Establishing a Multiple Structures Analysis Model for AHP

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Abstract

The purpose of this paper is to propose a multiple structures analysis model for Analytical Hierarchy Process (AHP). The approach is developed owing to the fact that in the analysis of large-scale problem, a different viewpoint or a specific points emphasis will result in different hierarchy structures. Traditionally, the AHP process, based only on single evaluation hierarchy, presents the Decision Making (DM) with a problem of schema selection for the hierarchy structure. It is difficult to verify an appropriate structure. To avoid or reduce the effect of an inappropriate selection of an evaluation hierarchy structure is therefore critical to the success of the hierarchy evaluation process. According to statistics and group decision theories, a more objective evaluation will be obtained if we can compromise several estimates. This paper will, therefore, utilize the Hierarchies Consistency Analysis (HCA) theory to establish multiple structures evaluation model for the AHP. We will construct several different structure schemata for a problem to be analyzed by the AHP approach, and determine the weight of criteria for all levels of each structure. Furthermore, we will use the weight consistent property and compromise process of the HCA theory to integrate these AHP models to obtain more objective evaluation result that is as free as possible from structure bias.

Keywords: AHP, Hierarchical Weighting, Group Decision, Evaluation, Multiple Attribute.