The challenge of increasing source segregated waste collection in the Centre region of Portugal

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Análise à Gestão de Resíduos
Overview
Waste Collection in Central Portugal

Zona Centro
ERSUC > 1 million hab. | 36 municipalities
VALORLIS > 200k hab. | 4 municipalities
Representing 11.4% of the Portuguese Pop.

Separate Collection: Glass | Paper | Packaging (plastics, metals, composites, other pack mat)
Road containers: > 95%
Door-to-door: ± 4%
Different Territories RURAL vs URBAN
Rural areas, small size villages, mountains and dispersed population
Urban areas (affluent, tourism, medium size towns as Aveiro, Coimbra, Leiria, Figueira da Foz)
Municipal Waste Management@Central Portugal

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Urban waste source segregation

• ERSUC S.A. : 7.5% source seg. rate considering total waste collected
  • 30.4 kg person\(^{-1}\) year\(^{-1}\)
• VALORLIS S.A.: 7.6%
  • 28.8 kg person\(^{-1}\) year\(^{-1}\)
• Below the target (PERSU2020):
  • 46.0 kg person\(^{-1}\) year\(^{-1}\) and 42.0 kg person\(^{-1}\) year\(^{-1}\), ERSUC and VALORIS.
• Source segregation negative growth between 2010 and 2014:
  • -5.1% for ERSUC S.A. and
  • -11.3% for VALORLIS S.A

Source segregation def: waste segregated at the point of generation and discarded at a road container aimed at capturing Glass, Paper and Packaging.
Stagnant source segregation and separate collection, 2010-2014
Source separation potential@ERSUC in kg/person year$^{-1}$

The loss of recyclables into the unsorted waste stream 12.5 million euros a year (estimated, 2014) i.e. loss income to Municipalities
“Push for source separation- ERSUC!”
Parameters influencing separate collection

• The source segregation rate is defined in this work as the percentage of the amount of recyclable waste collected separately, compared to the total amount of municipal solid waste collected:

$$\text{Source segregation rate (\%) } = \frac{\text{amount of source segregated waste}}{\text{total amount of municipal waste}} \times 100$$

• Source segregation rate was correlated to the following parameters, using Microsoft Office EXCEL 2013:
  • total population (P1),
  • density population (P2),
  • area (P3), purchase power (P4),
  • number of school years attended (P5),
  • number of containers for source-segregated waste collection (P6),
  • container per inhabitant (P7), and
  • number of containers per square kilometre (P8).
Results and Discussion

ERSUC, VALORLIS Source segregation rates in 2014, in % of total collected waste

**TOP municipality:** “Sever do Vouga” (13.0%; 37.4 kg person-1 year-1) pop 12,000. It is remarkable **that a small, rural municipality has higher source segregation rate than the most affluent areas such as Coimbra (8.3%; pop. 130,000) or Leiria (7.7%; pop. 126,897).**
Purchase power of municipality vs. source segregation

![Graph showing the relationship between purchase power of municipality and source segregation rate. The R^2 value is 0.0001.](image)

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Containers density vs. source segregation rate

![Graph showing the relationship between containers density and source segregation rate. The graph includes a scatter plot with points and a trend line. The R² value is 0.221.]
Study:
Other Parameters infl. source segregation results

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Discussion

• ERSUC and VALORIS have a low “recycling” performance.

• A correlation between source segregation rate and different parameters (total population, population density, area, purchase power, number of containers, number of containers per km²) was investigated, but none of the analysed parameters influenced significantly source segregation rates.

• Road containers are the “only” collection method at ERSUC+VALORIS and are not efficiently capturing materials, in both affluent municipalities and rural ones.

• Is there enough data? How accurate is it (potential for source separation; road containers collection weight precision)?

• Are other factors influencing source separation?
Análise à Gestão de Resíduos - 2014
Conclusions and recommendations

1. Currently in Portugal source segregation aimed at “recycling” is dependent only on sense of civic duty. However, this model should be questioned as recycling rates are poor (14% average national level, source, INE – National Statistics Institute, 2014)

2. The results obtained showed that there is still potential for improvement within waste management at ERSUC and VALORLIS.

3. Current collection of recyclables, exclusively with road-side containers (collective system; anonymous), is not effective in reaching a higher collection rates.

4. Improvements are required in order to achieve national targets and EU requirements – Waste Framework Directive.

5. Further studies should assess the primary data accuracy at municipal and intermunicipal level examining which factors explain why affluent and richer regions source segregate as much as rural poorer areas.
Thank you!

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