PROJECT

Travel behaviour on congested freeways
(ASTRA2009/005_OBF)

Fahrmuster auf überlasteten Autobahnen

Funding: National (Switzerland)
Duration: Oct 2009 - Sep 2010
Status: Complete with results

Background & policy context:

There was a need of the identification of parameters or functional contexts to evaluate the local effects of the removal of a bottleneck in a motorway network. The following models are needed:

- Probability of the transition of traffic flow on motorways from stable in the unstable conditions ("collapse") as a function of traffic demand.
- Relation for stable and unstable traffic flow, separated by link types and motorway profiles.
- Loss of time for road users if the traffic flow in a congestion area is unstable rather than stable.

Objectives:

The travel behaviour of car drivers on motorways will be assessed to identify the determination factors of the travel process, which are responsible for the benefit of travel time savings and the estimation of air pollution.

With the variables of the travel process and those of traffic amount and infrastructure the speed pattern on a part of the motorway network will be described.

Methodology:

The project includes the following steps:

1. Creation of data bases

Procurement, processing and enrichment of data on traffic volumes and speeds at appropriate counting or measuring points in the Swiss highway network.

2. Development of the model system

- Modelling the congestion probability.
- Estimation of speed functions.
- Modelling of the number and length of the unstable episodes.
- Estimate the time loss in the unstable region.
- Implementation of the model system and creation of a planning tool.

Parent Programmes:
ARAMIS - ARAMIS information system

Institute type: Public institution
Institute name: Swiss Government: State Secretariat for Education and Research
Funding type: Public (national/regional/local)

Partners:
Switzerland
Key Results:

The main focus of the investigation is to predict the traffic-related effects of debottlenecking (new construction, expansion) on motorway sections in front of a bottleneck.

The statistical description and analysis of "driving patterns" is distinguished between

• driving behaviour with stable flow of traffic and
• ride in unstable flow of traffic (stop-and-go, jam)

Congestion due to an accident should not be considered because of the random character of accidents. The same applies to traffic jams as a result of reconstruction.

Since an appropriate clean up of the data was not possible, the single numerical results must be considered with a certain reservation.

For traffic conditions with stable and unstable flow of traffic were the traffic-related, situational and infrastructure-related determinants of traveling speeds realized by motorway users determined in a very fine differentiation.

A practicable solution has been developed for situations with unstable flow of traffic. The loss of time in relation to the steady state for motorway users could be approximately calculated with this solution without complex simulation calculations.

The developed statistical models can be characterized as follows:

• Probabilistic models for the event of "traffic collapse".
• Regression models for the average speed (stable and unstable flow of traffic).
• Calculation method for determining the loss of time with unstable flow of traffic.

Innovation aspects

The model of the traffic behaviour on the congested motorways.

Documents:

- Summary in German (Other relevant documents)

STRIA Roadmaps: Network and traffic management systems
Transport mode: Road transport
Transport sectors: Passenger transport
Transport policies: Decarbonisation, Societal/Economic issues
Geo-spatial type: Other