EVALUATION OF CITY'S ROBUSTNESS AGAINST DISASTERS

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In a disaster situation, road networks play a critical role in maintaining routes for evacuation and logistics. In the event of a catastrophic disaster such as an earthquake, part of the road network may be easily broken into isolated components. In this situation, it is critical that individuals in each district have access to vital facilities in their local neighborhood so that no district is isolated. In this paper, we have proposed using a topological index (TI) to quantify road network dispersiveness/concentration (Sakakibara *et al*, 2004).

In order to construct the graph for calculating TI, we also present the methodology for specifying effective road links for avoiding functional isolation of districts. We focus on polarization of spatial distributions of demand and supply of a necessary service. In catastrophic disasters, such polarization can become a risk factor of a city. On the other hand, well-designed road network can mitigate such polarization. In order to evaluate robustness of a city against disasters taking compensation effect of road network into account, we propose the index for polarization of spatial distributions, and quantify the difference of compensation effect depending on the design of a network. We applied the methodology to actual city in Japan, and we also showed temporal change of the degree of polarization in the same city.