Ph.D. in Applied Economics: Business Engineer by Tom Van Lier

The Development of an External Cost Calculator Framework for Evaluating the Sustainability of Transport Solutions.

Abstract

Over the last decades, public awareness and scientific knowledge have gradually grown with regards to transport related harmful impacts such as accidents, climate change, air pollution, noise, up- and downstream processes and congestion. Due to the fact that transport users in general do not take these undesired effects and the resulting so-called external costs into account, they are faced with incorrect incentives when making transport related decisions, leading to welfare losses. Goal of this dissertation is to develop an external cost calculator framework that enables more nuanced and differentiated external cost calculations based on ready-to-use or self-developed input values, and where the resulting external cost values can be integrated into existing evaluation tools in order to evaluate the sustainability of transport options. The framework aims to enable different types of economic agents to assess the sustainability of transport options in a cost-efficient but scientifically sound manner, both for passenger transport and freight transport, in a variety of cases, taking into account influencing parameters to a maximum extent. The objective of this dissertation is therefore not purely the construction of the external cost calculator framework, but also demonstrating its applicability in determining the sustainability of different transport options. The external cost framework was tested in six cases, linking different scientific methods and models such as a GIS based model, discrete event simulation, life-cycle assessment and survey methods to the framework. The cases studied cover a broad range of topics situated in the transport domain such as intermodal transport, horizontal freight bundling, inland waterway transport, school bus transport and teleworking. Differentiated external cost calculations are demonstrated to be an essential asset to support sustainable transport policymaking.