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Institutional Development in the Urban Waste Market in Portugal. Market Structure, Regulation and Performance Analysis

Rui Cunha Marques and Pedro Simões

*Center of Urban and Regional Systems, IST, Technical University of Lisbon
Portugal*

1. Introduction

Many waste utilities managers and some think-tankers have considered the waste market as one of the best macroeconomic indicators of a country (US.EPA, 1999). They defend that the production of waste is deeply linked to the financial health of the citizens (O'Neil & Locke, 2004) and, therefore, to the financial health at a national level. Figure 1 shows the growth of urban waste in line with the Gross Domestic Product (GDP) and the population (OECD, 2002). The upward trend of waste production occurred at a rate slightly lower than GDP, but well above population growth.

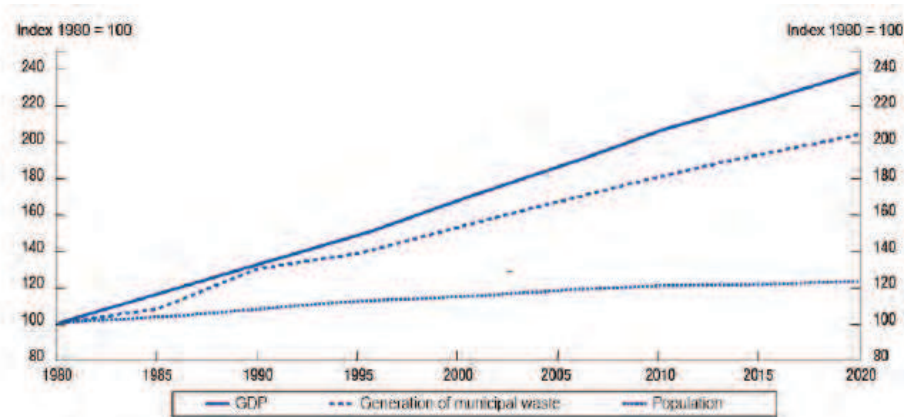


Fig. 1. Production of urban waste, GDP and population growth in OECD countries for the period 1980-2020

The increasing waste production brought several problems to Portugal as in the early 1990s, the country was not endowed with suitable facilities for waste treatment. The Portuguese Government at the time developed the first national strategic plan dedicated to urban waste treatment (acknowledged by PERSU I for the period 1997-2006), in order to fill this gap (Faria et al., 1996). PERSU I among other issues defined the Portuguese market structure for the final disposal of urban waste allowing for two types of utilities which cover the whole country, respectively the regional public companies and the regional municipal companies/systems. While the former comprises partnerships between the State and the

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municipalities (public-public partnerships), the latter can establish partnerships with the private sector (of contractual type or institutionalized) or be managed by the association municipalities alone.

Notwithstanding the improvements achieved by PERSU I, other (stricter) needs came up together with society development. So, in 2006 the PERSU II was approved for the period between 2007 and 2016. It continues the policy of waste management taking into account the new (more ambitious) requirements formulated at national and Community level. In particular, it focuses on ensuring the compliance with the European Union (EU) objectives of deviating biodegradable waste from landfill and recycling and recovering packaging waste.

Only these points would represent more than enough reasons to study, analyze and understand this market. However, the waste sector is framed by many characteristics that increase the importance of doing research on it (Abduli & Nasrabadi, 2007). The provision of the urban waste service, as a public service, inherently associated with reduced incentives to be efficient and innovative; the continuous growth and development of societies in general, together with more and more waste produced that require the ultimate technological means; more robust management models (IRAR, 2008); and the relevance that this sector has gained in the municipalities budget are some of the features that justify this research.

In Portugal, the major responsibilities within this sector are assigned to the public sector, where the local administration has the ultimate responsibility for waste service (collection and treatment). Globally, the urban waste sector in Portugal is clearly divided into "primary", "secondary" and "tertiary" markets, encompassing, respectively, collection, treatment and recycling of urban waste (Massarutto, 2006).

The aspects previously referred to, along with the proliferation of private management in the urban waste sector and the growing concern with the protection of users' interest, led the Portuguese Government to create a regulator dedicated to this sector, the Institute for the Regulation of Water and Waste (IRAR). IRAR represented an innovative step in Europe, since only few countries have a regulator for the urban waste sector in a worldwide context. Besides the responsibility for the economic regulation of some segments of the waste sector, IRAR supervises the quality of service. It determines a set of 20 performance indicators for each operator and compares and displays publicly the results (sunshine regulation). Thus, the operators become "embarrassed" with a poor performance and try to correct the deviations. This approach has led to good outcomes by fostering the improvement of performance in the whole sector (Marques & Simões, 2008).

This article intends to present and analyse the urban waste sector in Portugal. In particular, we focus on the regulation of the Portuguese urban waste services and its results which is the most noteworthy feature of the Portuguese context. After this brief introduction, the current paper analyses the legal framework of the urban waste sector in Portugal. Next, section 3 discusses the major institutional framework of the Portuguese urban waste sector concerning the most relevant authorities and, in special, the sector-specific regulation. Section 4 shows the market structure of the urban waste services in Portugal, encompassing different aspects such as the ownership, the players, the integration of the sector, and the major figures that characterize the waste sector. The rules of the game, concerning the tariff setting, quality of service and public service obligations, are presented in section 5. Finally, some conclusions and ideas for future research are highlighted in last section.

2. Legal framework

The waste sector, in general, and the urban waste sector, in particular, has observed significant and positive changes in Portugal. The access and the quality of service provided improved significantly in few years. Not everything resulted in improvements for the sector, although we must highlight that the reforms introduced in the sector, mainly the ones after 1993, allowed for this recognised (even internationally) progress (Marinho et al., 2006).

These deep reforms started with the introduction of private capital participation in the provision of these services and with the vertical separation of the waste sector into the wholesale and retail services. However, the municipalities or the association of municipalities remained the ultimate responsible for the waste service (Decree-Law No. 239/97).

In Portugal, the urban waste sector is regulated by various legislative documents, which can be divided according to their scope, respectively into management and sector-specific legislation. The characterization of the management legal framework can start with Decree-Law No. 372/93. In this diploma, the legal regime of management of regional and municipal systems was established and the private capital participation was authorised in this sector (allowing for the participation of private companies and other similar entities, by means of concession contracts arrangements). This law also made a distinction between regional systems and single municipality systems. The first only encompassed, a priori, the waste treatment whereas the second comprised the collection. Recycling could be allocated to both systems.

The vertical separation of the sector was defined in detail by means of Decree-Law No. 379/93. Under this diploma, if the municipalities voluntarily accept it, the State directly operates and manages regional systems, or attributes these functions by means of concessions arrangements to public corporate entities or to companies resulting from the association of public and private entities, where the public sector must compulsorily hold the major stake, being the State responsible for the major investments.¹ Notice, however, that municipalities can gather themselves to manage the regional systems or to choose a private partner.

Decree-Law No. 294/94 established the legal regime of concession and management of regional systems for waste treatment. This diploma focused on the (juridical regime) concessions of waste regional systems introducing some important points (for example harmonizing the concession period, defining criteria for the tariff setting, etc).

An important legal landmark was the creation of an Observatory for the waste sector, through Decree-Law No. 147/95 which would be replaced by IRAR with the publication of Decree-Law No. 230/97. Decree-Law No. 362/98 established the statutes of IRAR, later expanded by Decree-Law No. 151/2002.

It is equally important to point out the regulation of the local corporate sector (SEL), and the possibility of implementing municipal companies, which occurred by means of Law No. 58/98 later replaced by Law No. 53-F/2006. The latter normative document states that SEL entities engaged in activities within the regulated sectors are subject to the authority of the

¹ This normative document was later on amended by Decree-Law No. 103/2003, which clarified the public interest assignments of the regional systems.

respective regulatory agency and that it is essential to hold public tenders to choose private partners when they exist.

Regarding the protection of users of essential public services, which includes the waste services, the Decree-Law No. 12/2008 had a great relevance. In terms of public service obligations, this diploma is a significant milestone for user protection. It aims to assure a minimum requirement set of principles, deemed to be indispensable for the quality of life in modern society.

Specifically for the waste sector, the legal framework starts with the publication of Decree-Law No. 239/97, where the rules that should be subject to waste management were established. Few years later, this diploma was altered by the Decree-Law No. 178/2006, which set the waste management regime, transposing into national law the EU Directives. In addition, after observing the operators' difficulties in disposing the material collected, the Portuguese government enacted this diploma that introduced the Organized Market for Waste (MOR), which is an economic tool, voluntary in nature, to facilitate and promote trade in the various waste streams, boosting their reuse or recovery by reintroducing in the economic cycle. It is intended that MOR centralizes in one place or system of the trading transactions of various waste streams, ensuring their rational allocation, reducing transaction costs and decreasing demand for primary raw materials.

Regarding the disposal waste treatment, Decree-Law No. 152/2002 established the legal regime that is subject to the issuing procedure for license, installation, operation, closure and post-closure maintenance of landfills for waste disposal. Order No. 209/2004 approved the European Waste List, which ensures the harmonization of existing legal requirements for the identification and classification of waste, thus making the economic agents aware of the legal system to which they are subject. Moreover, Decree-Law No. 1023/2006 defined the elements that must accompany the permit application of storage, sorting, treatment and disposal of waste.

From the need of establishing an emergency plan for urban waste in order to recover the delay in meeting the European targets for recycling and recovery of waste, both consistent with PERSU and European strategy, the Intervention Plan for Urban Solid Waste and Similar (PIRSUE) was approved. It is a tool of characterization and resolution of problems and mechanisms to guide the urban waste management. Later, the regulation on the integrated system for waste electronic registration was also approved.

More recently, Order No. 187/2007 came to approve the PERSU II - Strategic Plan for Solid Waste 2007-2016, which, as referred, represents the ongoing diploma focused on the urban waste management, in particular, the recycling targets, in accordance with European Directives.

Finally, the Decree-Law No. 127/2008 implement and ensure compliance within the obligations of the legal systems, regarding the creation of the European register of Pollutant Emissions and Transfer, and Hazardous Waste, and the prevention and control of pollution, in accordance with the European Directives.

3. Institutional framework

3.1 Responsibilities

The waste sector encompasses diverse kinds of entities that, in some way, have responsibility in the waste sector. In administrative terms, it is important to highlight the role of the regulatory agency (IRAR) and of other bodies of the Public Administration,

namely, the Ministry for the Environment, Territorial Planning and Regional Development (MAOTDR), the Portuguese Environmental Agency (APA), the Directorate-General for Consumer Affairs (DGC), the Competition Authority (AC), and the municipalities. Apart from being involved in waste service provision, the public company *Empresa Geral de Fomento* (EGF), a sub-holding of *Águas de Portugal*, plays a very relevant and structural role in the environment domain. Finally, there is the *Sociedade Ponto Verde* (SPV) which performs activity in the tertiary market.

IRAR is the sector-specific regulator for the urban waste services (and water sector as well). Within the scope of its main functions, IRAR supervises and regulates the waste utilities in charge of the urban waste collection and treatment corresponding to concession arrangements. Its objectives include safeguarding the quality of service provided and supervising and ensuring the equilibrium and sustainability of the sector. IRAR suggests to the MAOTDR the tariffs that should be adopted by the regulated utilities. In fact, the MAOTDR represents the highest entity responsible for the diverse policies of the environmental sector, including the waste sector.

In Portugal, the environment agency (APA) gained more importance due to the merging between the Institute for the Environment and the Institute for Waste. APA, established in 2007, has the objective of creating conditions for a greater effectiveness in the management of environmental policies and sustainable development.

The DGC is a public institute created to promote the policy of user rights, as well as to coordinate and implement measures aimed at user protection, information and education and to support user organisations. In cooperation with IRAR, this body plays a significant role in protecting users from the eventual abuse of the waste services.

The AC, which was created in 2003, has transversal powers over the Portuguese economy to apply rules for competition, in cooperation with the sector-specific regulatory bodies. The AC's mission is to ensure that the rules of competition are implemented in Portugal, according to the principles of a market economy and free competition, with a view to ensuring that markets work efficiently. It seeks to achieve a high level of technical progress and secure greater benefits for users. The AC collaborates with IRAR in all matters related to competition in the waste market.

The municipalities are responsible for providing the waste services. In this context, they can manage themselves the urban waste services or delegate them to private entities by means of concession arrangements or to other entities, such as parishes and user associations. In the case of treatment services, municipalities and their associations might carry out themselves this task (or delegate it to a private company) or accept a partnership with the state to constitute a regional company (by means of a concession agreement) and in this way take advantage of the investment being mostly made by the State (EGF).

The EGF, which is a State owned company, is the main corporate group in the waste sector in Portugal. Its mission is to contribute towards resolving national problems in the waste service domain (treatment and collection), within a framework of economic, financial, technical, social and environmental sustainability. Presently, it encompasses 13 wholesale waste companies in the scope of its activities.

SPV is a private, non-profit making organization that was set up in November 1996 associated with the Green Dot program, to promote the selective collection, sorting, take-back and recycling of packaging waste.

3.2 Regulation

In Portugal, there is a sector-specific regulator (IRAR) which has responsibility for waste systems (and municipal and regional water and wastewater systems) that have been delegated as concession arrangements. Among its main objectives are the protection of user rights, the guarantee of sustainability and of economic viability of the waste operators.

IRAR is an authority governed by public law, endowed by administrative and financial autonomy, with legal personality and with its own patrimony but subject to the MAOTDR supervision. The board of directors is also politically appointed (for small mandates of 3 years). However, it is financially independent since it is entirely funded by the regulated concessionaires by means of a (regulatory) tax.

At the beginning, the objective was to consolidate the regulatory model, since it started in 2003 (Baptista et al., 2003). This model is now fully operational and its strategy is based on two broad planes of intervention: one at the level of the structural regulation of the waste sector, being concerned with the restrictions to the entry of operators and with the level of service integration (Marques & Simões, 2008) and the second at the level of regulating the behaviour of operators, known as conduct regulation.

In the conduct regulation scope, IRAR's strategy includes regulating the actions of the operators concerning economic aspects and the quality of service provided. Economic regulation is the most important way of regulating the behaviour that is allowed for operators, insofar as monopolistic prices tend to be higher than the prices practised in competitive markets. In this regard, the regulatory model is somewhat limited. As far as the regional systems are concerned, IRAR issues recommendations on the tariffs proposed by the concessionaire every year but they are always subject to the approval of the MAOTDR. Concerning the municipal concessions (basically on water sector), IRAR only issues opinions in the public tender documents and on the design draft of the contracts. It does not intervene in the process of setting tariffs, which is a decisive element while choosing concessionaires, except in situations of economic and financial rebalancing. The tariffs are regulated by the terms of the contract signed.

In terms of quality of service regulation, IRAR opted for discussing and publicising the results of the operators' performances. This model is known as sunshine regulation. The objective of this regulatory approach is to "embarrass" the operators that perform poorly, so that they will more likely correct their weaknesses (name and shame policy). Although this method does not set tariffs and its coercive power is limited, the display and public discussion of the behaviour of the regulated operators has very positive effects, inducing competition among operators and leading to progressive performance improvements in the whole market (Marques, 2005).

This model lies in the publication of an annual report with performance scores, obtained on the basis of a set of performance indicators applied to the operators. The preparation of this document, which is based on benchmarking, includes a joint assessment of performance, with comparisons between the operators, and an individual assessment of the performance of each operator in qualitative and quantitative terms (Marques, 2006). In addition to its attributions, IRAR also provides some recommendations/observations to the operators on the results obtained per each indicator. In this scope, the awareness that IRAR seeks to achieve, concerning the activities of the operators, is developed by means of pressure by users and citizens in general, through their protection groups, the media, the political classes (government/ political parties) and NGOs.

Recently, the Decree-Law No. 277/2009 replaces the IRAR by the Regulatory Authority for the Water and Waste Services (ERSAR). Besides the new name, which seeks to clarify that its action is specifically about the water and waste services and not generally on waste and on water as a resource, the new legislation reinforces the sector's regulation. This results in the extension of the activity of ERSAR to all water and waste utilities of these services (also the ones that do not correspond to the concession arrangements), as well as wider responsibilities and powers.

4. Market structure

4.1 Services ownership and management

The waste sector in Portugal has been historically associated with the public management. However, after the legal change (due to Decree-Law No. 379/93, allowing private participation), the sector started to observe a proliferation of the private sector (Pinela et al., 2003), mainly in the last decade, not only at a concession level, but also concerning the urban waste services provision, for example, the refuse collection and the urban cleaning (mainly through short-term contracts, between one and five years). Table 1 presents all possible management arrangements of the waste sector, although some of them not exist in the Portuguese reality (IRAR, 2008) yet.

Management models of State ownership		
	Utility	Partnership
Direct Management	State	No one
Delegated	Public company	No one
Concession	Regional public company	Public-Public ²
Management models of municipal ownership		
	Utility	Partnership
Direct Management	Municipality	No one
	Semi-autonomous utilities	No one
	Municipal associations	Public-Public (several municipalities)
Delegated	Municipal (or regional) companies	No one or Public-Private
	Local corporate entities	No one or Public-Private
	Parishes and users associations	Public-Public (several municipalities)
Concession	Municipal companies	Public-Private (municipalities and private companies)

Table 1. Management models in urban waste sector

² This kind of partnerships is established between State and municipalities, with the possibility of evolving to Public-Private Partnerships (State, municipalities and private companies).

4.2 Players in the sector

4.2.1 Wholesale segment

As stated, the waste sector in Portugal is structured in two segments, namely the wholesale³ and the retail segment. The wholesale companies have usually a regional scope. At this stage, there are 29 regional systems in Continental Portugal, which are split into regional public companies, and regional municipal utilities which in turn are divided into municipal associations (AM), municipal concessions (celebrated between AM and private companies) and regional companies (which include only the municipalities as partners).

Entity	Business Model	Control/Concessionaire
ALGAR	Concession	EGF, S.A.
AMARSUL	Concession	EGF, S.A.
BRAVAL	Concession	AGERE, EM, from Braga
ERSUC	Concession	EGF, S.A.
REBAT	Concession	EGF, S.A.
RESAT	Concession	EGF, S.A.
RESIDOURO	Concession	EGF, S.A.
RESIESTRELA	Concession	EGF, S.A.
RESIOESTE	Concession	EGF, S.A.
RESULIMA	Concession	EGF, S.A.
SULDOURO	Concession	EGF, S.A.
VALNOR	Concession	EGF, S.A.
VALORLIS	Concession	EGF, S.A.
VALORMINHO	Concession	EGF, S.A.
VALORSUL	Concession	EGF, S.A.
AMBILITAL	Regional municipal company	AMAGRA (AM)
AMBISOUSA	Regional municipal company	VALSOUSA (AM)
ECOBEIRÃO	Regional municipal company	AM Planalto Beirão
ECOLEZÍRIA	Regional municipal company	RESIURB (AM)
GESAMB	Regional municipal company	AMDE (AM)
RESIALENTEJO	Regional municipal company	AMALGA (AM)
TRATOLIXO	Regional municipal company	AMTRES (AM)
AMAVE	Association of Municipalities	
AMCAL	Association of Municipalities	
AMVDN	Association of Municipalities	
LIPOR	Association of Municipalities	
RESITEJO	Association of Municipalities	
ZAGOPE	Private Company	A. Gutierrez / AM Raia-Pinhal
FOCSA	Private Company	FCC / AMDSFE, AMTQT and AMTNFT via RDN

Table 2. Waste utilities operating in the Portuguese wholesale segment

³ Wholesale segment is related to the service of waste treatment, providing the last destination to the waste, whether it is disposal or other types (corresponding to the secondary and tertiary markets mentioned before).

Regional public companies include 15 concessions arrangements which had been set between the central government and the respective companies, except one, Braval, whose majority shareholder is the municipal company of the city of Braga (AGERE). The other ones are owned (at least 51%) and controlled by EGF. As to the AM's, there are currently 12 in charge of urban waste treatment, whereas only 5 of them operate on their own behalf. The remainders operate through regional municipal companies. The last management model is the municipal concession, which is a simple long-term contract celebrated by a group of municipalities (AM in this case) with a private company. There are only two cases of these in Portugal. Table 2 shows the Portuguese waste management in the wholesale segment.

Regarding the tertiary market (recycling and reselling), the major and oldest entity is SPV, which supports the selective collection and sorting and is also responsible for the take-back of waste likely to be recycled. Nowadays, there are also other operators responsible for other streams (Pássaro, 2003), such as Amb3E for electronic equipment, Valorpneu for used tires and Ecopilhas for used batteries.

4.2.2 Retail segment

The part of the system which deals directly with the user is called retail segment. Its main activity is the refuse collection but it can also encompass the selective collection. Other services of its scope are relative to particular activities of collection of large volumes or even with urban cleaning.

The retail service coincides usually with what is called the primary market, where the service directly provided by the municipality remains the most representative. These account for about 76% of the total served population. However, most of them contract-out their services awarding short-term contracts (1 to 5 years). Other part of the population is served by semi-autonomous utilities, which are endowed with financial and administrative autonomy and control 5% of the market. Municipal companies (covering 12% of the population) can be split into two types: the ones fully owned by the municipality (66%) and the ones with mixed capital (34%). In both types the municipality is the major shareholder and they are always corporate companies. There are also some particular cases where the wholesale utility is responsible for the waste collection. The market structure of Portuguese waste collection is presented in table 3.

Arrangement	Urban waste collection	
	Number	Population
Directly by municipalities	218	7 510 528 (76,2%)
Semi-autonomous utilities	5	490 674 (5,0%)
Municipal companies	15	1 199 321 (12,7%)
Regional utilities	6 (40 municipalities)	596 371 (6,1%)
TOTAL	244 (278 municipalities)	9 851 424

Table 3. Urban waste market structure in Continental Portugal for the retail segment

4.3 Integration of the sector and other services

In Continental Portugal, the waste services, with few exceptions, generally are not vertically integrated, i.e. the wholesale and retail systems are provided by different operators. In horizontal terms, the operators have a limited degree of integration and (even after excluding the parishes) there are 267 operators for almost 10 million inhabitants.

In the wholesale service the rule is to provide solely the waste service, but there are exceptions. Regarding the retail waste services, it is more common to see operators providing also other services, such as water and wastewater services and transportation.

4.4 Numbers of the sector

Whereas in the PERSU I, for 2005, the aim for landfill would be 25% of the urban waste produced, the result in 2007 was 63% (APA, 2008). At the same time, this value represents one of highest percentage of landfilling in EU-15 (Defra, 2007), as it is presented in figure 2. This was mainly related to the lack of equipment available and how it is distributed across the country. There are only two incinerators in Portugal, one in Lisbon and the other in Oporto. The same happens for organic recovery equipments which are also in reduced number at this stage.

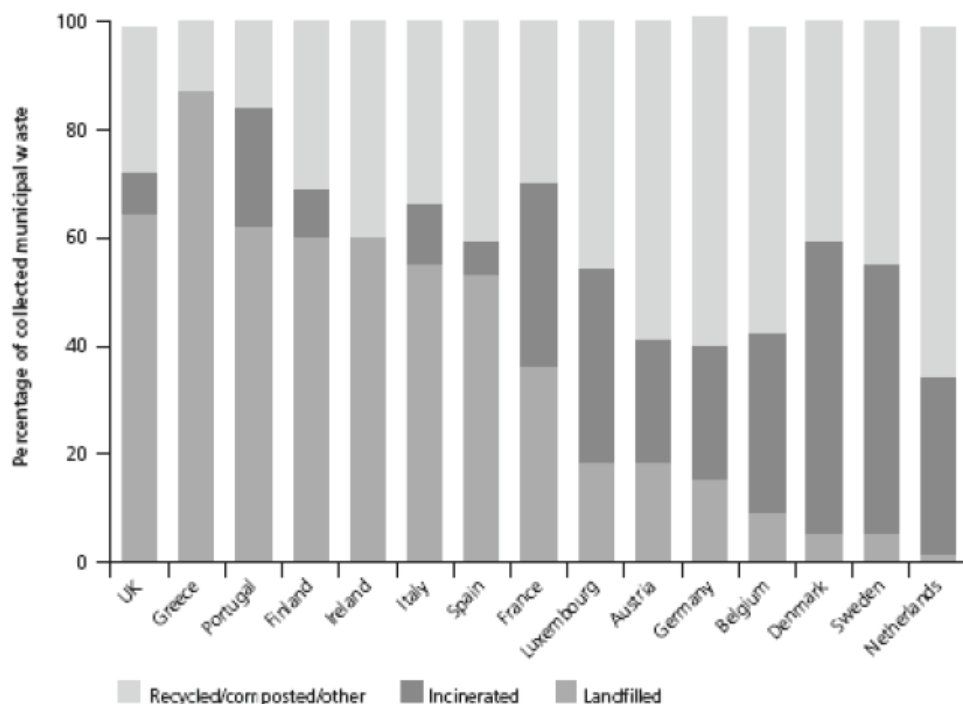


Fig. 2. Performance management of municipal waste in EU-15 (2005)

In 2006, in Portugal 4 641 103 tons of urban waste were collected. Of this, 89,5% corresponds to the refuse collection and only 10,5% fell within the collection of selective multi-material and biodegradable waste. In the following year there was an increase of about 4 698 774 tons of urban waste collected, which corresponds to 1,27 kg per inhabitant and day, a value below the EU average. Despite this, there was a decrease in selective multi-material collection of about 2%. Figures 3 and 4 present the evolution of waste production and selective collection in Portugal, respectively (APA, 2008).

Between 1995 and 2006, and compared both with the EU-15 and the current EU-27 Member States, the annual urban waste production per capita in Portugal has always remained below the European average production per capita.

Concerning the physical characterization of the urban waste, presented in figure 5, the biodegradable fraction corresponds to more than a quarter of the traditional waste composition, 36%. This figure highlights the need to give priority to organic recovery,

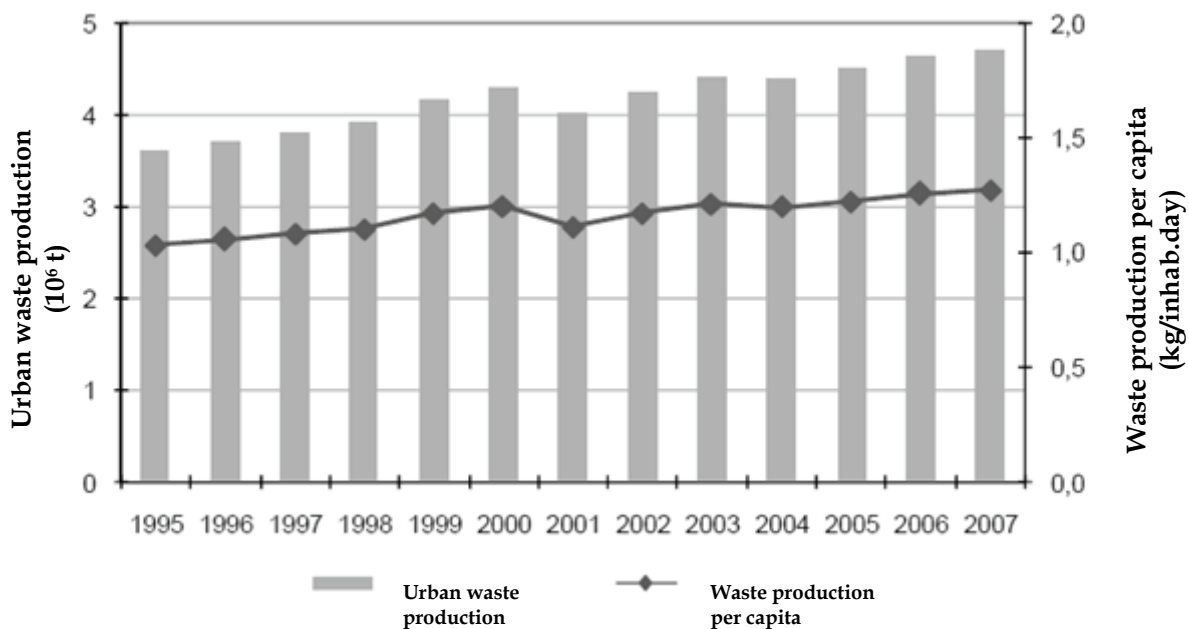


Fig. 3. Total and per capita waste production between 1995 and 2007

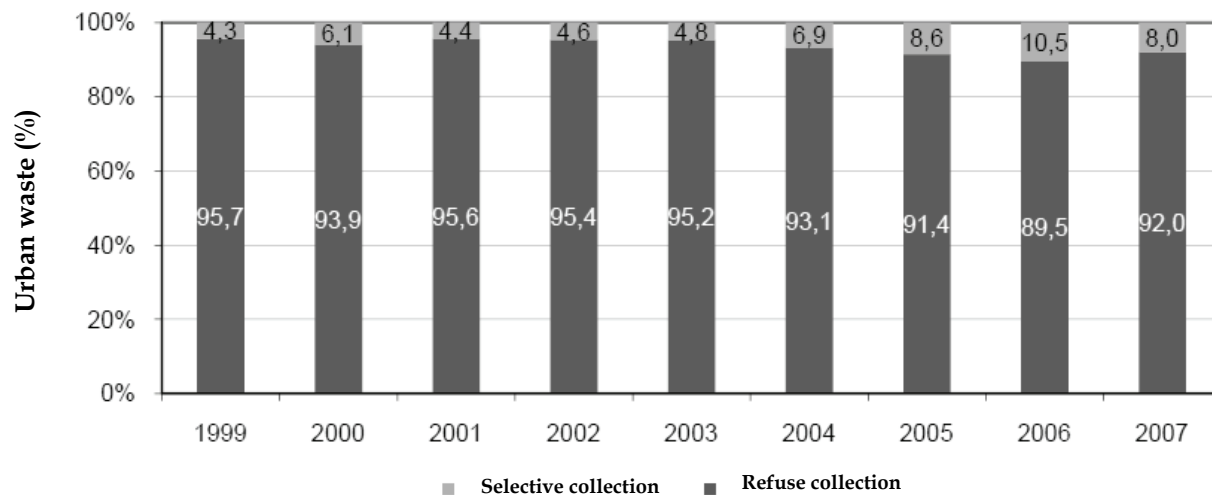


Fig. 4. Refuse and selective collection between 1995 and 2007

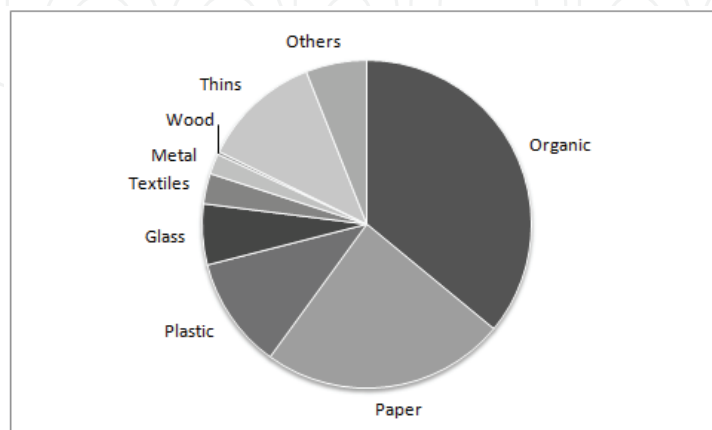


Fig. 5. Typical characterisation of the urban waste (in terms of percentage)

recycling, and incineration with energy recovery, against the current trend of landfill (INETI, 2009).

In terms of waste infrastructures, the Portuguese reality (until December 2007) is indicated in Table 4 (APA, 2008).

At this time, the national average of people per drop-off container was 322. In the region of Lisbon and Tagus Valley, this average was 364 inhabitants per drop-off container.

Figure 6 displays the main destinations of the urban waste in Portugal. The landfill is still the most frequent. With the implementation of PERSU I, the waste dumps were completed in 2001.

Infrastructures		Predicted	In construction	Working	Total
Landfill		2	2	34	38
Organic valorisation		11	2	8	21
Incineration		0	0	2	2
Transfer stations		0	2	76	78
	Sorting facilities	1	2	26	29
Selective collection	Drop-off centre	7	0	185	192
	Drop-off container	40	-	28 723	28 763

Table 4. Portuguese infrastructures for waste sector

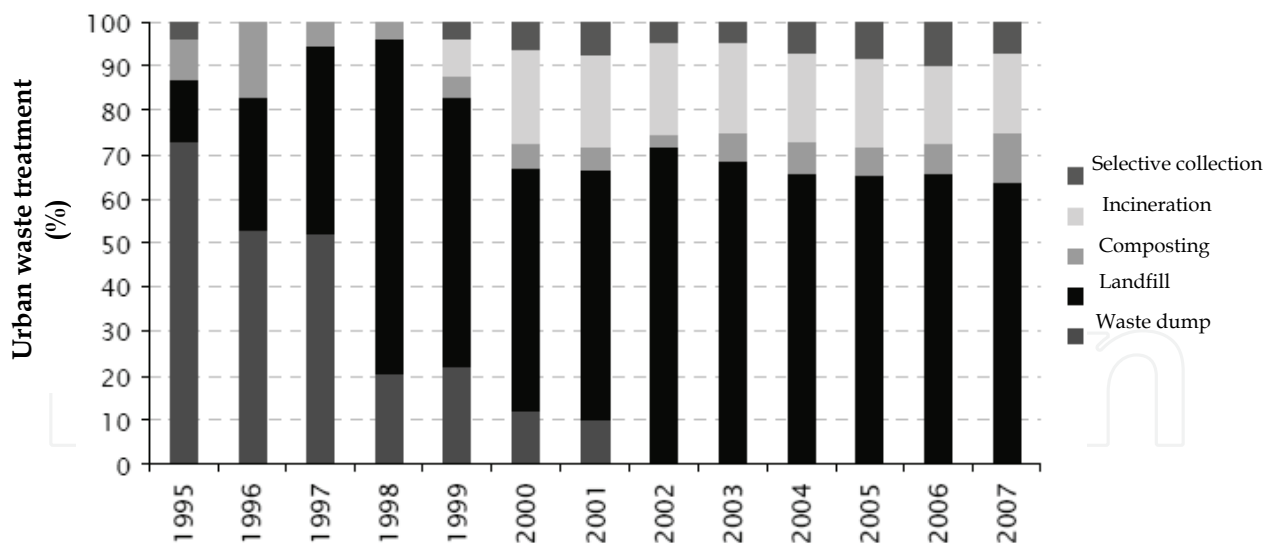


Fig. 6. Types of urban waste treatment in Portugal

APA (2008) identified a positive relation between GDP and waste production in Portugal. This relation provides evidence of producing waste with the wealth generated by translating a form of eco-efficiency at the national level. It reveals that the intensity of urban waste produced per unit of wealth in Portugal grows slightly in the period under review. In Portugal 35,88 kilograms of waste were produced per 1000 € of GDP in 2006 (APA, 2008).

Figure 7 also allow us to observe the relative amplitude (APA, 2008) between waste production and household expenses and compare their patterns over time. Nationally, between 1995 and 2007, both the urban waste production and the GDP increased (about 29% during 1995-2006), highlighting some connection between them.

5. Rules of the game

5.1 Tariff setting

In Portugal, the establishment of prices and tariffs is related to the model of waste management in question. IRAR does not have any kind of functions regarding municipal services (directly provided by municipality), semi-autonomous services and the different models of municipal companies. Thus, it is the responsibility of the local administration, in this case the Municipal Assembly, to approve the tariff systems proposed by the Municipal Executive or by the board of directors of the semi-autonomous services. Regarding the regional services, the assembly is responsible for approving tariffs. In the case of municipal (or regional) companies, it is possible to find different situations, according to the nature of the company in question. If it is an institutionalized PPP, then the General Assembly approves the tariffs, proposed by the Board of Directors. Concerning other municipal companies, the Town Hall or the Board of Directors approves tariffs.

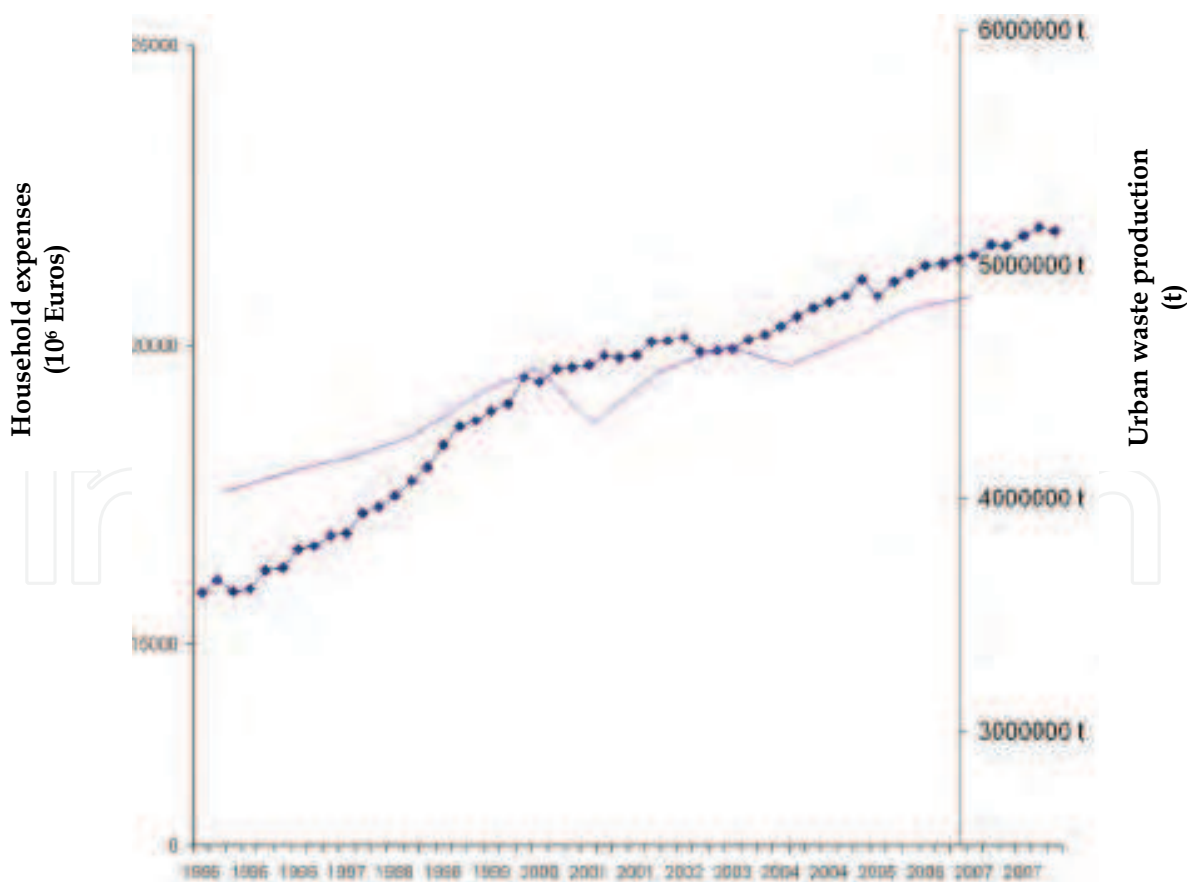


Fig. 7. Evolution of household expenses and the urban waste production

In municipal systems involving concession arrangements, tariffs are defined in the concession contract signed between the concession granting authority (Town Hall) and the concessionaire. The setting of tariffs is established in the winner bid (public tender), under the terms of the Decree-Law No. 147/95. IRAR cannot directly interfere in tariff setting, unless the economic and financial equilibrium of the concession is jeopardised by unpredictable reasons when the contract is signed. In such situation, IRAR can be invited to issue its opinion on the matter.

In regional systems, IRAR has other kind of powers, based on an investment programme that has been defined previously as well as on the annual account report of the companies and the respective budget. The formula for defining the tariff system proposed in the concession contracts of regional systems consists of a hybrid methodology, based on the rate of return regulation method established contractually and introducing a mechanism to share gains in productivity. Although it varies from contract to contract, the rate of return is fixed by the concession granting authority and consists of a base rate (Treasury Bonds or Euribor) plus a risk premium of 3%, applied to the capital stock achieved and the legal reserve.

Regarding the retail segment, it must be noted that each waste service has their own classification of users and their own tariff blocks (associated with the water service), which sometimes vary a great deal between operators (in some cases a free service). A study carried out by CESUR (2004), based on a survey to the municipalities, the waste charges vary with a) the supply (or not) of tap water, b) type of consumer (domestic, industrial, etc.), c) water consumption, d) percentage of water bill, e) type of collection system, f) frequency of collection, and g) municipality characteristics. In addition, it diverges in their implementation, that is, through a fixed part, a variable part, or both in the same tariff system. Beyond this disparity of tariff systems, the lack of sustainability of them is another concern of IRAR. Figure 8 presents this reform.

In this regard, IRAR, in 2009, issued a recommendation (since it is not entirely compulsory) intending to harmonise not only the structure of the tariff system but also its values, and to introduce some principles concerning the social tariffs. It is common to find social tariffs and special tariff systems for large families.

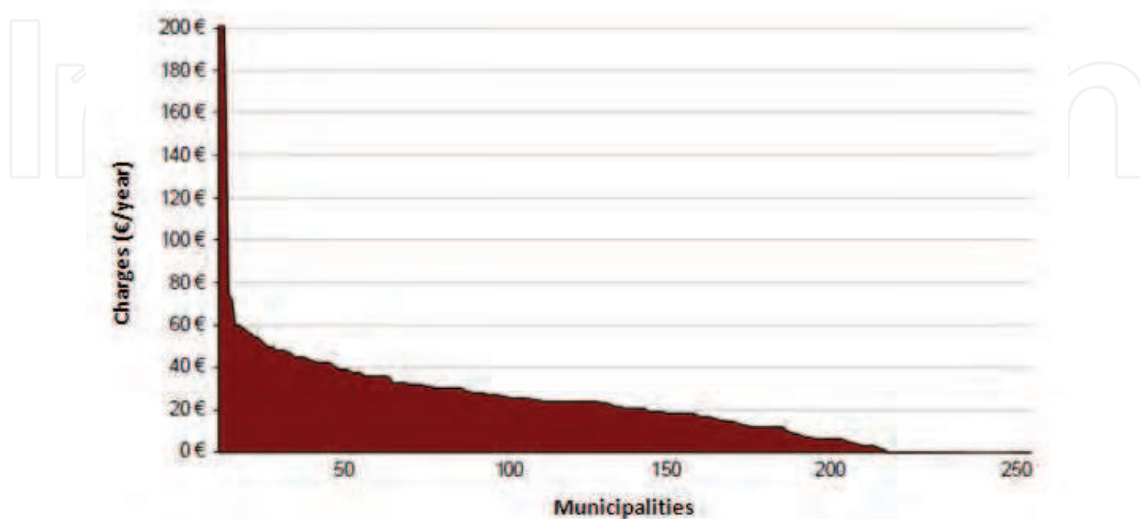


Fig. 8. Distribution of annual average tariff paid for refuse collection

5.2 Quality of service

The quality of service regulation became one of most important attributions of IRAR. In this scope, the quality of waste (and also water) service is regularly monitored. Actually a very high level of service has been observed since then. This positive evolution is a consequence of the role of the sector-specific regulator, which encourages the quality of service amongst the waste utilities regulated. This atypical situation, even in the worldwide context, has recognised the waste sector in Portugal as an example to follow by other countries (e. g. Italy and Brazil).

IRAR carries out an annual benchmarking exercise, in which it establishes, compares and publicises the performance of the regulated operators. For this purpose, the regulator has

PERFORMANCE INDICATORS	2004	2005	2006	2007
Protection of the user interests				
<i>User service accessibility</i>				
a) Service coverage (%)	100	100	100	100
b) Selective collection coverage (%)	67	77	79	80
c) Average waste charges (€/ton)	26.6	24.6	26.6	26.7
<i>Quality of service supplied to users</i>				
d) Answers to written complaints (%)	41	89	92	97
Sustainability of the operator				
<i>Operator's economical and financial sustainability</i>				
e) Operating cost coverage ratio (-)	1.5	1.58	1.65	1.6
f) Unit running costs (€/ton)	21.6	22.6	25.36	25.64
g) Solvency ratio (-)	0.19	0.51	0.55	0.59
<i>Operator's infrastructure sustainability</i>				
Recycling (%)	4.1	6.0	6.4	7.3
i) Organic recovery (%)	2.8	2.9	1.5	2.5
j) Incineration (%)	66.1	82	79	68
k) Waste landfill (%)	74.5	89.6	88	78
l) Landfill utilisation (%)	128	116	121	122
<i>Operator's operational sustainability</i>				
m) Failure in heavy duty equipment (nr./10 ³ ton/year)	0.17	0.16	0.14	0.15
n) Waste characterisation (-)	1.5	2.8	2.3	1.7
<i>Operator's human resource sustainability</i>				
o) Employees (nr./10 ³ ton/year)	0.35	0.46	0.49	0.52
Environmental sustainability				
p) Leachate tests performed (%)	90	80	96	96
q) Leachate quality upon treatment (%)	86	79	87	89
r) Utilisation efficiency of energy resources (kWh/ton)	-66.5	-90.4	-87.9	-73.9
s) Monitoring of groundwater quality (%)	84	97	90	84
t) Monitoring of air quality (%)	99.8	99.5	100	100

Table 5. Performance indicators for solid waste services used by IRAR and their results

defined a set of 20 performance indicators, focused on the wholesale segment of this service. These groups have also been divided into three categories, namely indicators aimed at protecting user interests, the sustainability of the operator and the environmental sustainability. Table 5 summarises the performance indicators defined by IRAR and shows the average results for the period 2004-2007 (four years). The results are generally very positive, although there are some indicators that have worsened. Nevertheless, this had to do with changes in the definitions of these indicators and a greater rigour in implementing them.

In addition, IRAR issues comments concerning the results of each indicator for every regulated operator. The performance obtained is compared with reference values (optimum values, or close to them, which IRAR deems to be reasonable and attainable by the waste utilities), considering the factors of the operational context in which each utility acts. From this assessment, IRAR classifies the performance of each operator in qualitative terms, taking into account the quality of service provided, whether it is poor, average or good, through a red, yellow or green ball per indicator, respectively, as it is presented in figure 9.

The annual regulatory process carried out by the IRAR results in the publication of an annual report (Portuguese Water and Waste Sector Report - RASARP) where the benchmarking results are presented and discussed. This document is a key element of the regulatory model adopted. Indeed, RASARP plays an important role in promoting a greater effectiveness and efficiency of the operators and provides reliable and easy to interpret information to users and other stakeholders about the waste services.

Together with the reformulation of its statutes and regulatory power (replaced by ERSAR), IRAR is developing a new and updated set of performance indicators in order to foster incentives to provide a service with better quality and attain other goals. For instance, in the Portuguese waste sector, the indicator coverage started not making much sense, since 100% was achieved by the waste utilities.

5.3 Public service obligations

Public service obligations are a fundamental tool for the protection of user interests. In Portugal they are considered in the "Waste Law" (Decree-Law No. 178/2006, which altered the Decree-Law No. 239/97) and the Essential Public Services Act (Decree-Law No. 12/2008), in which basic principles, such as, the universality or the continuity of the waste services are, respectively, guaranteed.

The MOR introduced some important principles, such as the equal access to market, costs, transparency and accuracy of the information provided and security for transactions, as well as the standards for the protection of the environment and public health. The creation of a MOR should encourage the participation of investors and of the waste producers themselves.

The Essential Public Services Act outlines various aspects to uphold the user interests: the right to participation (organisations representing users have the right to be consulted while defining regulations for the legal framework governing public services), the obligation to provide information when public services supply is suspended (except for unexpected situations or *force majeure* reasons, the service cannot be suspended without suitable warning) and the right to partial quittance (the payment of a public service cannot be

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2.3.6. R905 – Rácio de cobertura dos custos operacionais (1)

Indicador de desempenho

Este indicador destina-se a avaliar o nível de sustentabilidade da entidade gestora em termos económicos/financeiros, no que respeita à capacidade da empresa para gerar meios próprios de cobertura dos encargos que decorrem do desenvolvimento da sua actividade corrente.

É definido, de acordo com o Guia de Avaliação (1) (www.rappt.pt), como o rácio entre os proventos operacionais ajustados e os custos operacionais ajustados (conceito a aplicar a entidades gestoras de tratamento de águas e de saneamento).

O intervalo de referência deste indicador, numa optica de sustentabilidade do negócio, correspondente a um bom desempenho, tem que ser superior a 100. O desempenho é avaliado como mediano quando se situa entre 100 e 0,90 e como insatisfatório abaixo desse nível.

Análise comparativa das entidades gestoras em alta

No figura 295 apresenta-se a comparação dos desempenhos das entidades gestoras registadas pelo IRRAR, considerando-se também a intenção de referência considerada adequada.

Figura 295
R905 – Rácio de cobertura dos custos operacionais (1) (sector em alta)

Uma apreciação global, a média ponderada do rácio de cobertura dos custos operacionais destas entidades gestoras é de 1,66, o que corresponde a um bom desempenho global, indicando uma boa margem operacional. Contudo, se uma entidade registada apresenta desempenhos, com valores próximos e inferior ao respectivamente 2,00 e 1,00.

Diante da cobertura dos custos operacionais não foi determinado no sistema gerador pela RAR, por esta entidade não ter fornecido a informação necessária para a validação dos verbais consultantes do indicador.

Evolution do indicador para o sector em alta

No figura 297 apresenta-se a evolução da média ponderada deste indicador, bem como a intenção das respectivas variáveis a do número de entidades gestoras em alta avaliadas, anualmente no período de 2004 a 2007.

A evolução da média deste indicador é favorável, apesar de se ter verificado uma ligeira diminuição em 2007 decorrente do aumento dos custos operacionais.

Figura 297
Evolução do indicador R905 – Rácio de cobertura dos custos operacionais (1) (sector em alta)

Ano	2004	2005	2006	2007
Média	1,46	1,38	1,55	1,66
Entidades	11	10	10	10
Intenção	100	100	100	100

Validabilidade e exactidão dos verbais para o sector em alta

De acordo com a informação fornecida pelas entidades gestoras, as variáveis que participam no cálculo do indicador R905 (R905 – Rácio de cobertura dos custos operacionais) e R904 – Custos operacionais ajustados.

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Indicador apresentam níveis de fiabilidade e de exactidão conforme a figura 298.

Figura 298
Fiabilidade e exactidão das variáveis R905 e R904 (sector em alta)

Evolution do indicador para o sector em baixo

No âmbito do duplo ano de avaliação não existe um histórico comparativo para este indicador.

Validabilidade e exactidão para o sector em baixo

De acordo com a informação fornecida pelas entidades gestoras, as variáveis que participam no cálculo do indicador R905 (R905 – Rácio de cobertura dos custos operacionais) e R904 – Custos operacionais ajustados) apresentam níveis de fiabilidade e de exactidão conforme a figura 299.

Figura 299
Fiabilidade e exactidão das variáveis R905 e R904 (sector em baixo)

Indicador comparativo das entidades gestoras em baixo

No figura 300 apresenta-se a comparação dos desempenhos das entidades gestoras em baixo, considerando-se também o intervalo de referência considerado adequado.

Uma apreciação global, a média ponderada do rácio de cobertura dos custos operacionais destas entidades gestoras é de 0,88, o que corresponde a um desempenho global mediano.

Figura 300
R905 – Rácio de cobertura dos custos operacionais (1) (sector em baixo)

Recomendações

A análise detalhada das entidades gestoras apresenta um balanço de cobertura dos custos operacionais, recomendando-se que as entidades gestoras mantenham um esforço contínuo no sentido de minimizar os custos das diversas actividades.

A falta desta melhoria o procedimento no que se refere ao envio da informação necessária para a validação dos verbais de proventos e custos operacionais ajustados.

Sunshine regulation

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3.3.17. VALORSUL – Valorização e Tratamento de Resíduos Sólidos, da Área Metropolitana de Lisboa (Wortel) S.A.

Parque Industrial de CP – Grupo de Montagem de Instalações, 296-001 S, Avenida da Liberdade, 210, Lisboa, Portugal

Entidade gestora

A Valorsul, criada pelo Decreto-Lei nº 297/96, de 21 de Novembro, é o consórcio do Sistema Municipal de Valorização e Tratamento de Resíduos Sólidos Urbanos de Lisboa, nome O capital social está dividido pelas empresas controladas pelo IRRAR: a C. M. Lisboa (50%), a C. M. Lourenço Marques (25,49%), a C. M. Leiria (12,29%), a C. M. Évora (5,79%), a C. M. Vila Franca de Xira (5,79%) e a C. M. Aveiro (5,79%). O período de constituição vigora de 1995 a 2020.

Sistema de gestão dos resíduos urbanos

O sistema abrange os municípios de Amadora, Lisboa, Lourenço Marques e Vila Franca de Xira, numa base total de 596 km² servindo cerca de 1 161 000 habitantes, inclui um aterro sanitário, uma central de valorização energética, uma unidade de digestão anaeróbia, uma estação de triagem e dois incineradores e um conjunto de 2269 eco-pontos. Dentre entretanto 774 430 t em unidades de processamento de resíduos.

Localização do sistema

Qualidade do serviço

A análise da qualidade do serviço efectuado em termos de defesa dos interesses dos utilizadores, sustentabilidade da entidade gestora e sustentabilidade ambiental, encontra-se sintetizada na ficha de avaliação da página seguinte, destacando-se:

- como indicadores positivos, a cobertura do serviço, o rácio de cobertura dos custos operacionais, o nível de solvabilidade, a deposição em aterro, a recuperação, os aerias em equipamento pesado e a caracterização dos resíduos, os recursos humanos, os resíduos tratados em aterro, a utilização de recursos energéticos e a qualidade dos efluentes para o ar;
- como indicadores a melhorar de alguns aspectos, as respostas a reclamações positivas, a investigação e a investigação científica e outros indicadores a melhorar de dois aspectos, a utilização da capacidade de encanamento de águas, a qualidade das águas após tratamento e a qualidade das águas subterrâneas.

Intenção da qualidade do serviço

No tabela junto encontra-se apresentada a avaliação da intenção da qualidade do serviço de entidades gestoras ao longo dos últimos anos.

Recomenda-se uma maior atenção aos indicadores relativos ao capacidade de encanamento de águas (R612), qualidade do lixiviado após tratamento (R517) e qualidade das águas subterrâneas (R516), tendo em vista a melhoria do desempenho do sistema nomeadamente no que respeita a quantidade de resíduos depositados em aterro, a qualidade dos lixiviados após tratamento e a preservação da qualidade das águas subterrâneas.

Evolution da avaliação da qualidade do serviço

Indicador	2004	2005	2006	2007
R501	●	●	●	●
R502	●	●	●	●
R503	●	●	●	●
R504	●	●	●	●
R505	●	●	●	●
R506	●	●	●	●
R507	●	●	●	●
R508	●	●	●	●
R509	●	●	●	●
R510	●	●	●	●
R511	●	●	●	●
R512	●	●	●	●
R513	●	●	●	●
R514	●	●	●	●
R515	●	●	●	●
R516	●	●	●	●
R517	●	●	●	●
R518	●	●	●	●
R519	●	●	●	●
R520	●	●	●	●

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Ficha de avaliação da qualidade do serviço

Esta ficha apresenta a avaliação da qualidade do serviço, de acordo com o Guia de Avaliação (1) que pode ser consultado em www.rappt.pt

Indicador	Valor (em %)	Avaliação	Observações
INDICADORES OPERACIONAIS (R500-R510)			
R501 – Cobertura do serviço	100% (100%)	●	
R502 – Cobertura da receita selectiva	0%	●	A entidade gestora não procede à recolha selectiva.
R503 – Preço médio de serviço	27,5 € (17,7 €)	●	Preço médio inferior ao preço médio previsto (19,7 €) de acordo com o Plano de Gestão.
R504 – Respostas a reclamações positivas	58% (20%)	●	
INDICADORES ECONÓMICOS (R511-R520)			
R511 – Rácio de cobertura dos custos operacionais	1,66 (1,1)	●	
R512 – Custos operacionais unitários	39,2 €/t (17,7 €)	●	Este rácio está abaixo do rácio previsto (40,2 €) de acordo com o Plano de Gestão.
R513 – Rácio de solvabilidade	1,66 (1,1)	●	
R514 – Recuperação após triagem	2,0% (1,4%)	●	O rácio de recuperação após triagem é inferior ao previsto (1,4%) sendo o desempenho inferior ao que se esperava (1,4%) considerando o desempenho previsto (1,4%) de acordo com o Plano de Gestão.
R515 – Valorização orgânica	4%	●	A entidade gestora não procede à valorização orgânica dos resíduos urbanos.
R516 – Reciclagem	82%	●	
R517 – Deposição em aterro	21% (1)	●	
R518 – Utilização da capacidade do aterro anual (t/ano)	120% (100%)	●	A entidade gestora deve ter em atenção a capacidade do aterro, tendo em vista a utilização da capacidade do aterro (100%) de acordo com o Plano de Gestão.
R519 – Aerias em equipamento pesado	670 t/a (100 t/a)	●	
R520 – Caracterização dos resíduos	15,5 (1)	●	
R521 – Recursos humanos	0,85 t/a (100 t/a)	●	
INDICADORES AMBIENTAIS (R521-R530)			
R521 – Análises realizadas aos lixiviados	100% (100%)	●	
R522 – Quantidade dos lixiviados após tratamento	21% (100%)	●	A entidade gestora deve ter em atenção a quantidade dos lixiviados após tratamento (100%) de acordo com o Plano de Gestão.
R523 – Utilização de recursos energéticos (litros em kWh)	31,6 kWh/t (100 kWh/t)	●	
R524 – Qualidade das águas subterrâneas	60% (100%)	●	A entidade gestora deve ter em atenção a preservação das águas subterrâneas.
R525 – Qualidade das efluentes para o ar	100% (100%)	●	

Legenda: ● Qualidade superior ao previsto; ● Qualidade dentro do previsto; ● Qualidade inferior ao previsto; ● Qualidade inferior ao previsto.

Fig. 9. Benchmarking and sunshine regulation of IRAR

refused). Furthermore, it comprises the assurance of quality standards (any service provided must conform to high quality standards), minimum consumption (imposing and charging for minimum consumption is forbidden), billing (users are entitled to receive a bill specifying the sums presented), prescription by lapse of time (the right to require payment lapses after a period of six months after the service has been provided), the injunctive nature of rights (any agreements or dispositions that exclude or limit the rights of users by this law are considered to be null and void) and safeguards entitlements (all legal dispositions that specifically prove to be more favourable to users are safeguarded).

With the aim of improving transparency and raising awareness about costs in the waste sector, the Local Finance Act (Decree-Law No. 2/2007) established that both the tariff systems and a complete breakdown of the costs of the service should be made available on the website of the municipality.

In addition, operators are compelled to have a complaint book and send all complaints to IRAR within a period of ten working days in order to guarantee a greater efficiency while handling user complaints.

6. Conclusions

In Portugal, in the past two decades the waste sector has evolved considerably. Taking into account the situation of this sector in the early 1990s and the current panorama, it is easy to understand the great contribution of the legal framework and of the large investments that were allocated to the waste sector. Moreover, the establishment of dedicated regulation represented an important (additional) role to this development. The significant increase of refuse collection coverage, beyond the percentage of suitable treatment, is one of the relevant signs of this progress.

In addition, the large participation of stakeholders by promoting recommendations and the technical credibility and reputation of the operators along with their freedom from political pressure, especially considering their institutional vulnerability, are also factors that have contributed towards the national and international recognition of the vast operational and regulatory development that has characterised the waste sector in Portugal, particularly due to the presence of a sector-specific regulator, which is an atypical situation in the worldwide waste sector.

Notice, however, that Portugal still faces important challenges in this area, namely, the great discrepancy between what it is charged and the real cost of the service, the need for operators to improve their productive efficiency, the clarification of the role of the State in the waste sector and the separation of regulatory functions from operational functions and, finally, an improvement of the existing legislation governing this sector which, in some cases, is outdated and, in other instances, is still limited in the context of the new requirements.

It is unquestionable that IRAR's sunshine regulation has brought great improvements to the waste sector, despite its little coercive power. Nevertheless, the recent reform both of its statutes and regulatory model, turning it into a stronger regulator, is seen as an optimal window to develop even more the waste sector, inducing more incentives to waste utilities, focusing on a service with better quality, simultaneously sustainable and affordable for the users.

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Solid Waste Management is one of the essential obligatory functions of the Urban Local Bodies/Municipal Corporation. This service is falling too short of the desired level of efficiency and satisfaction resulting in problems of health, sanitation and environmental degradation. Due to lack of serious efforts by town/city authorities, garbage and its management has become a tenacious problem. Moreover, unsafe disposal of garbage and wastewater, coupled with poor hygiene, is creating opportunities for transmission of diseases. Solutions to problems of waste management are available. However, a general lack of awareness of the impact of unattended waste on people's health and lives, and the widespread perception that the solutions are not affordable have made communities and local authorities apathetic towards the problems. The aim of this Book is to bring together experiences reported from different geographical regions and local contexts. It consolidates the experiences of the experts from different geographical locations viz., Japan, Portugal, Columbia, Greece, India, Brazil, Chile, Australia and others.

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51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
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中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

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