

**“Technical Research and Development for Road Policy Quality Improvement”  
Study Summary**

No.	Title	Principal Researcher
No.25-1	Development of new practical anti-disaster reliability evaluation method for road network improvement project considering link vulnerability and project priority	Univ. of Tokyo Prof. Hitoshi IEDA

In this study, we aim to develop a new anti-disaster reliability evaluation method for the road networks improvement project evaluation and verify the applicability of proposed new method. In particular, (1) develop of the new evaluation methods considering practical needs and reality of the application area situation based on the provisional method, (2) verification of the applicability of the practice of a new evaluation method.

### 1. Backgrounds and Objects

After the Great East Japan Earthquake of Mar. 11 2011, MILT provide “Method for Assessing the Disaster Mitigation Functionality of Roads (the provisional draft)” to estimate necessity and effectiveness of road projects appropriately. However, this method has some theoretical and practical problems. Then, we aim to sort out the refinement points of the provisional method extracted from the opinions in the meetings of working-level person and to develop a new anti-disaster evaluation index of the road networks.

### 2. Activities in Research Period

#### [2013]

- 1) Review of previous research (mainly network reliability, project evaluation method)
- 2) Review of calculation behavior of the provisional methods in Tohoku area
- 3) Understanding practical needs for revise of provisional methods by interview
- 4) Consider the framework for improvement of the provisional method
- 5) Develop the prototype evaluation methods and its performance validation

#### [2014]

- 6) Integrity verification of the practical sense of the proposed method and revise
- 7) Application to the case study area (Shikoku area) and its performance validation
- 8) Develop the GUI based evaluation calculation system (Computer software)

#### [2014]

- 9) Brush-up of the proposed method for real application to consider multi-disaster
- 10) Application to whole area and fine-tuning of proposed method with working-level person
- 11) Establish proposed method, make a manual book for practical user.

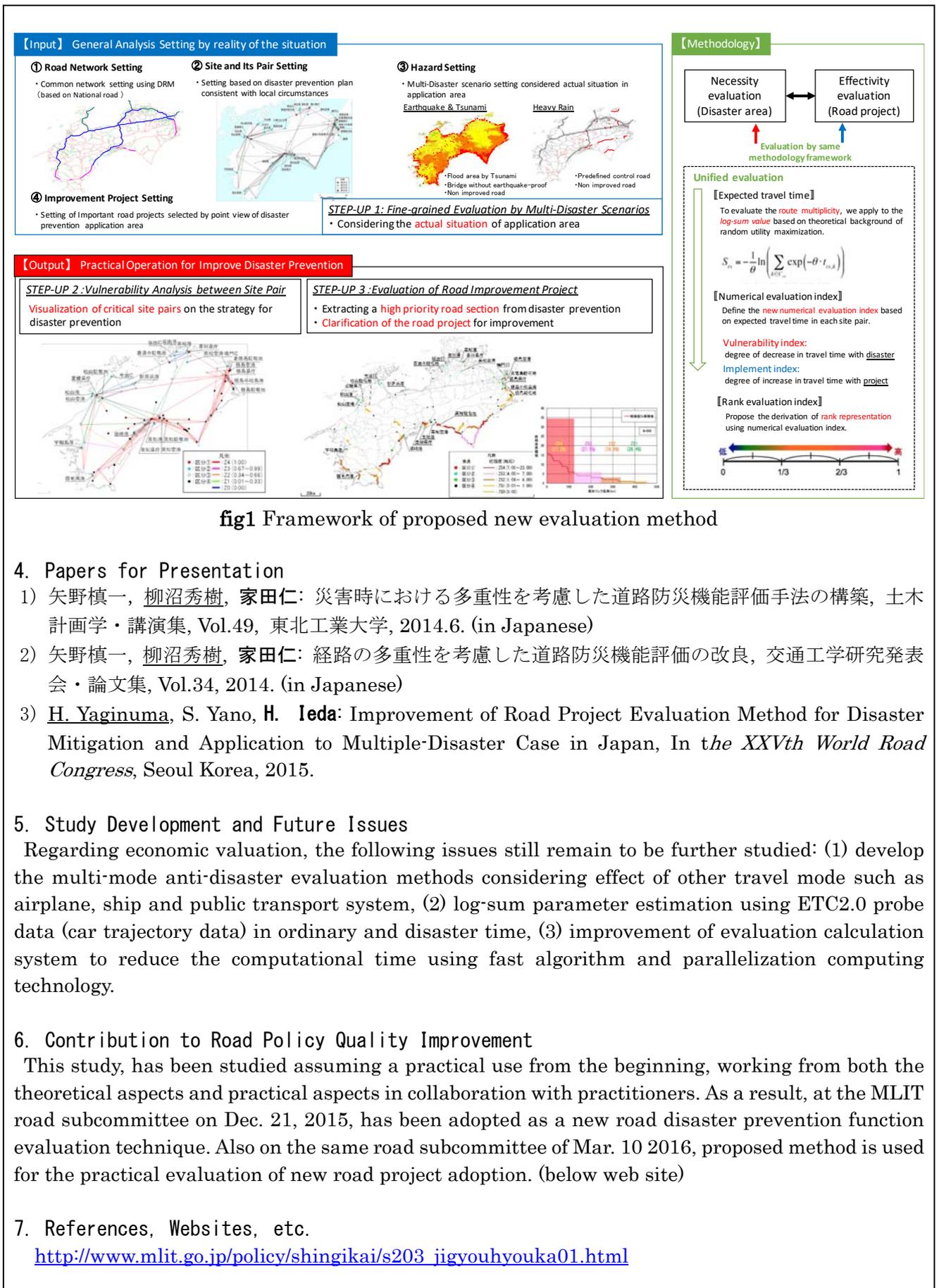
### 3. Study Results

#### (1) Develop the new anti-disaster evaluation method for road network

We make a model framework based on opinion from working-level person (**fig1**), and develop easy-to-understand numerical-based evaluation method considering multiplicity of routes. In addition, we define the setting for evaluation considering a number of disaster scenarios in accordance with the actual situation of area.

#### (2) Application to practical evaluation and attempts toward the evaluation method revision

To understand performance of proposed model, we apply to the whole country area (10 regions). As the results, proposed model has goodness performance and effectively for practical use. In Dec 2015, our method was employ the official method by MLIT.



#### 4. Papers for Presentation

- 1) 矢野慎一, 柳沼秀樹, 家田仁: 災害時における多重性を考慮した道路防災機能評価手法の構築, 土木計画学・講演集, Vol.49, 東北工業大学, 2014.6. (in Japanese)
- 2) 矢野慎一, 柳沼秀樹, 家田仁: 経路の多重性を考慮した道路防災機能評価の改良, 交通工学研究発表会・論文集, Vol.34, 2014. (in Japanese)
- 3) H. Yaginuma, S. Yano, H. Ieda: Improvement of Road Project Evaluation Method for Disaster Mitigation and Application to Multiple-Disaster Case in Japan, In the XXVth World Road Congress, Seoul Korea, 2015.

#### 5. Study Development and Future Issues

Regarding economic valuation, the following issues still remain to be further studied: (1) develop the multi-mode anti-disaster evaluation methods considering effect of other travel mode such as airplane, ship and public transport system, (2) log-sum parameter estimation using ETC2.0 probe data (car trajectory data) in ordinary and disaster time, (3) improvement of evaluation calculation system to reduce the computational time using fast algorithm and parallelization computing technology.

#### 6. Contribution to Road Policy Quality Improvement

This study, has been studied assuming a practical use from the beginning, working from both the theoretical aspects and practical aspects in collaboration with practitioners. As a result, at the MLIT road subcommittee on Dec. 21, 2015, has been adopted as a new road disaster prevention function evaluation technique. Also on the same road subcommittee of Mar. 10 2016, proposed method is used for the practical evaluation of new road project adoption. (below web site)

#### 7. References, Websites, etc.

[http://www.mlit.go.jp/policy/shingikai/s203\\_jigyohyouka01.html](http://www.mlit.go.jp/policy/shingikai/s203_jigyohyouka01.html)