

Multi-Objective Multi-Period Allocation of Temporary Earthquake Disaster Response Facilities with Multi-Commodities

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Abstract : All over the world, natural disasters (e.g., earthquakes, floods, volcanoes and hurricanes) causes a lot of deaths. Earthquakes are introduced as catastrophic events, which is accident by unusual phenomena leading to much loss around the world. Such could be replaced by disasters or any other synonyms strongly demand great long-term help and relief, which can be hard to be managed. Supplies and facilities are very important challenges after any earthquake which should be prepared for the disaster regions to satisfy the people's demands who are suffering from earthquake. This paper proposed disaster response facility allocation problem for disaster relief operations as a mathematical programming model. Not only damaged people in the earthquake victims, need the consumable commodities (e.g., food and water), but also they need non-consumable commodities (e.g., clothes) to protect themselves. Therefore, it is concluded that paying attention to disaster points and people's demands are very necessary. To deal with this objective, both commodities including consumable and need non-consumable commodities are considered in the presented model. This paper presented the multi-objective multi-period mathematical programming model regarding the minimizing the average of the weighted response times and minimizing the total operational cost and penalty costs of unmet demand and unused commodities simultaneously. Furthermore, a Chebycheff multi-objective solution procedure as a powerful solution algorithm is applied to solve the proposed model. Finally, to illustrate the model applicability, a case study of the Tehran earthquake is studied, also to show model validation a sensitivity analysis is carried out.

Keywords : facility location, multi-objective model, disaster response, commodity

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