A fuzzy AHP evaluation model for buyer-supplier relationships with the consideration of benefits, opportunities, costs and risks

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Abstract

With increasingly fierce global competition, firms in various industries need to build a cooperative buyer-supplier relationship to survive and to acquire reasonable profit. Even though the literatures on various types of collaborations between firms are abundant and the works on supplier selection models are numerous, the research that provides a mathematical model for the selection of the most appropriate form of buyer-supplier relationship is very limited. Existing buyer-supplier evaluation models usually only consider the benefits from the relationship, but not the opportunities, costs and risks that may need to confront. The main objective of this study is to propose an analytical approach to evaluate the forms of buyer-supplier relationship between a manufacturer and its supplier. A fuzzy analytic hierarchy process (AHP) model, which applies fuzzy set theory and the benefits, opportunities, costs and risks (BOCR) concept, is constructed to deal with uncertainty and to consider various aspects of alternatives. Multiple factors that affect the success of the relationship are analyzed by incorporating experts' opinions on their priority of importance, and a performance ranking of the buyer-supplier forms is obtained. A case study of selecting the most appropriate buyer-supplier form between a TFT-LCD manufacturer and its color filter supplier is presented, and the proposed model is applied to facilitate the decision process. The proposed model is a general form that can be tailored and applied by firms that are making decisions on buyer-supplier relationship.

Keyword：Buyer-supplier relationship, fuzzy analytic hierarchy process, performance ranking, BOCR, TFT-LCD.