Chapter 12

Effect of a Motorway on Development of Accidents in a Big City

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ABSTRACT

Traditional transport practice and science call motorways as safe roads since the accident rate (accidents per 1 million vehicle kilometres) is lower than on ordinary roads. This is based on the scientific inadmissible comparison. Similar, but not comparable things, are compared: the accident situation of two different kinds of transport systems, which are basically different not only in its construction elements, but also in operation condition, their environments and the composition of their users. All of them are different. To compare, comparability is a necessary precondition. If we take this into consideration we can recognize, that the existing contradiction between accident-research-results and physics can be removed. Systems with a higher speed have a higher risk. But these facts are continuously neglected by traditional educated practitioners: they cling to their myths. One of them is “Since the number of accidents per kilometer driven on motorways is less than on other roads, motorways are safer roads.”

INTRODUCTION

In 1960ies, during the period of fast motorization in West-European countries, the number of traffic accidents and victims in the road transport sector increased with increasing car ownership and reached a peak in the early 1970ies. In Austria the number of traffic accident victims exceeded the figure or 2100 people killed in traffic accidents in 1972. In Germany more than 21.300 people were killed in traffic accidents in 1970. Since then the number of traffic accidents victims is decreased continuously in this countries. There were many speculations, what might have been the cause for this change. Ministries and traffic safety organizations claimed the positive effect for her traffic safety measures. But at this time not very much of this kind of measures were implemented. Speed limits outside built-up areas were not implemented, no mandatory safety belt use and many other measures implemented today.
were introduces mainly since the first energy-crisis in 1973. The cause of this change in the time-series of traffic accidents was found by analyzing the “internal dynamic” of the transport system during this transition period from not motorized to motorized society. In the beginning inexperienced drivers are coming into the transport system. The risk of an accident of this group is more than seven times higher than the risk of experiences drivers. At the same time pedestrians, cyclists and even public transport users are becoming car users. After some years the surviving cohort of beginners are becoming safe transport users. When his group start to dominate the transport system behavior, the “Eigendynamic” of the transport system, concerning “accident-production”, change into as “safe mode”. By carrying out a dynamic analysis of the transport system introducing these internal structures of the system users, it could be shown that the accident figures observed in the statistics can be reproduces nearly perfectly and explain the change of the system dynamic before and after the peak. After 1975 the effects of safety belt law, speed limits, better enforcement had to be taken into account to reproduce the observed data. (Knoflacher 1981, 1985) But one variable has no effect on the development of traffic accidents: the motorways. At this time this conclusion of the analysis was in contradiction to the general professional belief that motorways contribute always to the safety of the whole system.

This wishful thinking can be found in reports, for example in Eurostat (2016) till today. The authors have made some reservations, that other factors might have influenced the development of traffic accidents in some regions. In general most of research is done to improve traffic safety on motorways, by implementing speed limits or traffic safety devices on the existing infrastructure. Although some studies indicate that the linear extrapolation of “more motorways – less accidents” might not be valid (Germany 2014), no in-depth studies have been made. The question: “What are the effects of a new motorway on the traffic safety of a region or a city?”, was never asked or a study published on this issue till recently. The broad system-view, concerning traffic safety, in this chapter, was not common in the profession of transport engineering, when the study if this chapter was carried out in 2001. Just recently as study “Effect of new urban motorway infrastructure on road traffic accidents in the local area: a retrospective longitudinal study in Scotland” war published (Olsen et. al. 2016). But this study was carried out by an Institute for Health and Wellbeing, University of Glasgow in Scotland and not by an institute of transport engineering. This underlines the necessity for new tools in transport engineering for the future. The study presented here is so far the only one from the transport engineering perspective.

Motorways are built in Austria since the 1950ies. But the traffic accident situation was not affected by this important, expensive and powerful - concerning capacity – infrastructure. The dynamic simulation had even the contrary effect: if Austria would not have built motorway, the country would have less traffic accidents. (Knoflacher 1985) At this time the findings were not recognized by the professionals, since it was no direct proof available till 1999. The city if Vienna asked the author to develop measures for further enhancement of traffic safety in the city. (Knoflacher 2001)

**COMPARISON IS ONLY POSSIBLE BETWEEN COMPARABLE THINGS**

Traditional transport practice and science call motorways as safe roads since the accident rate (accidents per 1 million vehicle kilometers) is lower than on ordinary roads. So the argument goes to build motorways for safety reasons. This seems logical, but the arguments are based on a scientific inadmissible comparison. To compare, comparability has to be executed. If somebody compares things or affairs, which are not comparable, it’s is a popular saying that he is “comparing apples with pears.” The popular
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