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A MODEL FOR EVACUATION RISK ASSESSMENT ON TRANSPORTATION NETWORKS

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Abstract

Cities are areas where hazards are more likely to escalate into disasters due to the large and highly concentrated populations and infrastructure that are likely to be affected. The complex layout of urban transportation networks and multi-story buildings make it even more challenging for rescuers to reach victims, which leads to greater vulnerability of cities and the potential increase of casualties as the hazardous consequences would be exacerbated (Kwan & Lee, 2005).

Traditional transportation demand analysis focuses on analyzing peak travel demands on weekday morning journey to work and evening journey from work trips and providing solutions to have acceptable level of service. However, it is important to give special consideration on analyzing demand and assessing transportation system capabilities during the special events or circumstances as well. One of these special event circumstances involves emergency evacuation. Emergency evacuation can be a life or death situation, where the lack of safe exit routes and the time that it might take to safely exit can be directly related to lives lost.

The main objective of this research is to identify spatial distribution of transportation difficulties that might arise during an urgent evacuation. The research has used Geographical Information System based Network based approaches to model the evacuation risk of road segments in small areas or neighborhoods under the pre-disaster conditions. Using the network based approaches it is possible to model risk scenarios by considering pre-disaster factors, rather than largely depending on post-disaster factors which sometimes unreliable to collect. However the evacuation risk assessment model presented in this research is not applicable for certain events like seasonal floods, in which the evacuation paths of the road network cannot be justified when the roads get flooded and when the community takes adaptation measures to live with the flood. The spatial distribution of transportation difficulties was assessed by taking Galle city as the case study area and the uncertain event as the Tsunami disaster.

Keywords: Emergency evacuation, Geographical Information System, Network based approaches

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LIST OF ABBREVIATIONS

EPZ	Emergency Planning Zone
IEPZ	Indeterminable Emergency Planning Zone
GIS	Geographical Information System
GPS	Global Positioning System
MC	Municipal Council
O-D	Origin - Destination