

## A COMBINED MCDM AND FUZZY MCDM APPROACH TO SELECTING THE LOCATION OF THE DISTRIBUTION CENTER IN THE HUB PORT: AN EMPIRICAL STUDY ON HONG KONG, SHANGHAI AND KAOHSIUNG

CHIEN-CHANG CHOU

Department of Shipping Technology  
National Kaohsiung Marine University  
482, Chung Chou 3rd Rd. Chi Chin, Kaohsiung 805, Taiwan  
chiench1@ms58.hinet.net

Received December 2008; revised May 2009

*ABSTRACT.* The purpose of this paper is to propose an approach for selecting the location of the distribution center in the hub port by combining the multiple criteria decision-making (MCDM) and the fuzzy multiple criteria decision-making (FMCDM). The outcome of the combined MCDM and FMCDM approach proposed in this paper is not only to evaluate the present investment environment, but also evaluate the future operation environment. With the MCDM method, the investment preferences for the present investment environments of alternative distribution center locations can be evaluated. The FMCDM method can then be used to evaluate the investment preferences for the future operation environments of alternative distribution center locations. This paper first summarizes the important criteria for evaluating the distribution center location in the hub port. Finally, the utilization of the proposed combined MCDM and FMCDM approach is demonstrated with a case study of the hub ports of Hong Kong, Shanghai and Kaohsiung. The results show that the combined MCDM and FMCDM approach can be used to explain the evaluation and decision making procedures for distribution center location selection.

**Keywords:** Location selection, Fuzzy sets theory, Multiple criteria decision-making, Distribution center

**1. Introduction.** To select a distribution center location in the hub port is a complex decision-making problem. Because the decision maker not only considers the evaluation criteria for location selection of the distribution center, but also takes account of the evaluation criteria for transshipment location, and the evaluation criteria for foreign direct investment.

A lot of researchers proposed some evaluation criteria for evaluating and selecting the distribution center location (Dahlberg and May [21], Hwang and Yoon [38], Spohrer and Kmak [56], Tompkins and White [62], Liang and Wang [46], Rietveld and Ouwersloot [55], Stevenson [58], Chen [8,9], Chou [16,17], Deng [23], Deng and Cheng [24]). Many researchers proposed evaluation criteria for evaluating and selecting the transshipment location (Hayuth [34], Brian [5], Jansson and Shneers [40], James and Gail [39], Thomson [60], Kuo and Chu [42], Sternberg [57], Chou [14,17], Chou et al. [18-20]). Some researchers proposed evaluation criteria for evaluating and selecting the foreign direct investment location (Brenes et al. [4], Globerman and Shapiro [31], Wu and Strange [64], Sun et al. [59], Bevan et al. [3]).

Although many researchers proposed evaluation criteria for evaluating and selecting the distribution center location, the transshipment location or the foreign direct investment location, none of these researchers proposed evaluation criteria for evaluating and selecting