

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

Topic: Development of a GIS-Based Model to Estimate the Demand of Critical Goods in Disasters

Context:

In times of disasters, delivering “the wrong goods” very commonly causes huge logistical problems and blocks the delivery of highly demanded goods. Therefore, it is important to determine the most important goods and to estimate the demand as precisely as possible. However, many different goods could potentially be critical for the population to survive. Furthermore, some goods are needed directly after a disastrous event, while other goods only become critical after lacking them for several days. Furthermore, not all people have the same demand for the same type of good and characteristics and specific factors (e.g. age) can influence their possibility to survive without specific goods dramatically.

The following aspects should be included in the thesis:

- (1) Critical goods (e.g. water) have to be defined and both the usual demand and the critical demand identified (using academic literature, public databases, and verifiable (!) internet sources). Different scenarios for the growth of the demand for these goods have to be developed with different approaches from the literature. A special focus should be on the chronological development of the demand over the course of several days (or weeks) and – if possible – different individual characteristics (e.g. age) that could affect this demand. Whenever available, real world examples of incorrect demand estimations connected to one of the aspects mentioned above could be discussed.
- (2) In disastrous situations, the demand of critical goods can change. For instance in case of a water contamination, people start to panic and buy dramatically more water than before, and goods that were produced using potentially contaminated water have to be destroyed and reproduced. Furthermore, the arrival of the humanitarian aid also leads to the generation of an additional demand of goods and should be included in the demand estimations. Different sub-scenarios should be developed, considering different levels of increase in demand.
- (3) The results of these sub-scenarios should be visualized using the GIS-data of a selected German city. Dependent on the demand estimations, specific conditions (e.g. population distribution) have to be considered. A critical assessment of the challenges that occur satisfying these demands concludes the thesis.

Requirements:

Advanced knowledge in the field of statistics/demand-estimation is highly recommended (and/or the motivation to acquire this knowledge).

Experience with processing GIS data is appreciated but not mandatory.

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