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ENVIRONMENTAL EFFICIENCY OF CHINESE PAPER MILLS ALONG HUAI RIVER: A DATA ENVELOPMENT ANALYSIS (DEA) BASED STUDY

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Abstract

To deal with the undesirable factors in Data Envelopment Analysis (DEA), a non-linear DEA model was previously developed for a paper production system, where the desirable outputs are increased and the undesirable outputs are decreased for efficiency improvement. To convert the proposed non-linear model into a linear one, a linear approximation to the non-linear constraint is used and an approximate efficiency score is obtained. In this paper, we propose a new method to solve the non-linear programming problem and calculate the efficiency scores accurately, in which a second-order cone programming (SOCP) is defined and applied to transfer the non-linear programming model into a linear one. We applied the proposed model to measure the environmental performance of 30 paper mills along the Huai River in China. It was found that the efficiency scores obtained by our model is obvious different with the ones by approximate models.

Key words: data envelopment analysis (DEA), paper mills, second-order cone programming (SOCP), undesirable factor

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