**RISK ANALYSIS AND EVALUATION FOR CRITICAL LOGISTICAL INFRASTRUCTURE**

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**Abstract**

Logistical infrastructure builds one of the backbones of an economy. Without an effective logistical infrastructure in place, supply for both enterprises and consumers might not be met. But even a high-quality logistical infrastructure can be threatened by risks. Thus, it is important to identify, analyse, and evaluate risks for logistical infrastructure that might threaten logistical processes. Only if those risks are known and their impact estimated, decision makers can implement counteractive measures to reduce risks.

In this article, we develop a network-based approach that allows for the evaluation of risks and its consequences onto the logistical network. We will demonstrate the relevance of this approach by applying it to the logistics network of the central German state of Hesse. Even though transport data is extensively tracked and recorded nowadays, typical daily risks, like accidents on a motorway, and extraordinary risks, like a bridge at risk to collapse, terrorists attacks or climate-related catastrophes, are not systematically anticipated. Several studies unveiled recently that the overall impact for an economy of possible failures of single nodes and/or edges in a network are not calculated, and particularly critical edges are not identified in advance. We address this information gap by method that helps to identify and quantify risks in a given network. To reach this objective, we define a mathematical optimization model that quantifies the current “risk-related costs” of the overall network and quantify the risk by investigating the change of the overall costs in the case a risk is realized.

**Key words:** Logistics, Risk, Resilience, Critical Infrastructure

**Biographical Notes:**

Sascha Düerkop is Research Associate in the fields of Production Planning and Logistics at Fulda University of Applied Sciences and the University of Wuppertal in Germany. As a mathematician and economist by profession he tries to work on the edge of both disciplines by using quantitative methods to tackle economic challenges. Today, Mr. Duerkop designs and evaluates algorithms to solve new challenges in logistics and production planning.

Michael Huth is Professor of Business Administration and Logistics at Fulda University of Applied Sciences in Germany. He has conducted research into the interdependencies between risk management and supply chain management for the past 18 years. Today, he conducts regular empirical surveys to document the status of risk management in the logistics industry, and teaches both supply chain management and risk management topics to students and companies. Mr. Huth is also co-editor of ‘Logistik-Risikomanagement’ (published at Springer in 2015).