A stochastic multi-criteria decision-making model for vulnerability assessment of natural disasters: A case study in Beijing

[†]*Qian Zhao¹, Yanbing Ju¹, Jun Ma², Wenkai Zhang¹

*Presenting author, †Corresponding author

Email addresses: <u>qian_zhaoqz@163.com</u> (Qian Zhao), <u>juyb@bit.edu.cn</u> (Yanbing Ju),

junma@uibe.edu.cn (Jun Ma), bitzwk@gmail.com (Wenkai Zhang)

¹School of Management and Economics, Beijing Institute of Technology, Beijing 100081, China

²Business School, University of International Business and Economics, Beijing 100029, China

Abstract

Vulnerability analysis and evaluation is the basis for disaster reduction, preparation, response and recovery, which has attracted much attention in the field of natural disasters and sustainable development. Take Beijing as an example, this paper employs a stochastic multi-criteria decision-making method, namely SMAA-ELECTRE, for evaluating vulnerability of natural disasters. First, an index system for evaluating vulnerability of natural disasters is constructed by means of analyzing historical data. Second, the SMAA-ELECTRE method is briefly introduced. After that, we extend the SMAA-ELECTRE method to handle heterogeneous inputs, where both stochastic and fuzzy uncertainties may inherent in the constructed index system. Then, the generalized SMAA-ELECTRE method is applied to evaluate the vulnerability of 16 districts in Beijing in the face of natural disasters.

Keywords: Vulnerability assessment of natural disasters, Stochastic multiple attribute decision-making method, SMAA-ELECTRE