ABSTRACT

The urban waste services (UWS) are commonly provided under monopoly, with tendency to raise price itself. In this scenario, it is important to ensure the defense of the user’s interests, while preserving the continuity, the quality of service and appropriate tariffs. With these goals, in Portugal, was created a regulatory agency (ERSAR, ex IRAR) dedicated to the sector of municipal waste, with the task of ensuring the balance between the provision of the service with adequate quality and safeguard the sustainability of the operators. In this context, the performance evaluation reveals fundamental. This study aims to define a set of performance indicators (PI), in order to be applied to various UWS responsible for providing the service of waste collection (undifferentiated and recyclable), for the year 2011. The set of PI sought to address the specificities of service in relation to service quality, the environment, human resources, the economic and financial aspects, of the service provision and the associated infrastructure. For this purpose, we analyzed the performance of 10 UWS through the application of 39 PI. We analyzed the results even taking into account the reference values and the comparison (benchmarking) among the utilities analyzed. The results of applying the set of PI suggested in this study show that the services reveal general good levels of coverage and quality of service provided to the users. However, despite the developments and reforms adopted in this sense, the costs are not properly passed to the users and the polluter/payer principle is not applied.

Keywords: Benchmarking, Performance Indicators, Portugal; municipal waste; retail services

1 INTRODUCTION

The state of development of a country is linked not only to their consumption patterns, but also the ability to be able to answer to the basic needs of its citizens and to provide them conditions of well-being.

In the last years, the changes in consumption patterns have led to an increasing volume of waste produced, which created a huge challenge to municipalities as entities responsible for their treatment.

The legal requirements to encourage recycling and collection, even by European Directives, the need for technological development in the collection and treatment of urban waste, raised the same way, a rampant increase in the cost of waste treatment in different Member States.

In the last two decades in Portugal, there was a remarkable development in the waste sector, the result of heavy investments made in the sector, the role of regulation of service quality and environmental regulation. The achievement of this development was more visible terminate all existing dumps and uncontrolled then it was considered odd in the European Union (EU).

The Portuguese sector still faces many challenges ahead, however the current crisis that devastates most of the EU countries require mandatory rationing expenditure, particularly with municipal services. In this situation the demand for efficiency on the part of municipalities becomes indispensable.
This paper gives an overview on the development of uws in Portugal, as well as a brief note of other EU countries (Netherlands, England and Italy), in chapter 2. Further, in chapter 3 defines the set of PI to be tested and applied in the 10 uws Portuga, in chapter 4. The main conclusions of this set of PI in chapter 5.

2 THE DEVELOPMENT AND REFORM OF THE MUNICIPAL WASTE SECTOR

2.1 Portugal

2.1.1 Market Structure

The waste policy in Portugal is defined by a legal framework in line with EU legislation. Among the various powers and duties, it is stressed the responsibility of municipalities for the final destination of the waste.

Between the production and the final destination of waste, services perform various operations such as: collection, transport to transfer stations and sorting. The process of waste collection is divided into two major groups of waste, recyclables and undifferentiated, with independent circuits collection. For these two groups of waste collection is door-to-door collection of points, the second option being the most common. There are transfer stations to optimize the distances between the collection circuits and waste disposal.

When at the removal and transportation to the final destination the same vehicles are used, the whole process of transportation is designated as low. On the other hand, when there is a transfer station, there is a differentiation between the collection vehicles and transportation vehicles to final destination. Thus, the path between the transfer station and the final destination is a transport upwards, while the collection circuit and the route to the transfer station called a downward transmission.

The services consist of high management of multimunicipal systems, which were created with the purpose of sharing structures to the final destination of waste, whether landfills or incineration plants. In multimunicipal systems, ownership is run by the Central Government when multi utilities are entities organized through a partnership between the municipalities involved and the Empresa Geral do Fomento, SA (EGF), sub-holding of Grupo Águas de Portugal. The EGF always holds a majority stake in the municipalities, so that the ownership of these systems, designated municipal systems, is state-owned. The ownership of Multimunicipal Systems, may also have to be managed directly by the municipalities through municipal associations or by delegation to multi companies.

In the sector there are also retail services in models of direct management, delegation and allocation. Direct management is done through municipal services, municipal services and municipal associations. there are still models of management by granting the concessionaire or by municipal or inter-municipal business delegation and local business entities. Companies can be formed with participation of private capital but, until the date, the Portuguese legislation does not allow the management of companies with majority private capital. These fund managers are quantified in Table 1.

<table>
<thead>
<tr>
<th>Management Model</th>
<th>Management entities</th>
<th>Municipalities covered</th>
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<tbody>
<tr>
<td>Municipal services</td>
<td>230</td>
<td>230</td>
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<tr>
<td>Municipality services</td>
<td>6</td>
<td>7</td>
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<tr>
<td>Associations / intermunicipal services</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Municipal and intermunicipal companies</td>
<td>20</td>
<td>32</td>
</tr>
<tr>
<td>Municipal outsourcing</td>
<td>1</td>
<td>5</td>
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</tbody>
</table>
2.1.2 UWS regulation

The services of waste collection are provided by a single entity in each geographic area, with no competition. Thus regulation is important to protect the interests of users of the service price to be inflated.

The regulator “Entidade Reguladora dos Serviços de Águas e Resíduos” (ERSAR) is the body responsible for regulating the sectors of water, waste water and waste in Portugal. It was created through the transformation of the Instituto Regulador de Águas e Resíduos (IRAR) through Decree-Law number 277/2009 approving the current organizational structure of ERSAR to extend the scope of regulatory intervention to all management of these services, regardless management model.

A comparison of the performance of management companies (benchmarking) is done by evaluating the results obtained and compared with the results of other similar entities operating in different geographical areas. The results of this comparison should be subject to public exposure, in that it puts pressure on fund managers towards efficiency by naturally do not want to see put in an unfavorable position, materializing and thus a fundamental right for all users. We also intend to build a true culture of information, concise, credible and easily understood by all (ERSAR, 2010).

2.1.3 Characterization of sector

The recipients of the fees charged by fund managers differ depending on the type of operations: multimunicipal services, waste collection. For the non-reusable packaging waste Sociedade Ponto Verde guarantees from producers that they are covered by an integrated packaging management (SIGRE).

The entities that manage municipal systems charge fees to municipalities or entities managing the waste collection, depending on the quantities of unsorted waste they receive.

SIGRE is funded by packers and importers to pay a set amount for each material and each amount of packaging placed on the market. The packaging is collected through collection made by fund managers. These receive a return value to the quantities of materials resumed. Packaging waste collected is sent for packaging manufacturers to be recovered and recycled.

Fund managers charge systems at low rates to users, but there is no uniformity in how to apply that same rate. In many cases it is charged depending on the amount of water consumed or via a fee for water meter. These situations happen because most entities responsible for waste collection are, simultaneously, the service provider of water supply and drainage of domestic wastewater.

In 2011, the total production of urban residues was about 4.9 million tons, and there has been a decrease in the previous year of 6%. As regards the selective collection of waste was collected for recycling 15.6% of the total waste generated in the year.

2.1.4 Future situation

The strategic plan for municipal waste (PERSU) entered into force in 1997 and is the second release since 2007. This second version of the plan is giving continuity to current policies on Waste Management in Portugal, taking into account the new requirements arising from the EU objectives of diverting biodegradable municipal waste from landfill and recycling of packaging waste. Alongside these targets is also expected that the implementation of measures in the waste management hierarchy combined with a prevention strategy is critical to achieving these objectives.

Another aspect that is intended to improve the suitability of the tariff systems of solid waste services, which at present unsuitable for management costs, for not being able to transfer to the user such costs. It is hoped that the regulation of the sector able to answer this question without being called into question the user's interest in having a service with continuity and an appropriate price.
2.2 England

England has about 50 million inhabitants and 130 395 km². In this country the organization of the sector has undergone successive changes over time. Initially the service of municipal waste was provided only by public entities, in contrast to the current situation characterized by a high concentration of private companies.

Local authorities, District Council and County Council have responsibility for the collection and disposal of waste. Tasks are shared between the two entity in situations of coexistence of both entities in the same area and when not happen collection services are the responsibility of the District Council, County Council fitting to the deposition.

The responsibility for defining policies for the waste sector is the Central Government, through the Department for Environment and Rural Affairs DEFRA. This government organization publishes annual statistics on the public sector and reports containing the revision of policies.

In England environmental regulation is the responsibility of the Environment Agency (EA), which is an executive non-departmental body responsible to the Public state secretary of the environment. This entity has the competence to evaluate the efficiency of incineration plants dedicated to the processing of municipal waste and if they are considered a recovery operation if they meet or exceed the thresholds set by the waste Framework Directive of the EU.

EA also has regulatory powers over licensing and operation of landfills, in particular, establish the calendar for local authorities and landfill operators meet their obligations to provide accurate and appropriate under the regulations of landfill allowances scheme (LAS).

The waste collection service is paid directly by the user in the case of waste collection from trade and industry. The fee charged by the service of collecting residues from dwellings is included in council tax, which helps pay for local services like policing and domestic rubbish collection. Council tax applies to all domestic properties, including houses, bungalows, flats, maisonettes, mobile homes and houseboats, whether owned or rented.

In 2011, England produced nearly 26 million tons of municipal waste. The quantities destined for landfill have been declining steadily, from 2001/2. Were landfilled 22 million tons of waste in 2011 and the amount of waste decreased by 50% compared to the quantities recorded in 2002.

The amounts of waste recycled also changed significantly. In 2002, we recycled 3.5 million tonnes of household waste, compared with 12.5 million tonnes recorded for the year 2011.

2.3 Italy

Italy is a country with a population of 58 863 156 inhabitants and an area of 301 230 km². The territorial structure consists of 20 regions, which can aggregate into three geographical macro-areas (North, Centre and South), there is a total of 8101 municipalities.

In Italy the legal framework that regulates the collection and disposal is based on the legislative decree number 22, 5 February 1997. It propose is to ensure conformity between national legislation and EU directives for the treatment of general waste, hazardous waste and packaging waste.

The regions are responsible for drawing up plans to integrate all the processes of collection, treatment and disposal areas under optimal management. There is more than 800 public waste management bodies for the collection and disposal of municipal waste, in Italy. Around 92 per cent of the Italian inhabitants live in the disposal areas covered by these institutions.

Locally, specific initiatives have been developed for the prevention of waste by public bodies such as municipalities and regions: rates of waste, local voluntary associations, development of home composting, information and awareness campaigns targeting citizens, creating switching networks articles used.
With regard to regulation, Italian law provides that where there is a national registry should include all firms operating in the services of waste management, with the aim of raising environmental standards, leading to a substantial improvement in the costs of meeting the obligations when environmental services are provided waste management. The ministry of environment and protection of the territory and the sea is aware of what is happening in the sector through the activity of the Osservatorio Nazionale sui rifiuti.

The revenues of the waste management services are fees or charges, depending on the municipalities. Municipal Waste The rate includes a fixed component to cover service costs and a variable component depending on the amount of waste produced per citizen / business. One purpose of introducing this type of tariff is to reduce the final destination of waste and comply with the objectives of the European directives for collection and recycling. In many cases, the funds coming mainly from municipalities that use rates rather than rates, are not sufficient to cover the full costs. There are also considerable differences between regions and cities with respect to the financial coverage.

2.4 The Netherlands

The Netherlands is a country with an area of 41,526 km² which works with arrangements of parliamentary democracy and constitutional monarchy divided into 12 provinces. It has about 16.1 million people and 6.9 million homes. Its territory is divided into 12 administrative regions, also called provinces, each is led by a governor, who is named Commissioner of the King or Queen. All provinces, in turn, are subdivided into municipalities ('Gemeenten'), which are 467.

The Ministry of Housing, Planning and Environment is responsible for the design and implementation of legislation and policy on waste in the country. By the end of 2001, the final destination of waste was managed at the regional level. The provinces were responsible for planning the deposition and the final allocation for deposition of large amounts of waste and treatment units.

The implementation of waste policy in the Netherlands is largely decentralized. The Central Government provides the key points of the policy while the regional and local authorities working in the most specific and implement policy. Examples are planning the disposal capacity plans of regional environmental policy and providing licenses to companies that collect and treat the waste and also the activities that produce waste.

There is no regulatory body for waste services in the Netherlands. The Government through legislation and economic instruments regulate the sector. The Dutch government recognizes that instruments can implement to achieve the environmental targets for waste management covering a wide range of incentives and regulations vary.

Interest in the use of economic instruments in waste policy has increased in recent years in The Netherlands. Tariffs on waste were introduced or are being considered in many countries. The rates in the Netherlands began to be used in full in 1995. Since the early 90s that the value of local tariffs for waste more than doubled. Some municipalities have abandoned the scheme of a uniform tariff for the collection of household waste and commercial activities and introduced differentiated tariffs, highlighting three types of systems: weigh the actual contents of the container "dustbin" at the point of collection, payment of the fare buying trash bags ("pay by bag"); rate applied over the area of housing and the frequency of collection.

3 METHODOLOGY

3.1 Introduction

The application of performance indicators (PI) may have different purposes depending on the type of entity (regulation, managing entity) that uses them. When used by the operator have the advantages of requiring the collection and information management, decision making by managers more quickly, strengthens the power of decision-makers, making it easier to justify the decisions made and the establishment of priorities. The PI allow for proactive management and detection of dark spots and weaknesses (and strengths) of the system. Also the management by objectives is a consequence of
the application of PI because they set goals for themselves. Finally, the application of PI by operators facilitates internal or external audits and makes the characteristics and results of activities more transparent (Marques, 2006).

The PI is usually a variable ratio and is expressed in specific units and may commensurate (%) or not (€ / ton). Denominators represent a system size (amount of waste collected, annual costs, etc.) (Alegre et al., 2006, ISO 24500).

### 3.2 Set of Performance indicators

The ID system is to be applied to evaluate the performance of management companies that provide services in municipal waste. The evaluation focuses on three perspectives: the fund manager, the user and the environment (Figure 1).

- **Perspective of managing body** - Ensure economic and financial sustainability of the organization.
- **User Perspective** - Protection of consumer interests by ensuring oninuidade and service quality, universal access.
- **Environmental Perspective** - Efficient use of energy resources to minimize negative impacts on the environment.

One of the objectives of the regulation and the application of PI is to identify situations in which they are concerned to obtain satisfactory standards in all perspectives of service delivery and also leverage improvements.

The PI system is applicable to retail services, where management entities provide the service of collecting household waste and recyclable waste, and includes the following indicators: Indicators of quality of service; Indicators of human resources; Economic and financial indicators; infrastructural indicators, operational indicators, indicators of environmental sustainability. Indicators were defined operational and infrastructure specifically for the collection of undifferentiated waste and the collection of recyclable waste, by reason of the specificity of each collection services.

In total, were defined 39 PI (Table 1), dividing into three indicators of quality of service, 5 indicators of human, economic and financial indicators 5, 5 infrastructural indicators of undifferentiated, 4 indicators of infrastructural recyclable, 7 operational indicators of undifferentiated, 7 indicators operational and recyclable 3 indicators of environmental sustainability.
Table 2 – Set of indicators to be applied in municipal waste services

<table>
<thead>
<tr>
<th>Indicators for service quality</th>
<th>Indicators of environmental sustainability</th>
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<tbody>
<tr>
<td>IQ01 Service coverage (%)</td>
<td>ISA01 Shares education / environmental awareness (no. / inhabitants)</td>
</tr>
<tr>
<td>IQ02 Average response time to claims (days/complaint)</td>
<td>ISA03 Use of energy resources (liters / ton)</td>
</tr>
<tr>
<td>IQ03 Claims (complaint/1000ton.year)</td>
<td>ISA04 CO₂ emissions (kg / ton)</td>
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<td></td>
<td>ISA02 Solvency ratio (-)</td>
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<tr>
<td>Economic and financial indicators</td>
<td>ISA03 Use of energy resources (liters / ton)</td>
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<tr>
<td>IEF01 Unit Operating Costs (€/t)</td>
<td>ISA04 CO₂ emissions (kg / ton)</td>
</tr>
<tr>
<td>IEF02 Solvency ratio (-)</td>
<td>ISA05 CO₂ emissions (kg / ton)</td>
</tr>
<tr>
<td>IEF03 Coverage ratio of operating costs (-)</td>
<td>ISA06 CO₂ emissions (kg / ton)</td>
</tr>
<tr>
<td>IEF04 Income from fares (€/t)</td>
<td>ISA07 CO₂ emissions (kg / ton)</td>
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<tr>
<td>IEF05 Overall liquidity (-)</td>
<td>ISA08 CO₂ emissions (kg / ton)</td>
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<tr>
<th>Human resources indicators</th>
<th>Recyclable waste:</th>
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<tr>
<td>IRH01 Sustainability of Human Resources [employees/(10^3ton.year)]</td>
<td>IIER01 Waste disposal capacity available (liters/ inhabitant)</td>
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<tr>
<td>IRH02 Accidents at work (accidents/100 employees/year)</td>
<td>IIER02 Coverage collection (%)</td>
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<tr>
<td>IRH03 Training sessions (hours/employees/year)</td>
<td>IIER03 Ecopoints (inhabitant/ recycle bin)</td>
</tr>
<tr>
<td>IRH04 Overtime (%)</td>
<td>IIER04 Recycling center (km²/recycling center)</td>
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<tr>
<td>IRH05 Absenteeism(%)</td>
<td>IIER05 Waste from ecopoints (%)</td>
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<tr>
<th>Household waste:</th>
<th>Recyclable waste:</th>
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<tbody>
<tr>
<td>IIE01 Waste disposal capacity available (liters/ inhabitant)</td>
<td>IIE02 Waste disposal capacity available (liters/ inhabitant)</td>
</tr>
<tr>
<td>IIE02 Distribution of containers (containers/km2)</td>
<td>IIE02 Coverage collection (%)</td>
</tr>
<tr>
<td>IIE03Collection vehicles and waste transport (inhabitant / vehicle)</td>
<td>IIE03 Ecopoints (inhabitant/ recycle bin)</td>
</tr>
<tr>
<td>IIE04 Containers (inhabitants / container)</td>
<td>IIE04 Recycling center (km²/recycling center)</td>
</tr>
<tr>
<td>IIE05 Volumetry of containers</td>
<td>IIE05 Waste from ecopoints (%)</td>
</tr>
<tr>
<td>IIE05a (% ) container of 800 liters</td>
<td>IIE05 Daily amount of recyclables (kg / inhabitant.day)</td>
</tr>
<tr>
<td>IIE05b (% ) of container 1100 liters</td>
<td>IIE05 Weekly amount of recyclables (kg / inhabitant.day)</td>
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<td>IIE05c (% ) of other volumetric container</td>
<td>IIE05 Paper collected (kg / inhabitant.week)</td>
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<thead>
<tr>
<th>Operational indicators</th>
<th>Recyclable waste:</th>
</tr>
</thead>
<tbody>
<tr>
<td>IOI01 Faults with collection vehicles and transport [no. / (10^3 t. year)]</td>
<td>IOR01 Recycling packaging (%)</td>
</tr>
<tr>
<td>IOI02 Use of vehicles (km / vehicle)</td>
<td>IOR02 Wastes from ecopoints (%)</td>
</tr>
<tr>
<td>IOI03 Monetization vehicle [kg / (1000liter. year)]</td>
<td>IOR03 Waste from door to door collection (%)</td>
</tr>
<tr>
<td>IOI04 Collected waste to transfer stations (%)</td>
<td>IOR04 Daily amount of recyclables (kg / inhabitant.day)</td>
</tr>
<tr>
<td>IOI05 Waste collected for landfill (%)</td>
<td>IOR05 Plastic / metal collected (kg / inhabitant.day)</td>
</tr>
<tr>
<td>IOI06 Daily amount of waste collected (kg / inhab.day)</td>
<td>IOR06 Paper collected (kg / inhabitant.year)</td>
</tr>
<tr>
<td>IOI07 Dry container (containers washed / containers.year)</td>
<td>IOR07 Glass collected (kg / inhabitant.year)</td>
</tr>
</tbody>
</table>

4 CASE STUDIES

The group of 10 entities under study, shown in Figure 2, covers an area of 3641.43 km² of territory and provides service to 892,991 inhabitants. These entities provide the service of waste collection, in most cases simultaneously with the water supply and drainage of domestic wastewater. The only entities that provide exclusive service of waste collection are Maiambiente, EEM and EMAC, E.M. Regarding the management model entities under study consist of one municipal service (Municipal Services of the Municipality of Almada), 2 municipalised services (SMSBVC - Municipalised Services Sanitation of Viana do Castelo, SMASCB – Municipalized Services of Water and Sanitation Castelo Branco -), 4 municipal public enterprises (EAMB - Esposende Ambiente, E.M.; EMAC, E.M.; EMARP, E.M.; Maiambiente, EEM ) and 3 municipal public companies with private capital (Águas da Covilha, EM; Tavira Verde, EM; Fagar, E.M.)
4.1 Quality of Service

The service quality was evaluated by a set of three PI. Service coverage is always desirable to be as comprehensive as possible. The reference values for this PI are situated near 100% for a service with high quality. One can consider that the service is good, in less urban areas, if the collection service has coverage amounts between 90% and 100%.

The quality of service provided by UWS under study is considered good for the level of service coverage is 100% for 5 entities, while for the remaining 5 UWS service coverage is in a range between 90% and 100%.

4.2 Human Resources

The UWS human resource in the study presents a good overall median levels of performance, the EMAC and CMA are located in a predominantly urban area and have good levels and median, respectively. With unsatisfactory arises EAMB, by raising its range given as reference. SMSBVC and MAIAMBIENTE, with geographical proximity to EAMB, performed well on this indicator.

The indicator absence of staff in most entities registered values between 2% and 4%, except EMARP and SMSBVC, with the amount exceeding this range. There is set a reference value it is desirable that absenteeism is the least possible.

4.3 Economic and financial sustainability

Comparing unit operating costs, the highest costs are those of EMARP and Tavira Verde. Located in similar geographic areas and the SMSBVC MAIAMBIENTE have values close to the unit cost. The amounts of revenue from tariffs range from € 29.58 / t of municipal services Almada and € 139.72 / t, the Tavira Verde. The value for the municipality of Almada is the lowest.

In relation to the solvency ratio and the coverage ratio of operating costs, the results show that not all management can cover the costs and generally have low levels of solvency.

The overall liquidity ratios were achieved for all entities and entities with the best results are EMARP and SMSBVC.
4.4 Operational and infrastructure

In operation the collection of undifferentiated, overall the results are satisfactory to good. The indicator of profitability of vehicles, all UWS obtained values exceeding 450 kg/m3.year. The vehicles have an average utilization of approximately 25000km/year, with variations between 19043.48 km / year (CM Almada) and 39010.40 km / year (EAMB). The washing of containers is made with different frequencies in the entities studied. Also reflect the use of containers and as expected, most urban areas have more frequency washes.

For indicators of infrastructure, indicators 'container' and 'distribution of containers' these structures relate to the number of system users and the intervention area. The entities providing service in urban areas mostly have generally fewer inhabitants / containers and more containers per unit area considered. The highest values in inhabitants / container are the entity's SMSBVC and EMARP. The EMAC turn gives the value close to two entities that are very rural area, the Águas da Covilhã and SMAS CB. Regarding volumes, entities also did not provide much information but that retains the capacity are the most common of which vary between 780 liters and 1100 liters.

Regarding ecopoints coverage ranges from 83.44% for EMARP up to 98% MAIAMBIENTE. The capabilities of these devices vary per capita in the areas of the various entities under study, with the highest values in the areas of action of Tavira Verde and EMARP.

4.5 Environmental Sustainability

The assessment of environmental sustainability was developed based on the results of ID defined for this point. For entities in study the effects of emissions of carbon dioxide (CO2), by the collection vehicles are quantified per ton of waste collected (Figure 27). The EMAC and recorded the lower CMA for quantities and other entities except Maiambiente, this ID was less than 15kg / t.

Also, the results of ID for use of energy resources results were few variations (Figure 28). As these two ID feature strong relationship with each other, these results also CM Almada and SMAS Castelo Branco had the lowest values.

5 CONCLUSIONS AND FURTHER RESEARCH

The service sector waste has undergone major developments in recent years. The individual policies of each member state, influenced by Community objectives, made the collection and processing operations are increasingly demanding.

In Portugal, the development was remarkable when passing is a shameful situation in the 90s, dominated by dumps, to a situation that fills us with pride, where the waste produced are treated appropriately and fulfilling the goals of the EU to recycling. In the future, it is expected that other challenges are the implementation of the strategy on waste prevention and the hierarchy of waste management and the achievement of targets for recovery and organic material.

Faced with this situation in greater demand for UWS, with the added costs that entails, and the characteristics of lack of competition in the sector, with the service being provided by a single provider in each geographic area, it becomes imperative evaluate the performance of management companies, whether public or private participation.

The regulatory activity of ERSAR first on wholesale sector, then on retail sector, has taken on this task and also creates conditions in the market of waste so that the user has access to a service with the principles of universality and continuity.

The ID is a good assessment tool, either to a regulator, as a uws which is not subject to regulation. In municipal waste services in downtown is still not common practice to use ID's or other forms of performance assessment. For example, in this study, the entities that the data had been more organized than the already used this method before the regulation be made compulsory to all UWS that provide services to urban waste.
The set of PI used and their results allowed a comparison between the performance of the entities under study. In this type of analysis becomes more evident that some indicators alone are not indicators of performance, but in conjunction with other possible characterize and evaluate the performance of different fund managers

The economic and financial indicators are important in this set of indicators to assess the sustainability of the entity itself, knowing that the service should not waste provided in order to maximize profits. It is important to ensure the proper ratio of gains and costs of the services provided.

The analysis based on the values of the set of PI applied result good levels of service quality. Rather, there are unsatisfactory levels on economic and financial performance in the majority of operators, not only taking into account the low levels of solvency but this situation shows clearly the difficulty from UWS to cover the actual costs with the service. The main problem encountered in the economic performance of the managing bodies of municipal waste services relates to the tariff systems misfits by the inability to pass on the costs of the service to the user. This again enhances the need for performance evaluation and in this context the use of the ID as a first step to do so.

The solid waste sector is still a sector still poorly researched. The lack of studies in this area reveals no doubt as disturbing factor in the development of this sector. In this context, the present investigation, beyond the objectives it sets itself, has the ambition of other studies that seek to boost the development and progress of this industry, namely, the possibility of exploiting economies of scale either at the wholesale or retail industry sector. Thus, it would be possible to evaluate the structural reforms implemented in multimunicipal systems with merging several UWS.

Another aspect that needs investigation relates to the analysis of outsourcing services at low, noting the establishment of numerous short-term contracts with municipalities for the services of collection and street cleaning. It would also be important to apply other benchmarking methodologies, parametric and nonparametric, the sample collected (or enlarged if possible) in this research and compare the results achieved here, and also seek to learn lessons about management models, geographic locations, policy areas, among others.

BIBLIOGRAPHY


