

A Modified SBM-NDEA Approach Considering Non-homogeneity of Sub Processes

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DEA is a non-parametric and linear programming based technique that attempts to maximize a decision making unit's (DMUs) relative efficiency, expressed as a ratio of outputs to inputs, by comparing a particular unit's efficiency with the performance of a group of similar DMUs that are delivering the same service. The traditional DEA models treat DMUs as black boxes whose internal structure is ignored. Recently, network DEA models have been introduced that treats the internal structure of a DMU as a network system. The increased interest in network DEA also produced different type of model formulations including the slacks-based measure network DEA (SBM-NDEA). SBM is a non-radial approach suitable for measuring efficiencies when inputs and outputs may change non-proportionally, which is a sharp contrast as compared to traditional DEA models that measures input and output changes proportionally. However, just like other DEA models, SBM-NDEA has its assumptions that limit its applicability and discriminative power in efficiency measurement. The proposed model differs from existing SBM-NDEA approaches in that it (a) considers the exogenous inputs and outputs at the system level instead of at the process level, (b) takes into account the presence of intermediate products in the model's objective function, and (c) applies into a more general scenario considering no matter what type of input and output measures are consumed and produced, respectively.