

Inventory control policies in the humanitarian supply chain using system dynamics modeling

Ali Anjomshoae

Department of Manufacturing and Industrial Engineering,
Faculty of Mechanical Engineering, Universiti Teknologi Malaysia, Skudai, Malaysia
aali5@live.utm.my

Adnan Hassan

Department of Manufacturing and Industrial Engineering,
Faculty of Mechanical Engineering, Universiti Teknologi Malaysia, Skudai, Malaysia
adnan@mail.fkm.utm.my

Kuan Yew Wong

Department of Manufacturing and Industrial Engineering,
Faculty of Mechanical Engineering, Universiti Teknologi Malaysia, Skudai, Malaysia
wongky@fkm.utm.my

Abstract

In the humanitarian relief operations due to the damaged infrastructure the flow of relief inventories usually experiences delay. For instance roads are often damaged or jammed, and the information about demand and inventory are usually disturbed or unable to be obtained. Such circumstance imposes a considerable amount of uncertainty on the demand and supply side in the disaster relief chain. Delays hinder the optimal and timely provision of aid to the beneficiaries. The mechanism of how such delays influence the flow of material and information in the humanitarian supply chain is less studied. In this research we focus on post-disaster inventory management. We consider inventory ordering decisions which are decisions related to the post-disaster/warning stage once some information about a disaster become available. In this study we aim to understand the effect of delays on the various inventory control policies and investigate effective strategies that help to reduce the impact of delays in the disaster relief operations. We use system dynamics modeling to present a two echelon disaster supply chain model consisting of a downstream and upstream agent under a dynamic transport/lead time delay.

Keywords

System dynamics, Humanitarian supply chain, Inventory control