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Strategic Transport Decision-Making

The SIMSIGHT approach based on Risk Simulation and Scenario Foresight

Salling, Kim Bang; Pilkauskiene, Inga

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PRESENTERS:
Assistant Professor Kim Salling and PhD student Inga Ambrasaite
kbs@transport.dtu.dk and inam@transport.dtu.dk
Department of Transport – Technical University of Denmark
The Decision Modelling Group (www.transport.dtu.dk)

ABSTRACT:
The proposed presentation concerns a brand new approach, SIMSIGHT, involving the combination of risk simulation and foresight based on scenario analysis for decision support. SIMSIGHT aims at providing decision support for transport decision making with a focus on awareness of feasibility risk. First, the SIMSIGHT modelling framework and the theories behind are described and afterwards SIMSIGHT is illustrated by an example concerning examination of an infrastructure project for a new airport in Greenland selected among three alternatives for upgrading and/or replacing the present airfield at Nuuk. The SIMSIGHT analysis aims at shedding light on the robustness of the socio-economic feasibility relating to undertake such a major infrastructure investment.

Providing suitable decision support for strategic transport decision making is a topic of growing concern. For large infrastructure investments, to exemplify with one important transport topic area, assessments are needed that explore the robustness of decisions that have been taken based on comparison of already examined alternatives. For large infrastructure projects comprehensive assessments are indeed needed. Typically, such investments have many-sided consequences which ought all to be taken into consideration to seek out the best alternative from a set of candidates that has come forward from the preparatory planning and design phases. In previous presentations among others at the Palisade risk conference methodologies of both a deterministic and of a stochastic type have been set out with the COSIMA-ROAD and CBA-DK approaches that have been tested on real-world cases (Salling, 2006; Salling, 2010). The COSIMA-ROAD and CBA-DK are both based upon Microsoft Excel platforms allowing for the add-in feature of @RISK. The CBA-DK model, furthermore, forms the basis for transport infrastructure planning containing a cost-benefit analysis module and a risk analysis module.

The purpose of this presentation is to present an approach to explore the robustness of a decision about implementing a certain alternative, for example having been based on applying either the COSIMA-ROAD or the CBA-DK approach. The relevance of examining robustness is related to the issues about uncertainty and risks, which may take a major role in connection with large scale projects, where factors such as construction costs and demand prognoses are uncertain for a number of reasons. Clearly, the variability relating to these will dominate and have high importance as regards the long-term socio-economic return or feasibility of the investment (Salling, 2008). A special interest in this context is to explore the concepts and belief of the “fat-tails” and “over-confidence” theory concerning input parameters as concerns MIN and MAX estimates. Specifically, three input distributions are investigated within @RISK namely the Trigen (Triangular), the Beta-PERT and the Erlang distributions, all relying on subjective measures corresponding to a minimum, most likely and maximum parameter value. However, how confident are we upon the latter? Is it merely guess work and speculations or is it possible to make actual decision support based upon subjective input parameters? And finally, how does @RISK cope with entries specifically concerning open-ended tails, thus, how are the extreme values represented in the Monte Carlo simulation?

The presentation revolves around a fixed case study concerning the enlargement of airport alternatives in the Capital of Greenland, Nuuk (Salling and Banister, 2009). A set of scenarios are created in order to assess the various input parameters to the SIMSIGHT approach where after a set of resulting accumulated descending graphs are depicted and scrutinized.

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Assistant Professor, Kim Salling:
Dr. Salling is currently employed as an assistant professor at the Department of Transport at the Technical University of Denmark (DTU Transport). He defended his PhD thesis entitled: *Assessment of Transport Projects: Risk Analysis and Decision Support*, November 2008. The thesis later received an honorary prize (2009) from the Professor PH Bendtsen foundation. Kim furthermore holds a Master's degree in Engineering within socio-economic evaluation methodologies and decision support systems with special emphasis on cost-benefit analysis and Risk Analysis.

His main topic of interest is transport planning and decision support where he currently works in a collaborative research project (a.o. with Oxford University and Princeton University) concerning *uncertainties in transport project evaluation* granted by the Danish Research Council in the period from 2009-2012. This project seeks to investigate the common bias in transport planning, i.e., overestimation of transport related time benefits and underestimation of the investment costs (so-called Optimism Bias).

PhD Student, Inga Ambrasaite:
Inga Ambrasaite is currently employed as a scientific assistant in the Decision Modelling Group at DTU Transport. She graduated from the Technical University of Denmark in September 2010 with a Master degree in Civil Engineering. Her thesis entitled *Comprehensive Infrastructure Assessment based on the Rail Baltica Case*, which investigated the appraisal of the transport corridor through the three Baltic country to Poland. The main occupational skills are within the area of transport planning and engineering – transport infrastructure project evaluation using Decision Support Systems, Cost-Benefit Analysis, Multi-Criteria Decision Analysis and Risk Analysis.

Ms Ambrasaite is schedule to commence her PhD study May 2011 in the area of transport infrastructure assessment by the use of composite analyses combining cost-benefit analysis, multi-criteria decision analysis and quantitative risk analysis.