

Benchmarking in wastewater treatment plants: a tool to save operational costs

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Received: 27 November 2012 / Accepted: 27 March 2013
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Abstract The economics of wastewater management and treatment is the subject of growing interest by water agencies and wastewater treatment plant (WWTP) operators. Benchmarking procedures are useful tools to assess the performance of these facilities and help identify best practices. To estimate the efficiency scores for each input involved in the operation of WWTPs, a non-radial data envelopment analysis model has been applied to a sample of Spanish WWTPs. The great advantage of this methodology is that it enables the identification of cost items on which to act to increase the efficiency at plant level. In the second stage, variables influencing efficiency scores have been identified. This analysis helps improve the understanding of how individual scores of efficiency and operating variables are related. It is shown that some factors do not affect all cost items—thus illustrating that an increase in global efficiency would not produce a reduction in all cost items. The benchmarking methodology and empirical application developed in this article could be very useful

for improving the management of WWTPs and contribute to save operational costs.

Keywords Cost savings · Economic efficiency · Non-radial DEA · Russell measure · Wastewater treatment costs

Introduction

The importance of good quality drinking water for urban populations was realised in antiquity. However, the importance of proper sanitation and wastewater treatment for the protection of public health and the environment was not understood until the nineteenth century (Lofrano and Brown 2010). Since then, concerted efforts have been made to provide adequate sanitation and prevent the discharge of wastewater without treatment to the environment. Hence, in developed regions, virtually the entire population (99 %) uses facilities for treating wastewater (WHO–UNICEF 2010).

Two challenges regarding wastewater treatment in developed countries are as follows. First, increasing the environmental sustainability of the process by reducing the consumption of resources and/or recovering them from wastewater. Second, minimising the economic cost of operating this service. For example, in 2009, expenditure on wastewater management and treatment in the EU-27 was around 0.60 % of GDP (Eurostat 2012). Hence, economics is of special interest in the management of wastewater treatment plants (WWTPs), above all in the current economic crisis.

In this context, the use of tools and methodologies to save costs has awakened a growing interest from water agencies and WWTP operators. One of the most useful methodologies is efficiency assessment using benchmarking procedures

Electronic supplementary material The online version of this article (doi:10.1007/s10098-013-0612-8) contains supplementary material, which is available to authorized users.

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