

A Humanitarian Logistics Model for disaster relief operation considering network failure and standard relief time

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Abstract

This paper, discusses a multi-depot location-routing model that we consider network failure by uses of vehicles and standard relief time. The model allocate locations of local depots and routing for last mile distribution just after an earthquake. The model is divided by two-part stochastic program with travel time which obeys uniform distribution and we deliberate on split-delivery. Some small cases have been solved by use of GAMS software. A variable neighborhood search algorithm is proposed to solve the deterministic model.

Keywords: Humanitarian logistics; Transportation network failure; Two-stage stochastic programming; Multi-depot location-routing problem; GIS data, split-delivery

1. Introduction

In recent years, large-scale natural or man-made disasters have occurred frequently (Gad-el Hak, 2008), causing large casualties and often destroying infrastructures, e.g., electricity, transportation, and communication. How to effectively respond to unpredictable and irregular emergency events has become of primal importance worldwide. The critical issues in such extreme events are how to respond immediately and how to schedule responses that can minimize the consequences of these disasters (Kovacs and Spens, 2011). In this context, humanitarian rescue and relief has been receiving greater attention by more and more academic scholars and emergency management practitioners (Apte, 2010 and Sheu, 2007b).

Accordingly, humanitarian logistics has attracted a lot of attention in recent years. In particular, logistics planning is the core of every relief operation. To decrease human losses, a sufficient amount of supplies must be distributed after a catastrophe within some time limit. A severe problem that usually occurs after an earthquake is destruction of some