Multiple criteria decision making in emergency management

Various types of incidents and disasters cause huge loss to people’s lives and property every year and highlight the need to improve our capabilities to handle natural, health, and manmade emergencies. How to develop emergency management systems that can provide critical decision support to emergency management personnel is considered a crucial issue by researchers and practitioners. Governments, such as the USA, the European Commission, and China, have recognized the importance of emergency management and funded national level emergency management projects during the past decade.

Multi-criteria decision making (MCDM) refers to the study of methods and procedures by which concerns about multiple and often competing criteria can be formally incorporated into the management planning process. Over the years, it has evolved as an important field of Operations Research, focusing on issues as: analyzing and evaluating of incompatible criteria and alternatives; modeling decision makers’ preferences; developing MCDM-based decision support systems; designing MCDM research paradigm; identifying compromising solutions of multi-criteria decision making problems.

In emergency management, MCDM can be used to evaluate decision alternatives and assist decision makers in making immediate and effective responses under pressures and uncertainties. However, although various approaches and technologies have been developed in the MCDM field to handle decision problems with conflicting criteria in some domains, effective decision support in emergency management requires in-depth analysis of current MCDM methods and techniques, and adaptation of these techniques specifically for emergency management. In terms of this basic fact, the guest editors determined that the purpose of this special issue should be “to assess the current state of knowledge about MCDM in emergency management and to generate and throw open for discussion, more ideas, hypotheses and theories, the specific objective being to determine directions for further research”.

For this purpose, this special issue presents some new progress about MCDM in emergency management that is expected to trigger thought and deepen further research. For this purpose, 11 papers [1–11] were selected from 41 submissions related to MCDM in emergency management from different countries and regions. All the selected papers went through a standard review process of the journal and the authors of all the papers made necessary revision in terms of reviewing comments.

In the selected 11 papers, they can be divided into three categories. The first category focuses on innovative MCDM methods for logistics management, which includes 3 papers. The first paper written by Liberatore et al. [1] is to propose a hierarchical compromise model called RecHADS method for the joint optimization of recovery operations and distribution of emergency goods in humanitarian logistics. In the second paper, Peng et al. [2] applies a system dynamics disruption analysis approach for inventory and logistics planning in the post-seismic supply chain risk management. In the third paper, Rath and Gutjahr [3] present an exact solution method and a math-heuristic method to solve the warehouse location routing problem in disaster relief and obtained the good performance.

In the second category, 4 papers about the MCDM-based risk assessment and risk decision-making methods in emergency response and emergency management are selected. In terms of the previous order, the fourth paper [4] is to integrate TODIM method and FSE method to formulate a new TODIM-FSE method for risk decision-making support in oil spill response. The fifth paper [5] is to utilize a fault tree analysis (FTA) method to give a risk decision-making solution to emergency response, especially in the case of the H1N1 infectious diseases. Similarly, the sixth paper [6] focuses on an analytic network process (ANP) method for risk assessment and decision analysis, and while the seventh paper [7] applies cumulative prospect theory (CPT) method to risk decision analysis in emergency response.

The papers in the third category emphasize on the MCDM methods for disaster assessment and emergence management and four papers are included into this category. In the similar order, the eighth paper [8] is to propose a multi-event and multi-criteria method to evaluate the situation of disaster resilience. In the ninth paper, Kou et al. [9] develop an integrated expert system for fast disaster assessment and obtained the good performance. Similarly, the 10th paper [10] proposes a multi-objective programming approach to make the optimal decisions for oil-importing plan considering country risk with extreme events. Finally, the last paper [11] in this special issue is to develop a community-based collaborative information system to manage natural and man-made disasters.

The guest editors hope that the papers published in this special issue would be of value to academic researchers and business practitioners and would provide a clearer sense of direction for further research, as well as facilitating use of existing methodologies in a more productive manner.

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impossible to make this special issue for our readers. It is hoped that readers can find some topics of interest and benefit to them. The guest editors also hope that this special issue would inspire researchers in the fields of MCDM in emergency management to explore more creative contributions in their research fields.

Orders of accepted papers


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