
**Humanitarian Logistics:
A New Field of Research
and Action**

Humanitarian Logistics: A New Field of Research and Action

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Abstract

Recent natural disasters such as the earthquake in Haiti, Hurricane Katrina in the United States, tsunami in the Indian Ocean, the earthquake in Pakistan, and numerous humanitarian challenges arising from such conflicts as that in Sudan have exposed the shortcomings in planning for disasters. In addition to the natural disasters, the homeland security issues related to domestic as well as international terrorism have increased the fear factor and have made ‘readiness’ the principal priority. Humanitarian logistics is a critical element of an effective disaster relief process. The objective of this monograph is to discuss research issues and potential actions surrounding the new field of humanitarian logistics. We define humanitarian logistics as that special branch of logistics which manages response supply chain of critical supplies and services with challenges such as demand surges, uncertain supplies, critical time windows in face of infrastructure vulnerabilities and vast scope and size of the operations. We survey case studies to learn from the past experience and review analytical models from the literature to understand the state-of-the-art in humanitarian logistics. We

recommend further research in the fields of operations management and operations research to improve the effectiveness and efficiency of humanitarian logistics. We conclude that though humanitarian logistics is inherently chaotic and complex, and it is difficult to do research in this area, the complexity and obstacles can be dealt with by the researchers.

Keywords: Humanitarian; logistics; disaster; emergency; relief; response; supply chain; analytical models; prepositioning; facility location; distribution; evacuation; inventory; decision making.

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Introduction

A significant proportion of the world's population has suffered in recent years as a result of disasters — both natural and manmade. Humanitarian responses to the 2004 tsunami in the Indian Ocean, the 2005 earthquake in Pakistan, various hurricanes in the United States, the conflict in Sudan, and the spread of HIV/AIDS in Africa have largely been neither effective nor efficient. A recent example of this is the 2010 earthquake in Haiti and the devastation after that. The reasons are many, but are partly attributable to the sheer size and scope of such disasters. As reported by the Center for Research on the Epidemiology of the Disaster (CRED), between 1974 and 2003 there were 6,637 natural disasters worldwide that affected 5.1 billion people and accrued \$1.38 trillion (US\$) in damage [56]. In 2007 alone, 106 natural disasters killed 17,000 people and affected 201 million more [107]. Between May and September 2007, the Red Cross responded to natural disasters in 18 countries in Africa, 16 in the Americas, 13 in Asia, and 10 in European Nations [69].

As a result of the Indian Ocean tsunami in 2004, the overall budgets for humanitarian efforts have increased — and this in turn has brought increased attention to humanitarian logistics. It is commonly

2 Introduction

agreed that disaster relief has a large logistics component [82, 162, 164]. With the 2004 budgets of the top 10 humanitarian agencies exceeding \$14 billion in total, the logistics of aid has attracted recent scrutiny [155]. Consequently, humanitarian logistics has become a topic of interest to both academics and practitioners [82]. An effective and efficient humanitarian response depends “on the ability of logisticians to procure, transport and receive supplies at the site of a humanitarian relief effort” [153].

The objective of this monograph is to take a comprehensive look at the issues surrounding humanitarian logistics through the life cycle of the disaster spanning three stages of operations: preparation, disaster response, and humanitarian relief. We define humanitarian logistics from different perspectives, survey case studies to delineate lessons learned, and review analytical models from the literature to understand the state-of-the-art in humanitarian logistics. We then recommend further research in the fields of operations management and operations research to improve the effectiveness and efficiency of humanitarian logistics.

This monograph consists of six sections, including the current introductory section. In the next section, we review various aspects of humanitarian logistics to provide a comprehensive definition. We discuss the need for humanitarian logistics, review the lessons learned in past humanitarian logistics efforts, develop a classification of disasters, and distinguish between disaster response and humanitarian relief. In Section 3 we discuss the factors important for the design of humanitarian logistics using traditional concepts of logistics and supply chain management. Specifically, we compare humanitarian logistics with the military logistics as well as commercial supply chains.

Sections 4 and 5 describe supply chain issues and organizational issues in humanitarian logistics. In Section 4 we review analytical models related to humanitarian logistics. In reviewing analytical models we focus on efficiency and effectiveness of various aspects of humanitarian logistics. This review includes models that have been published in extant research literature as well as those that have been proposed in various working papers known to the author. We should point out that although this monograph is intended for all audiences, academics

as well as practitioners, the academic community may find the discussion of analytical models in Section 4 particularly useful in their research efforts. Section 5 discusses organizational issues, such as collaboration among players, flow of information, knowledge management, etc., that are important factors in humanitarian logistics. Motivation for discussing the literature in these two sections is to present an informal survey of the current research.

In Section 6, the last section, we present case studies of current practices to place this academic research in the context of reality. We believe this will provide the broader picture of humanitarian logistics. In the same section we also describe the challenges as seen by the officials in the field. The case studies combined with challenges highlight the research needed in humanitarian logistics, a new field of research and action.

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