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Governance and efficiency in the Brazilian water utilities: A dynamic analysis in the process of universal access

Alexandro Barbosa [a, *], Severino Cesário de Lima [a], Isabel Brusca [b]

[a] Department of Accounting Sciences, Federal University of Rio Grande do Norte (UFRN), Edifício do Centro de Ciências Sociais Aplicadas, Campus Universitário, Lagoa Nova, 59072-970, Natal, RN, Brazil
[b] Department of Accounting and Finance, University of Zaragoza (UNIZAR), Facultad de Economía y Empresa, Apdo.2025, 50005, Zaragoza, Spain

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1. Introduction

Ensuring universal access to water supply and sanitation services represents one of the Millennium Challenge goals established by the United Nations (UN, 2005). Thus, several countries have established strategies to accomplish this goal. More recently, in Brazil, many strategies have been included in governmental programs, for example, the program of growth acceleration, which focusses on investments in the infrastructure of the country, including water services (Rodrigues and Salvador, 2011).

Initiatives such as the Millennium Challenge are accompanied by governance concepts to better assess the target's levels of performance (UN, 2005). Explanations of associations between some type of efficiency and governance aspects, both in the macro meaning (level of country/continent) and in the restricted meaning (institutional/sector), have directed several studies in the last decades. The seminal study in this field was Mann and Mikesell (1976), which investigated the influences of governance structure (owner and regulation) on the cost efficiency of water utilities in the United States. The most important findings of Mann and Mikesell's study, which should be highlighted, are the following: (i) Private Utilities tend to have higher operating costs. (ii) Capital investments may cause diseconomies of scale in some systems operated by state-owned enterprises. Finally, (iii) water public service utilities supervised by local regulation have higher unit operating costs than do utilities regulated by regional regulators.

Most recently, Barbosa and Brusca (2015) for Brazil and Ruester and Zschille (2010) for Germany analyse the association of governance structure on price performance. The first study concluded that Brazil tariff levels are higher when the management of the corporation is private, and unregulated water corporations with private management apply the highest tariffs. The second study concluded that private sector participation is accompanied by higher retail prices in Germany.

The debate about the relationship between performance and aspects of governance structure has received so much attention that it became one of the main scientific issues in the water sector. Studies have attempted to examine the influence of ownership and regulation on the performance of water utilities to the point of identifying several controversies in main empirical findings.

In theory, regulatory activity is based on a set of regulations that balance the interests of business owners and society, in other words, service providers and their users. In this case, regulatory monitoring and the protection of shareholder rights are assigned to regulatory bodies, which may vary from a single, simple level, as is true for associations and municipal councils, to structured regulatory agencies that can operate at the local, municipal, state, provincial, or federal level according to the political structure of each country. Therefore, regulation should provide an environment based on full contracts in which the performance of utilities, both publicly and privately owned, could achieve similar efficiencies.

However, the regulation of public services in a way that restricts private benefits weakens property rights and demonstrates the double role of the regulatory agency, which acts as both the principal and agent in the regulatory process and can serve as a political platform. This process is therefore related to property rights, agency and public choice theory. These relationships demonstrate that the economic results generated by the incentives suggested by each of these three theories, together or separately, just as the results related to the different properties, lie at the centre of discussions concerning the associations of regulation on the performance of water utilities.

In Brazil, water utilities have been under the supervision of regulatory agencies since 1997. Since 2007, water utilities have been regulated under Act 11.445/2007, which was later regulated

* Corresponding author.
E-mail address: alex@ufrnet.br (A. Barbosa).

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by Decree 7.217/2010. Among the Act's main principles are universal access; the use of methods, techniques and procedures that consider local and regional particularities; and economic efficiency and sustainability. In 2013, the national average of coverage of water supply services reached 80.3%, and the coverage of sewage services reached a mean of 35.7%.[1] These figures imply that almost 20% of the population is without access to water and almost 64% of the population is without access to sewage services, representing an important deficit of coverage that must be managed better.

However, to the best of our knowledge, no analytic-empirical studies have been conducted that discuss the activities of governance structure in Brazil with a focus on sector dynamic efficiency. In dynamic efficiency models time plays a direct role and decisions/production are connected over time (Färe and Grosskopf, 1996). Thus, these models allow the measurement of intertemporal efficiency considering the effect of carry-over activities between two consecutive terms and, as great advantage, it has an optimization mechanism that works over time, ideal for planning and investment in the long run (Tone and Tsutsui, 2010). Therefore, the aim of this study is first to develop a score for the dynamic efficiency of Water and Sewerage Companies (WaSCs) in Brazil, considering the universal access deficit to services as a bad carry-over, and explain their efficiency through the governance structure (ownership and regulation).

The paper is organized as follows. Section 2 describes the framework of the water utilities governance structure in Brazil. Section 3 analyses the previous empirical literature on factors that influence efficiency in the sector. Section 4 presents the methodological fundaments. Section 5 contains the results and discussions, and the last section draws conclusions and suggests future lines of study.

2. Framework and governance in Brazilian water utilities

The Brazilian water sector is decentralized into municipal jurisdictions in which municipalities are the holders; overall, the system comprises 1,385 utilities. When the municipality itself does not provide the services, they are delegated to public or private utilities. The current model of the Brazilian water sector is a legacy of the National Sanitation Basic Plan – PLANASA (1970–1992) – which has encouraged the creation of regional water utilities and 27 regional corporations of basic sanitation (CESBs), generally public corporations in the form of a business corporation (mixed capital companies) controlled by the state.

In the last few years, the dynamics of investment from the federal government in the countrywide infrastructure of the sector has evolved considerably in line with law 11.445/2007. This law established a number of principles stated in section 1 that consider local and regional peculiarities. However, there are important differences in costs and access to services of quality in different municipalities. Thus, progress in investment policies is needed to cover the services satisfactorily, particularly sewage services. The municipal sewage plans of each municipality contain the investment policies, and the specific aspects for the implementation of these policies are defined in the concession contracts or programs.

According to Berg (2010), ownership and regulatory mechanisms are explanatory variables of the structure of governance that are used in water utility benchmark studies. Concerning ownership, in 2012, 10.6% of the water supply, 11.7% of the sewage services, and 10.6% of the investment in the sector were assigned by private participation (66 utilities).[2]

Economic and technical regulations are the pillars of the water service regulatory process. According to Marques (2010), the regulatory regime most frequently employed by regulatory agencies in Brazil is rate of return. Obviously, in a situation in which the utilities are not regulated by a single agency at the national level, it is possible that utilities in the same country will face separate forms of economic regulation. Brazil's utilities face this situation, in which regulators employ at least three regulatory regimes: price-cap, rate of return and revenue-cap.

Finally, it is important to reiterate that each method of economic regulation must provide inherent rewards for satisfactory performance on the part of a utility for meeting pre-determined levels of efficiency, productivity and service quality. These rewards for the water sector, according to classical economic theory, are the result of the incentives suggested by combinations of property rights, public interest, agency and public choice theories.

In Brazil, according to the Brazilian Association of Regulatory Agencies (ABAR), there are 50 regulatory agencies in the water sector that regulate 48.8% of all concessions of the country, of which 22 are instituted by municipal governments, one instituted by a district government, 24 are instituted by state governments and three are from municipal government consortiums (micro-regional). Concerning the functions of these regulating agencies, two of the local agencies and 15 of the state agencies are multi-sectoral, primarily regulating electricity services, gas, transportation, water and sewage. The remaining regulatory bodies are specialized, focussing on the regulation of water supply and sewage, defined broadly to include the collection of solid waste according to the concept of Brazilian 'basic sanitation'. Of the total, 27 regulatory agencies regulate water and sewage business corporations studied in this paper, of which seven are municipal/district and 21 are regional/micro-regional bodies regulating 26 utilities.

3. Previous literature

One issue related to governance structure that is widely discussed in the Brazilian empirical literature is the question of ownership and its influence on the efficiency of the water supply and sewage sector. Comparing the results of different studies on this subject, the issue appears quite controversial. Four studies have concluded that there is better efficiency in private ownership utilities. Two studies, have found no significant differences between the performance achieved by the two types of ownership (public and private ownership). One study obtained evidence showing that the performance of public utilities is superior to the performance of private utilities. Two studies are inconclusive because they present opposite results about the association between ownership and efficiency when using different methods of analysis. Table 1 shows summary of these studies.

Another issue related to governance structure widely discussed in the international empirical literature but little discussed in the Brazilian context is the influences of regulation on efficiency. Empirical studies show that in England and Wales regulation improves the efficiency of utilities. In Mexico, Portugal, United States, Brazil and some African and Latin American countries cannot be declared that the existence of a regulatory agencies is associated with better efficiency in the sector. Concerning the regulatory regime, it is observed that the rate of return is associated with better efficiency, except in England and Wales, which use the price-cap as a single regulatory regime. Table 2 shows summary of these studies.

Finally, Abbott and Cohen (2009) suggested aspects of regulation that could improve the understanding of the relationships among regulation, efficiency, and productivity. The authors argue,

[1] Sistema Nacional de Informações sobre Saneamento (2013).

[2] For more details, see Barbosa and Brusca (2015).

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