

論文内容の要旨  
Abstract of Dissertation

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Disasters affect economic damage, people's lives, and the environment in both developed and developing countries. However, relief procedures for disasters in developing countries are more serious than in developed countries due to inconsistent government management procedures and a lack of resources to handle disaster relief efforts by the government. In order to minimize the damage caused by disasters, it is necessary to have a clear disaster relief plan, both short-term and long-term. In such scenarios, quick response to disasters is important as it helps in saving human lives and provide the basic needs. Since basic needs through government channels in developing countries lack resources, government-led disaster relief operations are aided by non-government agencies and citizens. Therefore, to improve the efficiency of disaster relief operations at the quick response phase, this study investigates the importance of third-party logistics service providers in developing countries. To achieve this objective through a case study, this work considered a disaster relief operation using third-party logistics services as a major role in distributing daily necessities.

First of all, this study developed a simulation model of logistics patterns for the disaster relief operation. For this purpose, block simulation models were developed as a novel approach considering the similarity between the water flow in the logistics network and the electric current in the electrical circuit. The simulation models were validated for the centralized, decentralized, and complex logistics networks. In order to validate the simulation model, a disaster relief operation was simulated, considering the number of people, distance from the disaster area to the distribution center, truck capacity, number of available trucks, truck speed during delivery, loading and unloading time, and initial storage of resources in the disaster area. For the transportation process, the following parameters were evaluated: delay in transportation from the warehouse to the affected area, time to meet the requirements of the affected area, and total time to meet the requirements of the affected area. The results show that the block simulation model can explain several logistic network models and their behavior.

Next, the block simulation models were applied to simulate the logistics distribution patterns for disaster relief operations for the government-led and the third-party-led disaster relief operations. The effectiveness of third-party logistics service providers at disaster relief operations was compared and evaluated for pre-transport and transport processes. Primary investigations carried on Thailand's third-party logistics service providers show that the third-party network has the ability and resources to handle disaster relief operations without any other third-party service providers. Hence, this study investigates the use of third-party networks in disaster relief operations scenarios for small to large-scale disasters. The results show that third-party-led disaster relief operations are effective in the pre-transport and the transport processes.

With those results, this study concludes that block simulation models can explain the logistics behaviors of transportation processes. In disaster relief efforts in developing countries, cooperation between third-party logistics service providers and the government can efficiently allocate relief goods in the quick response phase. In the case of a large-scale third-party logistics provider in a developing country, the government can further improve the efficiency of disaster relief operations by collaborating with this provider.

