

### **Short version of the PhD project**

„The sustainable development of transport infrastructure in shrinking urban regions.  
Development of an evaluation methodology and recommendations for public actors  
under the special consideration of economic aspects”

Ph.D. supervisor:

Prof. Dr.-Ing. Udo J. Becker, **University of Technology Dresden**

Institute of Traffic Planning and Road Traffic, Chair for Transportation Ecology

Dr. Martin Lanzendorf, **Helmholtz Centre for Environmental Research – UFZ**

Department Urban Ecology, Environmental Planning and Transport

Funded by a PhD scholarship of the German National Academic Foundation

**Introduction:**

The demographic change and parallel ongoing economical and structural upheaval in some German regions cause societal problems of a scope not to be underestimated, especially in stagnating or shrinking parts. So far the whole breathe of the fiscal and economic consequences of this development is not perceived. Primary the problems of financing the pension and health system and the problems of the labour market caused by the demographic change are discussed. Further effects on the public budgets attract less interest.

Also the public and private transport sector is affected by these demographic alterations. They have a significant influence on the allocation, costs and a sustainable development of the transport infrastructure. In dependence on the structural, quantitative and spatial characteristic, the demographic changes result partially in considerable alterations of the demand for infrastructure capacity, the transport volume and the transport capacity. These effects on the transport infrastructure are not analysed in a comprehensive form contrary to the effects in technical and social infrastructure. The need of research work in this purview is identified and shall be achieved within this Ph.D. project.

**Goal of the project:**

The goal of this Ph.D. project is the investigation of the effects of the demographic change on the costs of urban infrastructure and the formulation of an integrated instrument to evaluate transport infrastructure under sustainable and economical aspects in shrinking urban regions.

The practicability of the developed method is proved by applying it to an exemplary case study. The achieved results are used to define recommendations in a catalogue of countermeasures.

**Methodological framework:**

An extensive and detailed bibliographical analysis which covers the methods of economical and sustainable evaluation of transport infrastructure as well as the demographic change concerning the transport sector will institute the formulation of the methodology framework.

The declared aim of this project is the formulation of an integrated evaluation instrument for urban transport infrastructure for motorised individual transport, rail- and road-bound public transport, bicycle and pedestrian transport. The method consists of two levels:

In a first level the transport infrastructure will be evaluated according to economical aspects. To this aim a comprehensive method is developed which pursues the philosophy of the cost benefit analysis (CBA) – set costs and benefits of the infrastructure in contrast with each other. In addition to the CBA it is also drawn on methods such as cost efficiency analysis, multicriteria analysis or lifecycle analysis. Social costs, residual overhead costs and costs for the closure or renaturalisation shall also be considered in the context of an evaluation method.

Based on existing sets of indicators of sustainability for the transport in a second evaluation level indicators considering especially local specific approaches and demographic alterations are defined. These indicators shall cover the road transport infrastructure as well as the infrastructure of the public transport and bicycle and pedestrian transport.

Joining and analysing the results of the two evaluation levels conclude the evaluation method which shall be applied to a case study. For this study an urban region which offers on one side interdependencies between downtown and surrounding areas and on the other side a high diversity of housing and spatial elements is chosen as the investigation area. Scenarios of future transport demand are developed with the help of plausibility relations and varying basic conditions which bring out important input data for the evaluation of transport infrastructure. The estimated values of the indicators of sustainability are compared in a bench mark with those of so called best practise regions.

The achieved results of the case study are used to prepare a catalogue of countermeasures which refer to concerned municipal, regional and national. Possible recommendations are closure or renaturalisation as well as retention or a further expansion of the transport infrastructure. Also the use of transport Management systems as alternatives to expansion plans shall be discussed as well.