

## A NEW ALGORITHM FOR APPLYING FUZZY SET THEORY TO THE FACILITY SITE SELECTION

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**ABSTRACT.** *In this study, we present a new algorithm to select the appropriate facility site based on various investment environments. The proposed algorithm is not only easier but also more useful than presented before. Via the proposed new algorithm, the decision-makers or leaders of the multinational enterprises (MNEs) can select the appropriate facility site among the countries.*

**Keywords:** Linguistic variables, Facility site selection

**1. Introduction.** A critical issue for firms pursuing global expansion strategies involves facility site evaluation and selection. For successful expansion, corporations must identify countries and facility sites that offer a benefit combination with the firm's overall corporate strategy. Thus, to make the most beneficial choice of a new location among the several countries, the decision-makers/leaders of multinational enterprises (MNEs) would consider the factors of aggregative benefit rate of the investment environment while planning the operating strategies.

To establish a hierarchical structure model of aggregative benefit, Lin and Lee [5] classified the investment benefit factors presented by the literatures of [1,2,4,7-9] into five attributes as labor, geography, etc., and divided each attribute into some investment benefit items, such as salary level, manpower level, etc. For convenience, they denote the attribute Labor to be  $X_1$ , Geography to be  $X_2$ , etc., and the items such as salary level denoted by  $X_{11}$ , usage condition level of factory denoted by  $X_{21}$ , etc., as shown in Figure 1.

In evaluating the benefit rate of aggregative investment environments for MNEs, most decision-makers or leaders, in fact, viewed those assessment items as linguistic values (terms), e.g., very high, high, middle, low, very low, etc. After fuzzy set theory was introduced by Zadeh [11] to deal with problem in which vagueness was present, linguistic values could be used for approximate reasoning within the framework of fuzzy set theory to effectively handle the ambiguity involved in the data evaluation and the vague property of linguistic expression, and normal triangular fuzzy numbers were used to characterize the fuzzy values of quantitative data and linguistic terms used in approximate reasoning [12].

In [5], Lin and Lee proposed a fuzzy assessment model for the facility site selection of MNEs. They used the membership function to express the degree of evaluator's feelings