A Comparison between Subjective and Objective Weighting Approaches for Multi-Criteria Decision Making: A Case of Industrial Location Selection

Kowit Ponhan[1,a], and **Panitas Sureeyatanapas**[1,b,*]

[1] Supply Chain and Logistics Systems Research Unit, Department of Industrial Engineering, Faculty of Engineering, Khon Kaen University, Khon Kaen 40002, Thailand

E-mail: [a]kowipo@kku.ac.th, [b,*]panisu@kku.ac.th (Corresponding author)

Abstract. Location selection is a complex decision problem, mainly caused by many considered criteria. Moreover, the criteria normally have different levels of importance or weights, and seeking a consensus among multiple decision makers regarding the weights of criteria is difficult. Since the weights are essential inputs for a logical decision-making process, this study examines the effects of varying the weights towards five weighting methods under the subjective and objective approaches. The direct rating, rank-order centroid, and rank sum represent the methods that derive the weights based on a decision maker's subjective judgement, while the entropy and standard deviation methods signify the objective approach. A case of location selection for production fragmentation of a Thai manufacturing company that ranked candidate locations by the fuzzy Technique for Order Preference by Similarity to Ideal Solution (fuzzy TOPSIS) is used as a basis for comparing the sensibility of the five weighting methods. Discussions about their methodological and practical advantages and cautions are drawn according to the three criteria, including resource requirement, potential for bias, and general complexity of each method.

Keywords: location selection, weighing method, multi-criteria decision making, fuzzy TOPSIS