Evaluating and ranking decision making units in the two-stage network DEA based on reference frontier

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Abstract

The present study proposes a method for evaluating and ranking the efficiency of decision-making units (DMUs) that has a two-stage network structure in data envelopment analysis (DEA). Measuring the efficiency of two-stage network systems in data envelopment analysis has developed considerably, but ranking it in a logical and accurate analysis is a subject that still needs further study. In the present study, a model is presented that can consider the impact of each efficient DMUs on the whole two-stage network system, as well as using the reference frontier, the impact of each efficient DMUs in each evaluating non-efficient DMUs. It also provided more information to rank and identify the impact of extreme efficient DMUs on non-efficient DMUs by reference frontier. The concept of reference frontier introduced in the present study has the potential to determine the contribution of each extreme efficient DMUs in constructing a reference frontier for each non-extreme efficient DMUs and non-efficient DMUs. These facts have been investigated using logical reasoning and proof of several theorems, and have been discussed with a Practical example.

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