

## WASTE COSTS ADMINISTRATION IN THE SOUTH EAST DEVELOPMENT REGION

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**Abstract:** *The paper presents a new vision of the administration cost of waste in the south-east developing region of Romania. It is known that waste generation is influenced by several factors among which the most important are: the evolution of population and regional income, the car is made of waste collection on a regular and scheduled, the consumer (the unemployment rate, educational, personal preferences ) and the fraction of recovered waste collected. Large quantities of waste generated per capita and are a consequence of education and accelerated urbanization. Similarly, the consumer behaviour influenced the waste generated modality (the semi-cooked food give more packaging waste while in rural areas is mainly the organic waste.*

**Keywords:** *costs administration, consumer behaviour, packaging, waste generated*

### 1. INTRODUCTION

Consumer society has led to the replacement the traditional materials with new ones that have a reduced duration of use (for example, in recent years the PET packaging have replaced at general level the glass containers; the plastic replaced on the paper on the web for food) and in the decay-time we expect to change the composition of waste with a significant negative impact on the environment.

In 2007, the government developed the concept of territorial development Strategy of Romania from 2007 to 2030, which is considering ways to exploit the national potential in order to restore territorial development gaps.

On the other hand, the National Development Plan (NDP) National Strategic Reference Framework (NSRF), designed for the programming period 2007-2013, Romania promotes regional policy's overall objective of balanced territorial development of the country and reduce disparities of socio-economic development between Romania and EU Member States by improving the competitiveness of regions and achieve further growth of 15% of GDP by 2015, following the absorption of European funds. Regarding economic development in the south – east developing region is expected to trend upward, with an average annual rate of GDP that growth of 5 to 6%.

The world crisis that started in 2008 changed these estimates optimistic and imposed new measures to redress. Convergence Program of the Government during 2009-2012, estimated annual percentage change in real GDP from 7.3% in 2008 to 7% for 2009, 1.3% in 2010, 2.4% in 2011 and 3.7 in 2012. [8] After the year 2008 is seen that the GDP trend is decreasing so easy and for 2009 year estimated GDP can be 5.5%. We can expect that the rate of waste quantity to follow the same course [1].

The impact of new rules on packaging (such as those relating to the storage of packaging) and placing the separate collection, may lead to decrease the generation of municipal solid waste storage, as the quantities of waste collected separately from packaging to increase.

An important problem is the way to evolution of waste quantity from the offices, enterprises, stores and house hold, considering the requirements imposed by Romania's EU accession [4].

### 2. MUNICIPAL WASTE ADMINISTRATION

The amount of municipal waste generated has been calculated on the average difference (urban and rural) based on prognosis. The degree of coverage of health services and the indicator of house hold generation on year in urban areas was approximately 0.9 kg./inhabitant per day and in rural areas of 0.4 kilograms/inhabitant per day.

Table 1. Prognosis on indicator of house hold generated

Waste Quantity Kg/person /day	2007	2008	2009	2010	2011	2012	2013
urban	0.93	0.94	0.94	0.95	0.96	0.97	0.97
rural	0.41	0.42	0.42	0.42	0.43	0.43	0.43

Source: National Prognosis Commission (www.cnp.ro)

Based on prognosis in table 1 and started from indicator of house hold generated in 2007 year we estimate the waste quantity from 2008 to 2013 year. We considered the average waste quantity generated of 0.9 kg / inhabitant per

day in urban areas and 0.4 kg in the rural area and apply to the estimate population in the two environments (table 2).

Table 2. Prognosis of waste generation for the south-east developing region.

No.	Waste types	2007	2008	2009	2010	2011	2012	2013
1	Collected house hold	urban	493	508	523	533	542	552
	rural	76	134	154	162	167	174	179
2	Uncollected house hold	urban	43	32	22	16	11	6
	rural	114	57	39	33	29	24	20
3	Waste from trade, industry, institutions	196	198	199	201	203	204	206
4	Waste from parks and gardens	24	24	24	24	25	25	25
5	Waste from markets	20	21	21	21	21	21	21
6	Street waste	32	32	32	32	32	32	32
Total waste quantity		1000	1007	1016	1024	1032	1040	1048

Source: National Prognosis Commission (www.cnp.ro)

**“Mircea cel Batran” Naval Academy Scientific Bulletin, Volume XIV – 2011 – Issue 2**  
**Published by “Mircea cel Batran” Naval Academy Press, Constanta, Romania**

The flux of waste separately collected has been included in the equivalent of household waste. The percentage of 70% is household waste from trade and industry. For the categories of detailed packaging waste, the National Agency of Environmental Protection, has given equal growth for packaging paper and cardboard, glass, plastic, metal and

wood [2]. Their composition for 2008 is as follow: 26.5% for paper and cardboard; 30% plastic; 20% glass; 11.15% metal; 11.75% wood. Waste separately collecting will be generalised at the south-east developing region. In the next table is shown a prognosis on types and waste percent corresponding in the period 2008-2013.

Table 3. Types and waste percent on 2008-2013

	2008	2009	2010	2011	2012	2013
Paper and cardboard	60.1	66.8	71.5	75.9	75.9	84.0
Plastic	11.3	12.3	13.8	15.5	15.5	23.3
Glass	32.0	38.0	44.0	48.4	48.4	60.2
Metals	50.0	56.9	64.4	72.2	72.2	87.0
Wood	7.4	8.5	12.2	15.5	15.5	19.1
Total recycling	33.0	37.5	41.9	45.9	45.9	50
Total valorified	40.0	45.0	48.0	50.0	53.0	60

Source: National Prognosis Commission ([www.cnp.ro](http://www.cnp.ro)) [8].

### 3. WASTE COSTS ADMINISTRATION IN THE SOUTH-EAST DEVELOPING REGION

Costs associated with proposed investments of waste management have been extracted from several sources [2].

Establishment costs are high about the experience of projects implemented in Romania [3], as well as experience gained in the estimation of the costs of equipment and waste management, in line with international projects.

Operating costs are also influenced by the locations of new facilities and advantages. An increased level of safety on the estimate of costs can be achieved in later stage of planning, related to feasibility studies and is accompanied by the conceptual and detailed outline of the site, and the particular characteristics of the installations.

In the present stage of the process of planning, investment costs are based on the average total cost of various facilities and the various types of equipment to be purchased.

Taking as a starting point for the proposed funding for the region and said unit costs were estimated the following costs for investment.

Result analysis is a calculation of the overall VPN (net present value) associated costs of new services for waste management. Also, the calculated values are updated per tonne of waste, during the planning and per person per month. Net present value of investment per person per month is average total cost per person per month of investment over the period planned.

If we assume that a program of investment is financed entirely by user fees, the impact of the average monthly investment would be 0.48 Euro per person. It is likely that investment is borne by the EU.

Assuming that 70% of the EU financial support is directed towards investment. The cost of operation and maintenance is financed entirely by user charges and the impact of the average monthly investment would be 0.36 euros per person.

The total investment amounts to 79.7 million euro of between 2007 and 2013. This amount does not include projects that have already ISPA funding.

Also needed will be of 0.4 million €/year, for replacement containers of waste after 2013.

Table 4. Investments costs for south-east developing region

Types	Collecting units	Values/unit €	TOTAL x 1000 €
Collecting systems	11374		7985
➤ euro container 1 m3	7080	400	2832
➤ euro container 2.5 m3	4294	1200	5153
Collecting equipment	132		21780
Vehicles	132	165000	21780
Infrastructure			
Transfer stations	22		2200
Sorting and treatment	43		2643
Sorting stations	19	20,48	1331
Composing station	24	33,63	1312
Investment in new depot	12		40395
Warehouse		9,3	38595
Dosing	4	150000	600
Compactor	4	150000	600
Excavating	4	150000	600
Warehouse closed		150000	4410
TOTAL investment costs			79723

**“Mircea cel Batran” Naval Academy Scientific Bulletin, Volume XIV – 2011 – Issue 2**  
**Published by “Mircea cel Batran” Naval Academy Press, Constanta, Romania**

In the analysis carried out assumes that the future income will increase by the rate of GDP growth in the region.

Forecast growth rates of GDP for the period 2006-2009 were developed by the National Commission for Prognosis and are presented in the table below.

In the table below shows that the annual rate of GDP growth after 2009, will fall to 5%, and will remain constant in 2011 and beyond each year to all regions.

Table 5. Evolution of GDP – Regional development, 2007 edition

Developing region	GDP in %			GDP estimate in %		
	2006	2007	2008	2009	2010	2011
Average	6,0	6,2	6,3	6,0	5,5	5,0
1. NORTH - EAST	5,8	6,1	6,5	6,0	5,5	5,0
2. SOUTH - EAST	5,9	5,9	6,7	5,9	5,6	5,5
3. SOUTH	6,0	6,0	6,1	6,0	5,5	5,0
4. SOUTH - WEST	6,1	5,8	6,0	6,0	5,5	5,0
5. WEST	5,8	5,7	5,9	6,0	5,5	5,0
6. NORTH - WEST	5,4	5,9	6,2	6,0	5,5	5,0
7. CENTER	5,7	5,9	6,0	6,0	5,5	5,0
8. BUCHAREST	6,6	7,1	6,8	6,0	5,5	5,0

Source: National Prognosis Commission (www.cnp.ro)

Convergence of government programs, editions 2009 and 2010, these estimates have changed significantly under the impact of global crisis but, in terms of strengthening global situation and overcome the critical moment of economic and financial crisis, is expected to accelerate economic growth in 2012.

Taking as a point of reference income levels from 2007 and adjusting them with the forecasted values of regional

GDP can be calculated acceptable level of monthly costs for waste management for each developing region from Romania.

Another problem is represented by the costs of waste administration. In the table no.6 we show an estimation of waste cost administration from 2007 to 2013 in each developing region [2].

Table 6. Estimation for waste administration costs in €/on month/on person

	2007	2008	2009	2010	2011	2012	2013
Romania	1,72	1,83	1,94	2,05	2,15	2,26	2,37
1. NORTH - EAST	1,55	1,65	1,75	1,85	1,94	2,04	2,14
2. SOUTH - EAST	1,51	1,61	1,70	1,80	1,89	1,98	2,08
3. SOUTH	1,56	1,66	1,76	1,85	1,95	2,04	2,14
4. SOUTH - WEST	1,59	1,69	1,79	1,89	1,98	2,08	2,18
5. WEST	1,85	1,96	2,08	2,19	2,30	2,42	2,54
6. NORTH - WEST	1,78	1,89	2,00	2,11	2,22	2,33	2,44
7. CENTER	1,77	1,88	1,99	2,10	2,21	2,32	2,43
8. BUCHAREST	2,34	2,50	2,65	2,80	2,94	3,08	3,24

In south-east developing region the monthly average availability of supporting the growth rates for waste management, is from 1.32 euros to 2.08 euros between 2007 and 2013. For example, the ability to pay monthly in Region 8 (Bucharest) is where the highest maximum monthly payments accepted beyond the national average by 30%.

The most important source of income for households in urban areas is the salary and welfare. Impact of food produced in the private and the agricultural products have an impact on total income of urban households (11% of total revenue) [5].

In rural areas the most important source of income is farming activities and self income is low. This activity represent

45% of total revenue. Other sources of income are wages and self-financing (28%) and welfare (20%).

Rural Development Study results can be used for a very general approximation of the ability levels of support to rural households. In south-east region [6] the rural population represents 44.5% of the total population. It can be very general estimate that the ability of the monthly support charges of waste management - the person in rural areas - has fallen from around 1.9 euros in 2008 and will increase to 2.4 euros in 2013. The level of waste administrative taxes [7] in south-east developing region is show in table no.7.

Table 7. Level of waste administrative taxes in south-east developing region

Localities	Tariff (including TVA)		waste tariff at warehouse with TVA	Collecting quantity (30.06.2010)		
	Populations	Companies		total	From what	
					Populations	Comp-nies
	RON/pers /month	RON/mc/ month	RON/ mc	Quantity[mc]	Quantity[m c]	Quantity[mc]
Brăila	5,40	40,49	33,81	7545	5.690	1.855
Buzău	4,28	46,54	40,04	58615	49.882	8.733
Constanța	3,00	69,00	38,64	74634	61.809	12.825
Galați	2,25	29,78	4,66	34.014	19.064	14.950
Focșani	2,99	27,47	9,95	69849	42.754	27.095
Tulcea	4,00	39,00	10,00	47034	47.034	
Tecuci	1,98	28,7026	6,0	10.896	10896	
Average tariff	3,42					

Source: Dates from ANRSC, 2010

Tariffs applied to households in 2010 were between 1.98 to 5.4 euro per person / month. The average tariff for the management of waste at the south-east region was estimated at 3.42 RON / person / month. In other words, with the reference year 2010, is acceptable growth rates around. 0.4 euro per person per month by comparing with the year 2009. This amount may increase if the regional income per person, will increase.

#### 4. CONCLUSIONS

Primary predictions of the financial flows of investment in waste management service in the region have been developed, taking into account increased costs for the proposed investments and their impact on operating costs. Must specify that they were considered only incremental costs (additional) of the proposed investment for a planning period of 2006-2025, i.e. impact of additional investment and operating cost (increase / decrease) in regional infrastructure to manage waste.

Current costs for waste management in the region not included in the analysis and are assumed to be constant. These costs cover both the needs of current operations and the need for replacement existent equipment .This analyse can be characterized as follows: it was developed in real terms for 2010 year prices. The calculations have considered the costs for different categories of activities: collection, sorting / recycling / transfer, transport and disposal at landfill site (costs for these components are based on standard unit costs).

The proposed investment falls within acceptable limits possible in the region. In south-east region, a rate of 30% of waste, was collected from factories, offices, gardens, streets and cafeterias. The rest of garbage provide from the household. If the costs would be distributed proportionally between the generators of waste (population, business administration) and the consumers from the household. The values presented in this studies are considered average per capita.

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