

Assessing the efficiency of wastewater treatment plants: A double-bootstrap approach

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Abstract

Benchmarking the performance of wastewater treatment plants (WWTPs) is essential for promoting their long-term sustainability. Recent research has applied data envelopment analysis (DEA) models to evaluate the efficiency of WWTPs providing a synthetic index of their performance. However, the traditional DEA is a deterministic method; therefore, regression analysis cannot be used to explore the external factors influencing efficiency scores. To overcome this limitation, in this study, a double bootstrap DEA model was used for the first time to compute the efficiency scores for a sample of WWTPs. The confidence intervals for efficiency scores were estimated for each facility. Results evidenced that in average WWTPs assessed could save 30% of their costs. Moreover, at the second stage of the analysis, the volume of the treated wastewater and energy consumed were found to influence the efficiency of WWTPs. This study shows the importance of using a reliable and robust method to benchmark the WWTP performance. Information about factors affecting WWTPs efficiency is essential to develop policies for promoting sustainable wastewater treatment.

Keywords: Bootstrapping | Data envelopment analysis | Underlying factors | Wastewater treatment | Performance

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