



Tariff regulation in the waste sector: An unavoidable future

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ABSTRACT

Waste management and other services of general economic interest are normally out of market. Therefore, regulation may be required to provide sustainable services with the desired quality of service at affordable and fair prices. Some countries have created regulatory authorities to supervise service levels and tariffs. However, the implementation of such entities is still a novelty being relevant to open the discussion about the explicit regulation of the waste sector. This study addresses the waste sector in Portugal and the regulator's role in setting prices and providing proper incentives to ensure efficiency and added value. In this context, regulation was proposed to implement a tariff setting mechanism based on a productivity-related X factor linked to revenue caps. This innovative application (in the waste sector) calculates the X factor through a catch-up factor (static efficiency determined by Data Envelopment Analysis) and a production technology change or frontier shift (dynamic efficiency calculated by a Törnqvist index). Besides targeting the financial sustainability of waste utilities, there is also a focus to achieve reasonable environmental and quality of service standards. This study argues that economic regulation is required for this sector since it can be prone to the quiet life and inefficiency due to market failures and lack of incentives. Thus, a tariff setting system may be important and, perhaps, unavoidable to prevent these misbehaviors. The results highlight several predicaments and opportunities related to the application of this innovative performance-based approach.

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1. Introduction

Waste services are considered of general economic interest since they are essential to human comfort, public health and environmental quality, and are key elements for an economy's competitiveness and society's overall well-being (Hoorweg and Bhada-Tata, 2012). However, the presence of 'market failures' is a structural feature of this sector (Marques and Simões, 2008) as they frequently work under structural or legal monopolies. Regulation can play an important corrective role in this scope, including the promotion of the 'waste hierarchy' (Van Ewijk and Stegemann, 2016), which suggests that the order of priority for tackling waste should be waste reduction, reuse, recycling, recovery of energy from waste, and disposal. Commonly, since these services are directly provided by public entities or private companies under a contract arrangement, 'self-regulation' may traditionally be seen as sufficient (Barkenbus, 1983). However, some countries (such as Portugal, Italy, Romania, and Brazil) have created regulatory authorities to promote efficiency, innovation, sustainability

and managing the (economic) balance between negative externalities (from, for instance, final disposal) or positive externalities (from, for instance, reuse), in the waste sector. In addition to technical and quality of service regulation, economic regulation is also pivotal (Simões and Marques, 2012); for example, they can implement the principle of economic and financial sustainability and ensure the suitability of tariff structures at the national, regional or local levels.

Hence, some aspects must be set. These include the main principles (e.g., the waste produced, on-the-property characteristics), the methodology to assure cost recovery, the typology of users/customers, the number and range of blocks (if blocks are considered), the rules for social and other special tariffs, the billing aspects (such as the invoice contents and period), and the identification of auxiliary services, to name a few (Pinto and Marques, 2016).

In the waste sector, tariff systems are a relevant and complex topic, especially in environments with low incentives to reduce waste. Hence, Pay-as-You-Throw (PAYT) systems are relevant to change users/citizens habits (Bozec, 2008; Chamizo-Gonzalez et al., 2016), while the financial sustainability of the utilities is assured. Although the utilities have the possibility to implement this kind of system, there are typically several constraints

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(political, cultural, and technical) that block the implementation (Ventosa, 2008), so the regulator can (and should) encourage its adoption.

Moreover, the regulator also ought to have a word on the regulated entities investments. This is a particular question, since it is controlled the trend to under or over investment adopting gold plate practices (which must be paid by users according to the Internal Rate of Return (IRR) set in the contract) and to avoid (possible) restoring of economic and financial balance. Therefore, these entities should submit yearly proposals for the physical and financial execution of investments.

The tariff setting of regulated entities should be carried out by considering the incentives promoted and the cost recovery assumptions (typically, a 'price cap' or 'revenue cap' approach). Hence, regulation must set efficiency targets to be reached by each regulated entity using performance-based principles (Guerriero, 2013), including benchmarking tools. For this purpose, a methodology based on a catch-up factor (static efficiency determined by Data Envelopment Analysis, DEA) and a production technology change or frontier shift (dynamic efficiency calculated by the Tornqvist index) that was applied in Portugal is discussed in this research. This approach identifies the benchmarks (best practices) among the regulated entities and was adopted to help provide the right incentives to Portuguese waste utilities.

Worldwide, it is common to adopt the 'cost plus' approach (or no approach at all) as a waste price setting mechanism. Nonetheless, due to an increase in economic and financial constraints and waste production, waste treatment requirements, new technological demands and social concerns, a paradigm shift is required for waste utilities towards an output-based and performance-oriented approach;¹ this paradigm shift is required and seems to be 'an unavoidable future'.

In this paper, we discuss and present the Portuguese regulatory model of waste services to set the tariff system, to which the authors greatly contributed. This is a relevant and innovative contribution for the literature since it is very important to open the discussion about the explicit regulation of the waste sector. The main predicaments and opportunities of such approach are also highlighted. Indeed, there is no reason for the waste services to be addressed differently from other utilities, such as energy, water or transportation.

After this brief introduction, this paper is organized as follows. Section 2 introduces the Portuguese waste sector, including the market structure and institutional and regulatory framework. Section 3 describes how the tariffs are established by the Portuguese regulator. Section 4 shows how the incentives are provided to waste utilities and discusses the results achieved. Finally, Section 5 presents the main conclusions.

2. Market structure and regulation

2.1. Overview

The Portuguese waste sector can be classified into three distinct markets (irrespective of their ownership and of possibly being provided by the same operator), including primary, secondary, and tertiary markets (Marques and Simões, 2009). In the Portuguese waste sector, the primary market is related to the 'retail' service, including collection and street cleaning; the secondary market is associated with the 'wholesale' services that comprise the urban waste disposal, including landfills or other treatment facilities, the waste transportation between the transfer stations (when they

exist), and their facilities. Finally, the tertiary market concerns recycling, reuse and other waste 'destinies', covering all streams (for example, packaging, batteries, tires, electric material).

The waste sector in Portugal has been considerably influenced by the European Union (EU) legislation with which all State Members must comply (for the case of waste hierarchy, see Gharfalkar et al., 2015). At the beginning of the 20th century, waste collection was the priority; later, in the 1990s and into the current century, it evolved into the eradication of dumping sites or uncontrolled landfills, the increase in valorization and recycling that steered European public policies in this sector. Since 2004, all municipal waste disposal is appropriately addressed, mostly through sanitary landfills. Waste is composted and organically valued, and the strict waste recycling targets are generally fulfilled (Cruz et al., 2014). Still, the EU is keenly working on amendments to the Waste Framework Directive to target the increasing challenges, namely through the circular economy package, to instigate recycling and resource savings in the waste sector.

2.2. Ownership

In Portugal, the private sector has a short history in public services, especially in waste services (Cruz et al., 2013). In fact, only after a local government reform in 1993 was private capital allowed in these services. After that, especially over the last decade, we have observed a proliferation of the private sector in the 'wholesale' market (long-term contracts) and refuse collection (short-term contracts). The long-term contracts employed in the 'wholesale' market can correspond to a contractual public-private partnership (PPP) arrangement usually by concession contracts or an institutionalized PPP, such as a mixed company where public and private partners share the ownership of the waste company (Marques and Berg, 2011). Table 1 shows the range of possible management arrangements for the Portuguese waste sector (ERSAR, 2016), highlighting when private participation is allowed. The different models can be associated with direct management, delegated management contracts or concession contracts to both State and municipal ownership in a regional and local scale and with public, private or mixed ownership.

2.3. Organization

2.3.1. 'Wholesale' market

In mainland Portugal, the 'wholesale' sector is comprised of 23 operators, of which 12 are concession arrangements. Table 2 summarizes the waste market structure of the 'wholesale' market in Portugal.

The multimunicipal concessionaires in the past corresponded to a PPP between the (i) Central State (with the majority of shares – EGF company), and (ii) the municipalities associated with the waste disposal systems. They are now majority privately-owned, as the shares of the Central State (EGF company) were sold to a private company (privatized). This privatization was very controversial and against the will of most municipalities (the partners and the main customers of these companies). Moreover, the aforementioned private company (winner of the public tender) is the major player in the Portuguese 'retail segment', which could jeopardize the competition rules (due to market power which can just "simulate" competition for the market with direct implications in the tariffs). Still, the competitive authority has considered these acquisitions valid.

2.3.2. 'Retail' market

Concerning the 'retail' market, regardless of the increasing trend of private sector participation, the services of refuse collection and urban cleaning are still being commonly provided by

¹ See Fudala-Ksiazek et al. (2016) for a modern solid waste management strategy that considers additional outputs through the generation of new by-products.

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