Karlsruher Institut für Technologie

Institute for Industrial Production (IIP))
Chair of Business Administration, Production and Operations Management
Prof. Dr. Frank Schultmann

Outline for a Bachelor's/Master's Thesis in the Risk Management Research Group

***Topic: Identification of Bottlenecks in the* Water Purification Emergency Supply Chain**

Context:

Drinking water underlies strict hygiene standards that need to be fulfilled at any time. If the water is considered contaminated, it is mandatory to purify the water before providing it to the population.
The purification requires – in general – two components: a purification technology and contaminated water to purify. In the context of the thesis, a lack of water after a terror attack is assumed.

The following aspects should be included in the thesis:

(1) A literature review on water contamination technologies, the physical process steps, and real life examples, in which purification technologies helped large parts of the population in response to a crisis.

(2) Calculation of the required number of purification units and the amount of contaminated water necessary to provide water for the population of a specific district in Berlin for 14 days.

(3) Definition of the supply chain structure and required capacities (sources of water, means of transportation, distribution, if necessary storage).

(4) Estimation of the total costs for the water purification supply chain.

(5) Critical discussion of challenges and identification of bottlenecks in the supply chain.

A master thesis additionally includes:

(6) A holistic view on Berlin (the whole city) and an investigation of local characteristics.

(7) A literature review on MCDA.

(8) An optimization model that minimizes distribution time and costs (objective function based on (7)).

The thesis can be written in German or English.

Requirements:
Advanced knowledge in the fields of operations research, supply chain management, and programming is mandatory (and/or the motivation to acquire this knowledge).
For a master thesis: Experience with GAMS is appreciated but not mandatory.

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