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ABSTRACT

STUDY ON A SUBJECTIVE EVALUATION SYSTEM SUPPORTED BY ISM AND ITS OBJECTIVITY

Noboru KIMATA
Kanazawa University

It is a very atractive feature of ISM that it activates subjective judgments for problem solving. But this feature becomes a restraint of ISM in practical situations, because we need a guarantee of the "objectivity" of the result at the implementation stage. In this paper, we pick up the problem of evaluation of the safety of evacuation routes in great quakes, in which we need to use our subjective judgment, and we discuss the potential for certain guarantee of the "objectivity" of the subjective result supported by ISM.

Each evacuation route is characterized by several components which prescribe its safety level in a strong quake. We determine seven such dominant components, applying ISM in the usual way. And we prepare so-called "characteristic cards", in which these seven components are described according to preevaluation using individual evaluation models.

Next, we propose a subjective evaluation system supported by ISM to synthesize these components and to do comprehensive evaluation. This system requires only relative evaluation and not an absolute one. That is, an evaluator is only responsible for the pair-wise comparison of safety between two routes using two cards. The result of subjective evaluation is imbedded in a binary matrix, and transformed by the structuralization algorithm of ISM into a multi-level diagraph that shows a safety order of sample evacuation routes.

In practice we use VISMS, developed by the author as an expanded computer system of ISM, and demonstrate how to develop the "safety-order diagram". The process supported by VISMS is highly visible so that other people can follow its development very easily and check up on the result from their own points of view. This feature is one important condition for a guarantee of objectivity of the subjective result.

Finally, we try to check the possibility of a numerical explanation of the the result as another condition for a guarantee of objectivity. Here we classify the sample routes into three categories; safe, moderate, and danger, according to the subjective evaluation, and we apply Discriminant Model and reclassify them according to this numerical model. In this research we can show that the gap between the subjective judgment and the numerical classification is found only in two cases among twenty-four samples.