

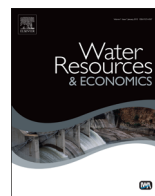


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## Exploring and analysing sources of technical efficiency in water supply services: Some evidence from Southeast Asian public water utilities



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### ABSTRACT

This is the first efficiency analysis of Southeast Asian water utilities that uses a double bootstrap data envelopment analysis model. A sample of 40 publicly owned water utilities was selected in the study. Six explanatory factors (i.e., non-revenue water, population density, gross domestic production per capita, average maximum temperature, dummies for state-owned enterprises and ground-water extraction) have been used to explain the differences in the technical inefficiency effects across public water utilities in Southeast Asia. We find that Southeast Asian water utilities, on average, obtained a technical efficiency of 0.74. The result reveals that the population density is linked with the technical inefficiency in the reverse direction. Furthermore, we also observe that state-owned water enterprises perform slightly lower than those from other forms of publicly-owned water utility. Policy implications are derived.

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## 1. Introduction

The water supply industry consists of three main activities: water abstraction and transfer, water treatment and water distribution. In the last two decades, the water supply activities in many countries were managed by the state government. However, some public utilities often operate

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inefficiently with high production costs and excess labour. This inefficiency could be part of the reason that water supply industry reforms have occurred in many developed countries such as Australia and the United Kingdom. The process of market reform, however, has not been implemented in all countries, especially in developing countries. For instance, some water services in Southeast Asia are, to some extent, still owned and supplied by either state-owned enterprises or statutory institutional bodies. The assessment of the water and the water supply quality has become their main interest and focus to enhance water supply efficiency. Therefore, we can see many countries in Southeast Asia (e.g., Vietnam, Cambodia and Indonesia) that have remained unchanged until today.

Privatisation and competitive models have been “limitedly” introduced and adopted in Southeast Asian countries. For instance, private participation is permitted for the water supply service in Thailand, although their water services are mostly covered by the Metropolitan Waterworks Authority (MWA) and the Provincial Water works Authority (PWA) for the urban and rural areas, respectively. In the case of Malaysia, each state or territory is responsible for the water supply process, from water abstraction to distribution. To ease the state government's burden, several states have allowed private entry into the market under a concession agreement (for example, Syarikat Bekalan Air Selangor Sdn. Bhd. in Selangor and the Federal Territory of Kuala Lumpur and Putrajaya). Similar market reforms to those in Malaysia also occurred in the Philippines. Prior to 1997, the water supply industry in Manila was owned by the Metropolitan Waterworks and Sewerage System (MWSS). To allow private entry, two concession contracts were awarded to private utilities for the Metro Manila water distribution, while the water districts and local government units necessitate the delivery of water to the areas outside of Manila. However, the impact of privatisation on the Philippine water industry is inconclusive [1].<sup>1</sup>

Water is considered to be a basic need for everyone. Any changes in the cost of the water supply will affect all domestic and non-domestic consumers in a society. It is expected that higher levels of efficiency in the water supply provides many benefits, such as lower water costs for consumers. From the literature survey, some empirical efficiency studies have analysed the factors that influence the technical efficiency of water utilities, while the others are related to the role played by market reforms in efficiency gains and productivity growth. Explanatory variables in efficiency studies are usually referred as those variables which may influence a water utility's efficiency. For the purpose of explaining water utility inefficiency, the impact of these determinants helps one explain the relative performance of water utilities. Several firm-specific and country-specific factors (e.g., ownership, population density, income per capita) have been adopted to identify the impact of explanatory factors on the performance of the water supply industry.

Since the early 1990s, many developed countries have undergone market reforms in their water industry; therefore, it is not surprising that the various explanatory variables have been investigated in a number of efficiency and productivity analysis studies. There are a large number of efficiency studies that have been conducted in developed countries, such as those by Saal and Parker [34], Saal et al. [36] and Thanassoulis [39,40] for the United Kingdom; García-Sánchez [23], García-Valiñas and Muñiz [24] and Picazo-Tadeo et al. [31] for Spain; and Woodbury and Dollery [40], Coelli and Walding [12], and Abbott et al. [2] for Australia. A few studies have involved developing countries, such as those by Kirkpatrick et al. [26] and Mbuvi et al. [30] for African countries and Tupper and Resende [41] for Brazil. However, none of these studies assessed Southeast Asian water utilities either using statistical or econometric approach.<sup>2</sup>

In general, there are some similarities in the Southeast Asian water industry. For example, most of the water utilities are operated in similar geographical weather and market structures (refer to [Section 2](#) for further details on the Southeast Asian water industry). This will allow us to identify the determinants that are associated with variations in water utilities within a similar environment. The study also provides a reliable indicator that can be used to compare the performance of public

<sup>1</sup> This is because the utility operating in the east zone was profitable and the other in the west zone was operating inefficiently and was taken over by the government at the end of 2005. For more details, please see Asian Development Bank [1].

<sup>2</sup> In fact, there are a limited number of published and unpublished studies that have reviewed the latest water industry developments, but these discussions did not include any data for statistical analysis.

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