

A cluster-based decision support system for estimating earthquake damage and casualties

For Turkey, where infrastructural context is not developed well and no training and education programmes for increasing the level of preparedness of residents exist, a Decision Support System for Disaster Management (DSS-DM) is proposed in Aleskerov et al. (2005) for fast prediction of earthquake damage, human losses and injuries, need for temporary shelters at the district and sub-district level at different earthquake intensities and time of a disaster.

In the DSS-DM so-called clusters are considered as objects for evaluation. A cluster represents the number of “buildings of the same type and utilized for the same purpose” or “a single building that many people use simultaneously at a given time”.

The DSS-DM uses three major factors, namely, construction typology, number of stories, and year of construction, as well as a scenario approach to calculate the mentioned parameters. Different earthquake scenarios may take place under the condition of the intensity of a possible earthquake. As three intensities are possible for each district in the model, one might obtain $3n$ scenarios for city with n districts.

There are three main steps in work of the model. Firstly, for a cluster with a certain construction typology, depending on the earthquake intensity, the extent of building damage is estimated. Secondly, using building damage estimates gained for clusters with known distribution of people in them during day and night, one can determine the number of human losses and injuries. Thirdly, based on received figures the number of people in a sub-district who will need a shelter is defined.

As a result, users of the DSS-DM may obtain answers to the most important disaster management questions.

References:

1. Fuad Aleskerov, Arzu Iseri Say, Aysegül Toker, H Levent Akin, Gülray Altay. “A cluster-based decision support system for estimating earthquake damage and casualties”, *Disasters*, v.22, 29(3), 2005, 255-276