Socioeconomic baseline on waste for households in Aveiro, Portugal

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1. Introduction

This report intends to be the baseline for the monitoring of the impact of the project actions done within the framework of LIFE PAYT project.

The scope of this baseline report is to establish a socioeconomic context as the starting point for the monitoring system of the LIFEPAYT project in Aveiro. This document, prepared in the end of 2018, intends to provide information regarding the set-up of a baseline for the twelve socioeconomic indicators to establish a preliminary analysis.

As shown on Table 1, every indicator is identified by an assigned code, ranging from SE1 to SE12, and they are defined on the "*Report on the development of socioeconomic indicators*" (LIFEPAYT, 2017).

Table 1: Set of environmental indicators for LIFE PAYT project; MSW: Municipal Solid Waste

INDICATOR			UNITS	CALCULATION FORMULA
SE1	MSW management cost for municipality		€ / year	Cost in target zone per year
SE2	MSW management revenue from domestic and non-domestic sectors		€ / year	MSW tariff paid value in target zone per year
SE3	Individual cost of MSW management	Commercials	€	Hourly salary · Necessary hours
		Families	Degree of effort (mean score between 1–5)	$\dfrac{\sum individual\ scores}{\sum total\ answers}$
SE4	Coverage of MSW management costs		%	$\dfrac{MSW\ tariff\ revenue}{Cost\ of\ MSW\ management} \cdot 100$
SE5	Economic revenue due to increased recycling		€ / year	$\sum_i (\text{Units of recovered MSW i fraction} \cdot \text{Unitary price of MSW i fraction})$
SE6	Potential employment creation		No. jobs	$\sum_i \left(\begin{array}{l}\text{Units of recovered MSW i fraction} \cdot \\ \text{jobs created by unit MSW i fraction}\end{array}\right)$
SE7	Satisfaction with MSW collection system		%	$\dfrac{\sum positive\ answers \cdot 100}{\sum total\ answers}$
SE8	Acceptance of MSW management pricing		%	$\dfrac{\sum positive\ answers \cdot 100}{\sum total\ answers}$
SE9	Population percentage who separates MSW at source		%	$\left(1 - \dfrac{\sum answers\ "I\ don't\ recycle"}{\sum total\ answers}\right) \cdot 100$
SE10	Population percentage practicing home composting		%	$\dfrac{\sum positive\ answers \cdot 100}{\sum total\ answers}$
SE11	Population perception on the importance of recycling		Mean score between 1–5	$\dfrac{\sum individual\ scores}{\sum total\ answers}$
SE12	Project visibility		%	$\dfrac{\sum positive\ answers \cdot 100}{\sum total\ answers}$

The initial values calculated for the set-up of indicators defined in sub-action C2.1 constitute an assessment of the socioeconomic situation regarding MSW management in target zones prior to the implementation of the LIFE PAYT project. This initial assessment will be used as a baseline against which the progress achieved by the project in socioeconomic dimension will be evaluated.

2. Methodology: Key Aspects and Limitations

This assessment focuses on social aspects, as the perceived attitude of the population towards the waste issue, and on economic implications (derived from MSW data of the target area). Therefore, it was necessary to use primary and secondary sources of information.

As primary source, a survey was performed in the form of questionnaires answered by a sample of 76 respondents among the population affected by the project. Therefore, two versions of the questionnaire were prepared: for domestic (residential) and for non-domestic (commercial) MSW producers. The main limitation concerned the residential sector, because it was difficult to find people at home during the week. To solve this issue, the researchers left an invitation for an online survey on several mailboxes. The survey ended up performed in three groups or categories: through field interviews to the residents (1) and in the commercial (2) establishments of the involved area, and through an on-line questionnaire (3) available on the project's web site[1]. Models of the questionnaire issued for the Aveiro survey are attached to this survey, for domestic version (Annex 1) and commercial version (Annex 2).

The field interviews were conducted during two days in the end of April 2018 at the target zone (Forca-Vouga neighbourhood). There were 9 respondents for the residential sector and 23 for the commercial one. The online survey collected data from 44 respondents.

As a secondary source, the values of the indicators were obtained from information from the municipal authorities responsible for the MSW management, as for instance, the information related to costs and revenues. The information was found on official documents provided by the municipality and agencies, or on outside organization's report and other kinds of communication materials.

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[1] http://www.life-payt.eu/pt/inquerito1

There were key challenges to obtain adequate baselines on each of the indicators. For instance, the fast replacement of human resources among the project partners, due to political exchange or changes in careers. As well as for the change in the MSW operators that affected even the flow of information on the annual reports provided by the municipalities.

The same survey - that was performed before the implementation of the project to build this baseline - will be conducted as well after the implementation, in order to check the possible improvement comparing it with the initial situation.

3. Results and discussion

This section shows the initial values of the socioeconomic indicators, which form the baseline for the project area. The data presented on Table 2 will be used as reference in the end of the project, when the final situation in each target area will be compared with this baseline previously established.

Table 2: Results of the 12 socioeconomic indicators

	INDICATOR		RESULTS Aveiro
SE1	MSW management cost for municipality		36 845 €/year
SE2	MSW management revenue from domestic and non-domestic sectors		53 698 €/year
SE3	Individual cost of MSW management	Commercials	Min. hourly salary 2.3 €/week
		Families	3.2 – Moderate effort
SE4	Coverage of MSW management costs		146%
SE5	Economic revenue due to increased recycling		16 470€/year
SE6	Potential employment gains due to recycling		0.21 jobs (per 54 tonnes collected)
SE7	Satisfaction with MSW collection system		56.5%
SE8	Acceptance of MSW management pricing		1.7%
SE9	Population percentage who separates MSW at source		92.2%
SE10	Population percentage practicing home composting		2.8%
SE11	Population perception on the importance of recycling		4.9
SE12	Project visibility		61.0%

3.1. Economic Indicators

As shown on Table 2, the economic indicators for the baseline assessment focuses on: costs, revenues, tariffs, degree of efforts, economic profits and employment creation.

Table 2. Economic Indicators for the baseline

Economic Indicators	Aveiro Baseline Summary
SE1. MSW management cost for municipality (2017)	
$$\frac{CC + TC + LT + AD}{yearly\ MSW} = 95\ €/t$$ **42 656 €** in the target area (2017) CC: collection costs TC: treatment costs LT: landfill tax AD: administrative costs	There was an influencing factor in 2018: Aveiro has a new operator for collection, which is about 20% cheaper than the previous one. This calculation includes the administrative costs (AD) from Aveiro Municipal Council, which is another part of the information collected by Portuguese regulatory body (ERSAR). If after the implementation of PAYT, there is a reduction of mixed waste produced, the MSW costs could decrease as well, leading to a reduction in the municipalities costs.

SE2. MSW management revenues for domestic and non-domestic sectors	
45 790 € in the target area (2017)	Although the municipal revenue with the MSW tariffs already covers the costs, a possible reduction of mixed MSW fraction due to PAYT, may reduce even more the price paid by the population. The expected variations in the MSW revenues allows us to understand the influence of the PAYT project.
SE3. Individual cost of MSW management	
For domestic/effort and non-domestic/cost participants: 1. Commercials: average time per week spent is 52 min, considering the minimum hourly salary of 4.15 €, the proportional salary is **3.58 €** 2. Families: the average answer on the Likert scale (five levels) was: **3.2 (moderate effort)**	This indicator aims to understand the evolution of the cost/effort bear by privates in MSW management. It is expected that throughout the project, participants will increase their time in MSW management, by separating, composting, etc., in order to produce less residual waste. On the survey (question 2) for the commercial sector, the non-specific answers related to the employee responsible for the waste management influenced the hourly salary. The answers were, namely: 11 specific cleaning-persons; 9 average employees non-related with cleaning; 3 non-specific employees. Since the higher number of responses indicated a cleaning-person, the decision was to consider that the employee responsible for the waste receives the minimum salary of 557€. In the case of domestic participants, the idea is to evaluate their perception of household effort in MSW management. The average of all the 53 answers about the 5 levels pointed to level 3.2. At the frequency level, it was verified that the most repeated level was 4, with 18 responses of respondents.
SE4. Coverage of MSW management costs (only for the area of the project)	
SE2/SE1·100 = 107%	This indicator represents the percentage of MSW management cost of the municipalities that is covered by the tariffs charged. The municipality covers the costs and still has a profit of almost 50%.
SE5. Economic revenue due to increased recycling	
16 408 €[2]	The purpose of this indicator is to understand if there are any economic benefits derived from PAYT as a result of increased recycling. The revenues associated to the increased sale of recovered materials for recycling has a potential to increase.
SE6. Potential employment gains due to recycling	
Target zone generates 54 tons of recyclables (5.7 t glass, 28.6 t paper, 13.7 t plastics, 3.6 t steel, 0.3 Al and 2.3 t beverage boxes). That implies: **0,29 direct jobs**	Literature review pointed that job creation is greater than the potential decrease resulting from employment loss in alternative MSW treatments (e.g. landfills) and in the production of new raw materials. According to the report "More jobs, less waste" (Friends of the Earth, 2009)[3], estimations of potential job creation by recycling show that for every 204 tons of recycled waste 1 direct job is created with an economic value of € 72,500 per year, while specific factors were applied to each material (BIO Intelligence Service, 2011)[4].

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[2] The information on prices obtained from Portuguese law: "Despacho nº 14202-C/2016" published in "Diário da República, 2ª Série, 227/2016", 25th November 2016.
[3] Friends of the Earth (2009), More jobs, less waste. Potential for job creation through higher rates of recycling in the UK and EU.
[4] BIO Intelligence Service (2011), Implementing EU Waste Legislation for Green Growth, Final Report prepared for European Commission DG ENV.

3.2. Social Indicators

Social Indicators	Aveiro Baseline Summary
SE7. Satisfaction with MSW collection system	
Satisfaction with the system: **56.6%**	This indicator measures whether the participants are satisfied with the MSW collection service provided by the local administration. The indicator measures the percentage of participants who thinks that the waste collection system works well. The commercial sector is more satisfied (69%) than the household (50,9%). However, it is the household sector who separates more MSW at source (SE9).
SE8. Acceptance of MSW management pricing	
Only one person accepts the price: **1.7%**	The financial question is decisive for PAYT systems, since the population that correctly separates their waste expects a reduction of the tariff. In Portugal, for example, the amount charged is linked to the water bill and goes unnoticed by the majority. The focus of the indicator is the participant's opinion on the amount paid for the collection of urban waste, but not all the respondents were aware of the amount paid for the MSW tariff. The indicator measures the percentage of participants that consider that the tariff they currently pay is fair. The information needed for the calculation is provided by the questionnaire applied to families and commercial participants (question 10.2).
SE9. Population percentage who separates MSW at source	
57.9% (any kind of separation)	The objective of this indicator is to establish the percentage population that practices waste separation at source at the beginning of the project. If we disaggregate the number of materials that are separated, the household shows more effort than the commercial sector. The difference between the percentages is a strong indicator of the project success, since it is understood that the separation at source is a fundamental parameter in the behavioural transformation of the population.
SE10. Population percentage practicing home composting	
2.6%	Composting is a strong factor to be raised at the beginning of the project, because the main component of urban waste is the fraction of organic waste. It is important to know the branch of population that already practices home composting. Home composting is made feasible with domestic composters, which are intended to be distributed to some participants at the beginning of the project. The participants that already practice composting will function as a control population, establishing the base level for this indicator. There were only two participants that practice home composting in target area.
SE11. Population perception on the importance of recycling	
Likert scale with five levels: **4.86**	The perception of the importance of recycling is an indicator that points also to the commitment of the population to give the correct destination to MSW. However the result is contradictory if the sectors are disaggregated: the commercial has the highest scores for importance of recycling (SE11), also for the satisfaction (SE7) with the MSW system (69%), but for separation at source has the lowest score (SE9).

SE12. Project visibility	
61.0% of population	In the course of the project, it is important to evaluate the progress on the knowledge of the population regarding LIFEPAYT, in order to verify if the means of dissemination of the project fulfil their function. Awareness raising is a key element for effective PAYT implementation and it was more efficient among the household sector.

Extra data extracted from the questionnaires:

- 22% of households throw away up to 2 waste carry bags (30 L) per week.
- Even though 92,2% separate MSW at source, only 56% is satisfied with MSW collection system.
- Out of 76, only 30 participants (39%) would be interested to compost if they receive a composter.
- The most separated material is glass: 90%.
- The main complaint (47%) concerned the opening of the drum waste disposal: 27 out of the 57 valid answers. Because of the previous experience in 2017 during the implementation of the first container model which had a very small drum for 30L/bag instead of 40L/bag.
- The population was concerned about the illegal dumping of waste and aware that they could end up holding waste at home too long until the bag was filled, which is a problem especially in apartment buildings and in the summer.

4. Conclusions

The problem related with the survey among the household sector was solved with the online survey, but the problems faced with the MSW data from the municipality of Aveiro still needs attention regarding the year 2018. The fact that the new MSW operator has changed the costs makes it more difficult to identify the impact of the PAYT system. There were key challenges to obtain the results of each indicator. Little adjustments on the titles and description of the indicators were necessary in order to have more specific results.

Out of these preliminary results, it was possible to identify some contradictions:

1. Online surveys received higher scores on dissatisfaction than the pen and paper questionnaires, in which the respondents indicate uncertainty rather than dissatisfaction.

2. Another contradiction concerns the commercial sector, that has the highest score for importance of recycling (SE11) and for the satisfaction (SE7) with the MSW system but has the lowest perception of separation at source (SE9) and knowledge about the project (SE12). The reason might be because the responsibility is shared among employees and less attention is paid on waste management.

Since the population of the target area had a previous bad experience with the small drum waste disposal of the containers (first attempt in 2018), the respondents were very critical and aware of the risks of the new system.

5. Annexes

- Annex 1: Model of the questionnaire issued for the Aveiro survey (domestic version)
- Annex 2: Model of the questionnaire issued for the Aveiro survey (commercial version)

PAYT

Tool to reduce waste in South Europe