Benchmarking Central American water utilities

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ABSTRACT

This study provides a comprehensive efficiency analysis of water service providers in six countries in the Central American region. Pressures for sector reform have stimulated interest in identifying and understanding the factors that can contribute to network expansion, improved service quality, and cost containment. The aim is to provide policy-makers and investment funds institutions with quantitative evidence on the effectiveness of the regional water sectors and utilities under different perspectives. In addition to key sector performance indicators, the analysis considers several benchmarking methodologies to assess technical and cost efficiency.

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1. Introduction

A recent Inter-American Development Bank (IADB) study reports that investments of US $40 billion for water assets are needed to meet the United Nation's Millennium Development Goals.[2] Public and private sector funding could play a role in expanding or improving urban water systems through either equity investments or the purchase of municipal bonds. However, external financial flows are unlikely to increase significantly absent major improvements and incentives in measuring system performance.

Developments over the past decade in quantitative techniques and pressures for sector reform have stimulated interest in identifying and understanding the factors that can contribute to water and sanitation systems network expansion, improved service quality, and cost containment in the sector[3] (related research examines how benchmarking might facilitate conflict resolution in Central America; Berg, 2008). Policy-makers in Latin America, Asia,

and Africa have begun to collect data that can serve as the basis for performance comparisons that help decision-makers identify weak and strong performers. Utility managers, water associations, regulators, and other groups have begun to undertake statistical analyses of water systems over time, across geographic regions, and across countries.

The purpose of this study is to analyze the relative performance of water utilities in the Central American region to identify best performers and areas of weakness in the sector. The results can help decision-makers better direct investment funds into projects that will further develop the water sector in this region. A substantial body of technical literature exists regarding how to measure performance. Coelli et al. (2003) present a survey of different methodologies to measure performance. The methodologies considered in this study are performance indicators, total factor productivity indexes, and frontiers.

A limitation associated with studies of Central America is the scarcity of data related to the water sector. The first steps of the study involved examining existing data and defining a set of variables to be collected. A main contribution of this study is the assembly of a current database for the water sector in Central America. During the data collection process, some factors were found to be limiting and others were critical for the success of the process. The subsequent steps of the study relate to performance measurement. With key input, output, and quality information, basic performance comparisons can be made. A set of performance

indicators commonly used among practitioners in the water sector was calculated to provide a very simple picture of the sector's performance characteristics in the region. Some of these performance indicators were compared to those presented by the benchmarking task force of Association of Water and Sanitation Regulatory Entities of the Americas (ADERASA)[4] in its most recent annual report.[5]

The availability of data from 2002 to 2005 allowed assessing performance in the region through the calculation of total factor productivity indexes. Finally, to provide a more comprehensive picture of the efficiencies associated with production practices in the region, a production frontier using Data Envelopment Analysis (DEA) and a stochastic cost frontier were included in the analysis. Differences on some of the values obtained from this variety of performance measures are based on the different assumptions underlying each methodology. A best performer was found consistently through the performance methodologies calculation.

The study is organized as follows. In Section 2, the data collection process is described. Section 3 provides an analysis of core performance indicators. Section 4 utilizes total productivity indexes to examine productivity. Sections 5 and 6 contain a non-parametric and parametric frontier analysis. Section 7 concludes.

2. Data collection process

The starting point of this study was to build a verifiable database taking into account data already available. To this end, the author requested and collected data from ADERASA and the International Benchmarking Network for Water and Sanitation Utilities (IBNET). The ADERASA database is comprised of data that come from the regulatory agencies in each Latin American country. This information is reported by some of the utilities in each sector but not all. Appropriate contact was established with these utilities to verify the existing data and to obtain missing values. In addition, Guatemala and El Salvador are not members of ADERASA, so data for these countries were collected for the first time. The adopted strategy for the collection process was incremental in the sense that data were sent to the source several times for verification. A new and refined data set for the water sector in Central America[6] emerged from this process. Nevertheless, only a subset of variables was used for the analysis because not all countries reported all variables or all years. Consequently, the number of observations was reduced to allow the data set to be comparable for all utilities and to include all countries.

Several factors were identified as affecting data availability within the region: the on going water sector restructuring, the low level of water infrastructure in place, and the low presence of information technology among the service providers.

From an institutional point of view, Costa Rica, Panama, and Honduras have independent regulatory agencies, but El Salvador, Guatemala, and Nicaragua still have central government bodies overseeing the water sector. Some of these central government institutions are undergoing restructuring such as the transfer of sector responsibilities to municipalities. Some countries have just finished a major restructuring of this type. Because these changes generally imply changes within the company staff, the flow and registering of data may get interrupted, affecting data collection procedures.

El Salvador, Honduras, and Nicaragua show a low level of infrastructure in place. This promotes the presence of a large number of local independent water providers which limit the data collection process. Solo (1998) provides a detailed description of the role of these independent providers within the water sector of Latin American countries.

Overall, the water sector in this region is fragmented given the decentralization of service provision into municipalities. For instance, for Honduras with 271 municipalities, and for Guatemala with more than 300 municipalities, the lack of data is evident. Consequently, available data came from the municipalities serving the largest cities. This fragmentation greatly hampers performance analysis for the water sector in this region.

Finally, the development of information technology is central to any data collection initiative. To frame the status of the region on this matter, the information and communication technology (ICT) diffusion index utilized by the United Nations Conference on Trade and Development (UNCTAD) is utilized.[7] More specifically, the ICT index includes a connectivity index to measure technology infrastructure development. This connectivity index includes per capita number of Internet hosts, number of PCs, number of telephone mainlines, and the number of mobile subscribers. The connectivity index for 2005 was 0.75 for the United States. In the same year, this index was 0.20 for Costa Rica; 0.10 for El Salvador and Panama; 0.08 for Guatemala, and 0.04 for Honduras and Nicaragua. Information technology is the core of any structured data collection procedure. Of no less importance, the availability of an information system specific to the sector is crucial for any data collection process within this region. Initiatives in this respect are only incipient. In a 2004 workshop hosted by Peru, water sector representatives from several Latin American countries gathered initial ideas and directed some efforts into the development of a water sector information system common to the region. A similar initiative hosted by El Salvador developed in late 2006.

The presence of technology is necessary but not sufficient for improved information on water utility performance. When designing rules for the sector, the government needs not only to consider the role of the utilities, the main entities responsible for collecting data, but also the role played by each stakeholder regarding the request of data. For instance, the reporting of data to the regulator from the utilities needs to be stated by law and not taken as an informal relationship between the parties. In the same way it is important to establish formal communication channels among all the sector stakeholders, such as environmental or municipal development agencies, in a way that data collection programs and possible data repositories are well identified and efforts are not duplicated.

Costa Rica, Guatemala, and Honduras are represented in this analysis by two service providers of different sizes, which are referred to as the small and large providers for each of these countries. The rest of countries are represented by only one operator.

3. Sector performance indicators

The simplest types of performance indicators are unit-dimensional such as labor productivity, service coverage, and non-revenue water. These indicators focus on a specific area of performance within the production process. Considering the most commonly used performance indicators in this sector, they have been classified in this study as operational, financial and quality indicators. Since several of these indicators were benchmarked against those calculated by the

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[4] Asociación de Entes Reguladores de Agua Potable y Saneamiento de las Americas.

[5] For a description and brief on the characteristics of the countries comprising the ADERASA association, refer to Corton and Molinari (2008).

[6] Central America countries included in this study are Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama.

[7] See http://www.rashon.org.hn/noticias_sept.html, accessed 17.09.08.