern of human activities. The term 'route choice' includes the many attributes of the path chosen to conduct the trip and establishes the link with the behaviour pattern of an individual.

The aim of this research is to identify statistically significant relationships between activity patterns and the behaviour regarding route choice. The focus is on the relationship between the purpose of the trip and whether or not the shortest route is chosen.

To estimate this relationship a logistic regression is developed. To assess the significance of the various trip-related and non-trip related predictors, a type III analysis of the effects is made.

The data for this study stem from a large scale activity-based data collection effort conducted on households since the household context, in which individuals operate, has a very strong influence on individuals' decisions, particularly when household resources are shared, there are shared household responsibilities and there are decisions that are made jointly by multiple household members. The survey used a mixed-mode survey design, using a PDA application on the one hand, and using traditional paper and pencil diaries on the other hand. In order to analyze the reported and recorded travel data, advanced post-processing is necessary to make the information usable for route choice modelling. The data processing step leads to a dataset containing car displacements on the Belgian road network for respondents of whom the personal characteristics are known and for whom the GPS-data is consistent with the data reported in the diaries. The dataset contains 1423 car displacements, made by 299 different respondents.

When analyzing the relationship between whether or not the shortest path is chosen and the activities people perform, there is no significant influence of the activity-based segmentation. However, when the deviation from the shortest path is related to the activities people perform, a significant relationship is found. Furthermore, in accordance with international literature, next to trip-related attributes (trip distance), also socio-demographic variables and geographical differences play a noticeable role.