Construction and Demolition Waste Management: A Case Study on Romania

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Abstract: - The paper presents the situation of construction and demolition waste in Romania, in the context of a previous economic growth with construction as one of the main drivers. The situation of the construction market in Romania is presented, alongside a statistical view of the waste generated, both at a macroeconomic level as well as at a microeconomic level, by using results of a questionnaire applied to several Romanian companies in the field.

Key-Words: - construction and demolition waste management, strategies, Romania

1 Introduction

The design, construction and maintenance of dwellings and other types of buildings has an tremendous amount in the environment and on resources. The sustainability issue that arises when constructions are discussed is two-pronged. Firstly, the issue of the depletion of scarce resources, such as: timber, gravel or sand has been mitigated to some extent in the past years, by shifts in technology and the use of energy-efficient “clean” materials. Secondly, the waste generated by construction activities in the context of environmental contamination, is the issue addressed in the paper with a focus on the Romanian situation.

The important increase in the construction activity throughout the world in the past decade, as well as the need to demolish non-energy efficient or non-compliant to present regulations buildings has lead to several issues regarding the waste generated by the activity of construction and demolition.

2 Romanian situation on construction and demolition waste management

Romania, as a member state of the European Union, applies the same requirements and objectives as all member states in the field of waste management, that is: prevention and minimization of waste generation, reuse and recycling, turning waste into energy and treatment of waste with a view to decrease both quantities and dangerous potential and, last, but definitely not least, as based on European history on waste management, depositing waste in landfills. In order to clarify issues regarding the construction and demolition waste in Romania, a classification of construction activities, as made by the Romanian National Institute of Statistics, is necessary [1]. Therefore, the construction activities are the following:

- Construction as business – construction activities by construction companies
- Construction for self usage – construction done by individuals and/or companies for their own use and by using own resources
- New constructions – Greenfield construction of new buildings: dwellings, office buildings, etc.
- Capital repairs
- Maintenance and current repairs.

Demolition is not considered to be part of the construction activities.

2.1 Current Romanian Construction Market

The Romanian construction market is undergoing the global financial and economic crisis with difficulty, especially after a series of several years when the construction sector was providing one of the most important drivers for economic growth. Romania, as one of the new EU countries, has confronted itself to a much larger increase in the construction sector, that has generated in 2008 10.5% of GDP, as compared to 5.7% in 2002 [2].

The latest official data on the supply and demand in the construction market come from 2008, referring to the 2007 situation, which provided the most important growth so far. However, empirical observations, as well as monthly data from the Romanian National Institute of Statistics, show that the entire situation has declined after 2007.

At the peak of activity, 45,867 new habitations were completed, with 7,689 more than in 2006; most buildings were in the north-eastern region of Romania, followed by the metropolitan area of Ilfov (which includes Bucharest) and the south-eastern region.
Bucharest is a special case, accounting for around 65% of the construction projects for dwellings and office buildings [1].

Apart from the new construction market, throughout Romania, there is still an extremely high number of habitations built before 1989, with the materials and technologies corresponding to that time, including with asbestos-based materials.

### 2.2 Legal Regulations regarding C&DW

The current situation in Romania as regards C&DW management and treatment fall under the Second Priority Axis in the Operational Sector Plan for Environment issued by the Romanian Government, in the National Strategic Plan. The Second Axis refers to the development of integrated waste management systems and the rehabilitation of contaminated historical sites. Romanian legislation proposes just two alternatives for the treatment and deposit of waste: the operations take place in the company generating waste or waste is transferred to third parties specialized in waste treatment and elimination. For depositing waste (according to Orders of the Ministry for Environment and Agriculture MMGA Nr. 867/2002 and Nr. 95/2005), a series of criteria have to be fulfilled in order for a certain waste to be accepted in a deposit. The criteria are aimed at ensuring environmental protection and health protection for the population, while taking into consideration the type of waste, its composition, its percentage of organic matter, the biodegradability of its components, etc.

The European regulations, to which Romania must adhere to, impose the collection of C&DW in special places in view of their subsequent transportation to treatment stations. In order to reduce the quantity of deposited waste (according to Framework Directive on waste 75/442/EEC as amended by 91/156/EEC and the Fifth Environmental Action Programme), the waste that can be reused or recycled is prohibited from depositing. In this direction, Law no 426/2001 to enforce the Governmental Ordinance 78/2000 states that the mayor’s office in each town sets a location for depositing the non-reusable and/or recyclable materials resulting from construction and demolition, and the companies are responsible for either reusing, recycling or eliminating the waste by using one of the previously mentioned alternatives: either in-house waste management or outsourcing to specialized companies. Governmental Decision 856/2002 makes a list, based on the European Waste List, stating the types of waste resulting from construction and demolition activities:

- Concrete and other ceramics
- Timber, glass and plastics
- Asphalts
- Metals (including alloys)
- Soil, gravel and rocks (including excavations from contaminated areas)
- Isolating materials and materials containing asbestos
- Gypsum based materials
- Other waste

This type of classification is more than necessary when implementing a C&DW management strategy, considering the fact that waste must be treated differently based on its components, that some components cause waste to be included into dangerous materials category (such is asbestos).

### 2.3 C&DW Situation in Romania

Based on the classifications provided by Romanian Government in the previously mentioned laws and regulations, and the official data provided by the National Institute of Statistics [1], the following conclusions may be drawn in which concerns the Romanian situation:

- Out of the total municipal waste, C&DW have a weight of 4% in 2003, 10% in 2004 and 7% in 2005. In total amounts, the quantity of C&DW has raised in 2004 to 646,400 tons and then dropped in 2005 to 466,893 tons.
- The weights of each type of C&DW in 2006 as compared to 2004 are listed in Table 1.

<table>
<thead>
<tr>
<th>Category</th>
<th>2004</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical and medical waste</td>
<td>0.23%</td>
<td>0.14%</td>
</tr>
<tr>
<td>Materials and equipment</td>
<td>1.00%</td>
<td>0.88%</td>
</tr>
<tr>
<td>Animal and vegetal waste</td>
<td>1.55%</td>
<td>1.62%</td>
</tr>
<tr>
<td>Standard combined waste</td>
<td>0.70%</td>
<td>0.79%</td>
</tr>
<tr>
<td>Mineral solid Waste</td>
<td>47.55%</td>
<td>42.13%</td>
</tr>
<tr>
<td>Solvents</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Acid, alkaline and saline waste</td>
<td>0.07%</td>
<td>0.07%</td>
</tr>
<tr>
<td>Chemical residues</td>
<td>0.13%</td>
<td>0.02%</td>
</tr>
<tr>
<td>Metallic waste</td>
<td>0.58%</td>
<td>0.28%</td>
</tr>
<tr>
<td>Glass</td>
<td>0.07%</td>
<td>0.13%</td>
</tr>
<tr>
<td>Timber</td>
<td>0.19%</td>
<td>0.20%</td>
</tr>
<tr>
<td>Combined and not-differentiated waste</td>
<td>0.35%</td>
<td>0.46%</td>
</tr>
<tr>
<td>Dredging spoils</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Mineral waste</td>
<td>47.26%</td>
<td>40.57%</td>
</tr>
<tr>
<td>Combustion waste</td>
<td>0.29%</td>
<td>1.56%</td>
</tr>
</tbody>
</table>

Table 1 Construction and demolition waste – weights in total of types of waste 2004 and 2006
The situation resulted from a questionnaire applied by the authors of this paper to 3 construction companies, of several sizes and with different types of construction activities, stated the situation presented in Figure 1. The questionnaire was applied in order to get a complete view of the situation, from a microeconomic point of view, as well.

Fig. 1 Percentage of C&DW – microeconomic view

- The results of the questionnaire have proven that most of the waste generated in the three companies analyzed consisted of iron. The metallic waste was entirely re-used, either via in-house usage or recycling.
- Another result from the questionnaire has shown that the recycling and reuse of waste has increased in 2007 as compared to 2006 with 106% on the average.
- The trend of recycle is expected to be on the rise, considering the price of a recycled and/or material with is considerably lower than the price of a new raw material.

2.4 Construction and Demolition Waste Management

The current practice in Romania on C&DW management follows the trends and technologies in Europe and is presented in the next figure.

In literature, it is well known the fact that the traditional treatment of construction and demolition waste (further on referred to as C&DW) was landfilling, usually in landfills used for municipal solid waste [3]. The same situation has been frequently encountered in Romania, where, currently, there is no landfill dedicated to C&DW. However, as throughout Europe, there is an increase in scarcity of landfill space, as well as increased costs in environmental protection in conformity with European regulations, therefore a like solution is less and less attractive for states. In which concerns Romania, we shall refer to the situation of Bucharest, which, as stated before, accounts for 65% of the construction projects. Currently, Bucharest has 3 municipal solid waste landfills: Glina, Chitila and Vidra. Glina, the largest of landfills, with a surface of 119 ha, out of which 110 are used for waste depositing, and out of these 37 actually belong to the former non-ecological landfill. A recent declaration of the Romanian Ministry for Environment [4] states that approximately 93% of all Romanian landfills are not in conformity with environmental regulations, and according to European requirements, they have to be in conformity by 2010.
3 Recommendations for a future strategy

In view of this situation, there are a series of activities necessary to be undertaken in order to reach a proper level of waste management in demolition and construction in Romania, that is:

- A better statistics reporting of the construction process with a focus on waste
- A correct implementation of laws and regulations
- More stimulation of the development of recycling companies, either public or private
  - Proper collection sites
  - Suitable landfills for C&DW
  - Separation of C&DW from Municipal waste
  - Increase in fines for non-compliant companies
  - Creation of a landfill tax for inert C&DW
  - Stimulation of the use of prevention methods
- Information and training for construction and demolition companies.

4 Conclusion

In conclusion, Romania has benefited economically from the construction sector as a driver for economic growth. However, one of the downfalls of this has an intense generation of waste, leading to the need of suitable laws, regulations and instruments. The country has implemented the European regulations and has listed the Best Available Technologies, however, there are still a series of steps that need to be taken in order to reach a proper level of C&D waste management.

References:

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