Trip generation and distribution of leisure traffic
A case study in Austria

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1 INTRODUCTION

Over 40 % of all trips on workdays in Austria are leisure trips. On weekends this trip purpose is even more dominant. However, little attention has been paid in the modelling literature as leisure trips are difficult to handle. Some work has been done in Switzerland [1] but few studies are known for the Alpine region of Austria. Traffic of foreigners approaching and leaving vacation resorts, daily tourists and local traffic mix especially on Saturdays. Destination and departure time choice depend very much on season and weather conditions which make it harder to model leisure traffic than recurrent work trips. This paper describes investigations to estimate all trip purposes on Saturdays in the Alpine region of Austria with large impact of tourism related trips. The work is focused on proper modelling of trip generation and distribution of leisure trips. Moreover the influence of weather conditions on traffic demand is investigated.

2 METHODOLOGY

2.1 Exemplary application of the methodology

The province of Salzburg is well known for its tourism causing traffic congestions especially on Saturdays. Therefore, this area seems to be ideal to serve as investigation area in this research work. As an exemplary application two specific Saturdays, one in summer and the other in winter were chosen, because on that weekday a high number of leisure trips overlay with a fair number of work-induced trips and the arrival and departure of tourists are mostly located on Saturdays too.

2.2 Choice of a demand model

The full paper contains a comprehensive literature review on characteristics on leisure transport and some modelling work. Furthermore, methodological principles of transport planning models are discussed and tested for their possible adoption to model the demand of leisure traffic.

The EVA-model [1] is selected which simultaneously models generation, distribution and mode choice based on pairs of activities. Since this kind of demand modelling allows a disaggregated analysis of the different trip purposes the translocations are divided into origin-destination groups. Generally, the EVA algorithm seeks equilibrium between transport supply and travel demand. Different travel behaviour is considered by separating people into homogeneous groups taking age, car availability and employment status as classification factors.

2.3 Data base, processing and analysis

Structural data indicate amount and distribution of traffic-generating potential in the planning area and can be subdivided into spatial structure data and travel behaviour data. A detailed data cluster for the demand model was produced to describe the destinations (469 traffic zones) and their associated supply (see Figure 1).

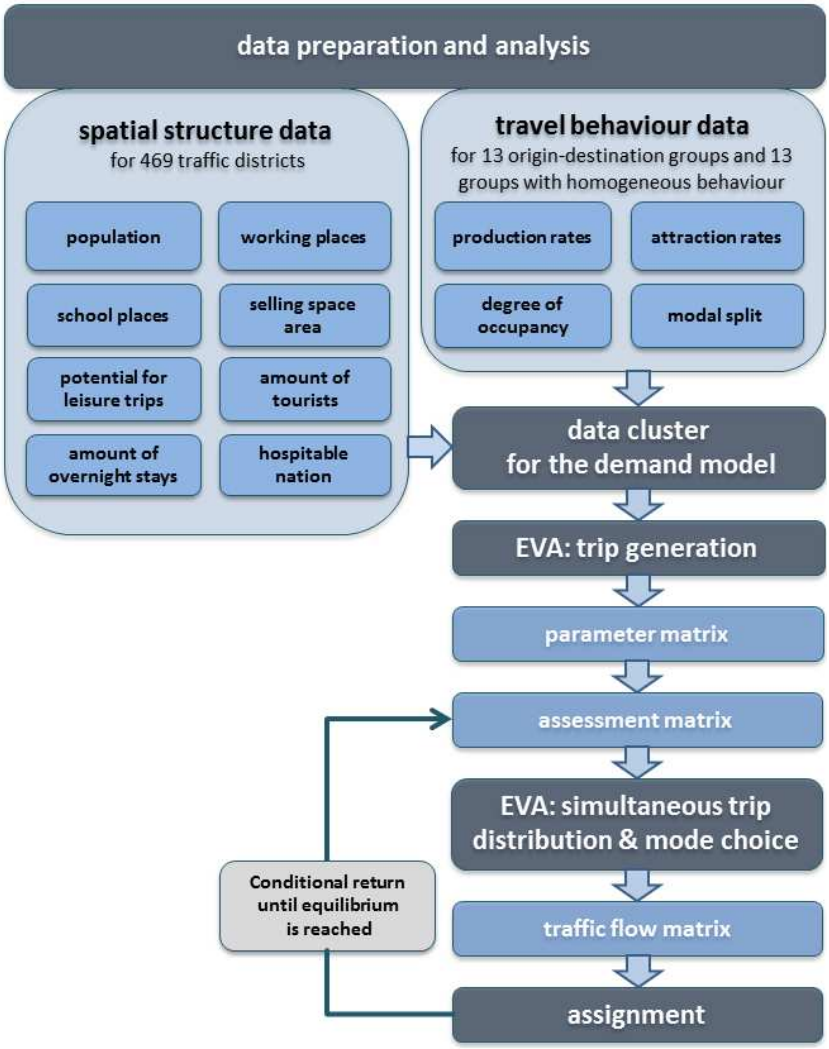

Figure 1: Flow diagram of the demand modelling for Saturdays

The spatial structure data set contains zone specific values about standard data such as population and working places supplemented by innovative data for leisure. For example, this includes hotel capacities and numbers of overnight stays, locations of sights combined with numbers of visitors, various sport facilities, parking space in vicinity of ski lifts, the quantity of ski lifts and kilometres of ski slopes as well as the corresponding ticket prices of the skiing regions and the locations of lakes or restaurants and their quantity. In addition detailed retail space areas (divided into different shopping categories with varying trip attraction rates according to the new Austrian guidelines RVS 02.01.13) are investigated. As figure 2 indicates, some zones are prone to attract leisure trips while others are less attractive.

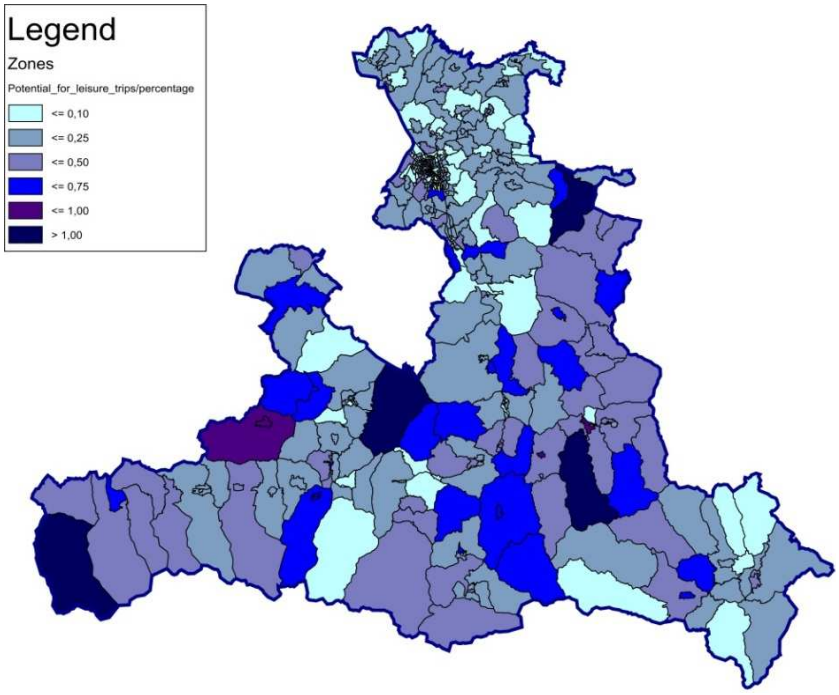

Figure 2: Potential for leisure trips in the province of Salzburg on Saturdays in winter [in per cent]

According to Simma et al. [2] leisure induced planning models are based on the concept that leisure consists of different activities that satisfy variable desires and are influenced by completely differing impacts. As leisure is so diverse, it is necessary to concentrate on various types of leisure activities such as visits, cultural activities or sport related activities. Hence, specific calculations were needed in order to generate proper potentials for leisure trips in the province of Salzburg on Saturdays for summer as well as for winter separately [3]. In winter Salzburg offers skiing resorts, in summer the lake district of Salzkammergut is very attractive for locals as well as for foreign tourists. Thus, each zone contains a percentage value reflecting the attraction for leisure induced translocations specific for each leisure activity.

Since no survey for the study area, regarding transport behaviour on Saturdays was carried out; new methods are required to draw conclusions on the ability to obtain behavioural data. The total trip generation of motorized individual traffic for thirteen different origin-destination groups is calculated in order to identify attraction rates out of the ratio of the produced trips to the total number of attractors. Ditto calculations for the production rates and the degree of occupancy are performed; thereby a workday-model serves as basis for the conversions.

2.4 Influence of weather conditions on traffic demand

A hypothesis was set up that weather data could be useful for a more accurate prediction of the expected leisure related trips [4]. The modelled demand data has been compared by long-term point data of vehicle counts. For a one year period (March 2010 until February 2011) hourly traffic volumes and speeds for cars and trucks were taken and added by weather conditions provided by the Central Institute for Meteorology and Geodynamics (ZAMG-Austria).

The method of multiple linear regressions appears as most suitable and is able to determine the correlations of independent weather coefficients on dependent traffic demand, as shown in Figure 3.

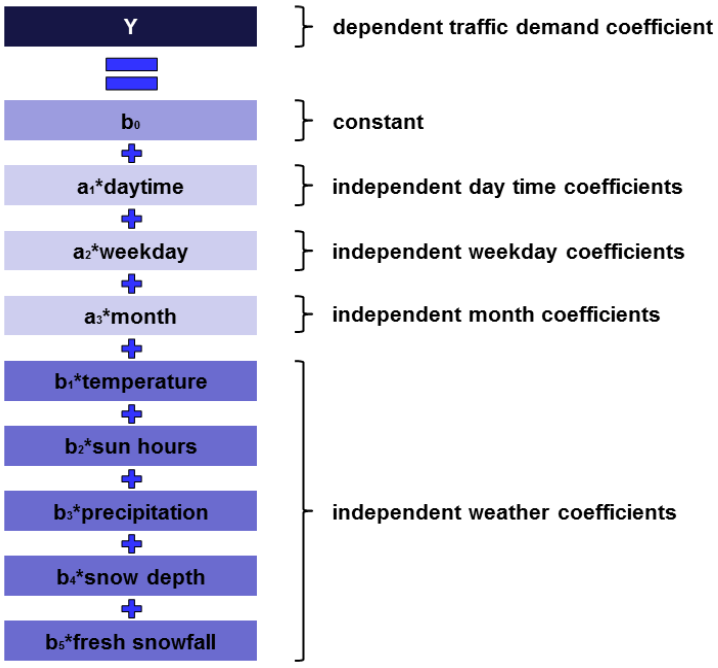

Figure 3: Components of the multiple linear regressions

During winter eight independent coefficients are used for the analysis, which consists of the daytime, weekday, month and the influence of weather conditions. The different

weather coefficients consist of measurements of the temperature, the sunshine hours, the precipitation, the snow depth and fresh snowfall. During summer six independent coefficients were identified to be significant. The coefficients snow depth and fresh snowfall should not have an impact at all.

3 RESULTS AND DISCUSSION

Due to the weather conditions the results show generally that coefficients of temperature und sun hours (additionally fresh snowfall in winter) have the highest significance in relation to the traffic demand. The method of regression analysis proved to be a very suitable method in order to identify multivariate relationships. However, due to the low explanation of variance of the weather parameters on the traffic demand, the weather conditions were not considered in the demand model.

The exemplary application shows that generating a Saturday model on the basis of a model for workdays only is regarded to be difficult, because a good data base is necessary in order to be able to convert spatial structure and travel behaviour data. Nevertheless, this research work offers an improvement of the generation of the potential for leisure purpose for different seasons of the year. However the generation of the potential for leisure purpose should be an objective for prospective scientific works. Furthermore dedicated surveys about leisure trips are required to ensure proper demand models for travel behaviour on Saturdays and even Sundays.

References

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