

# Benefits of the selective collection in the public company Companhia Docas do Pará - CDP, in the Amazon / Brazil

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## INTRODUCTION

The pollution of the environment, in particular the hydric resources, compromising the useful life of landfills, the social problem caused by the permanence of garbage dumpsters, the abusive use of raw materials, are problems that could be mitigated if the population properly disposed of urban solid waste, which is still a severe torment to be tackled and solved by environmental managers of Brazil. Recycling is a mechanism still little explored, but with a significant potential of exploitation, because it can be used as an environmental, social and economic indicator extremely viable in the process of solid waste management (RIBEIRO *et al.*, 2014).

According to Ribeiro, Besen (2006) *apud* Waite (1995) selective collection offers several advantages, among them the environmental benefits by reducing the use of virgin raw material and the economy of renewable and non-renewable natural resources; the energy savings in material reprocessing compared to extraction and production from natural raw materials and the recovery of secondary raw materials, and the reduction of waste disposal in landfills and the resulting environmental impacts. Singer (2002) reports about the economic valuation of recyclable materials and its potential for generating business, work and income. It emphasizes that selective collection contributes significantly to urban sustainability, as well as it has been integrating over the years a profile of social inclusion and income generation for the most deprived sectors and excluded from access to formal labor markets.

Since the publication of Decree No. 5.940, dated October 25, 2006, the entities of the federal public administration should institute directly and indirectly the separation of recyclable waste discarded for the benefit of the functioning of the organs directly in the generating source, and its destination made to the associations and cooperatives of waste pickers.

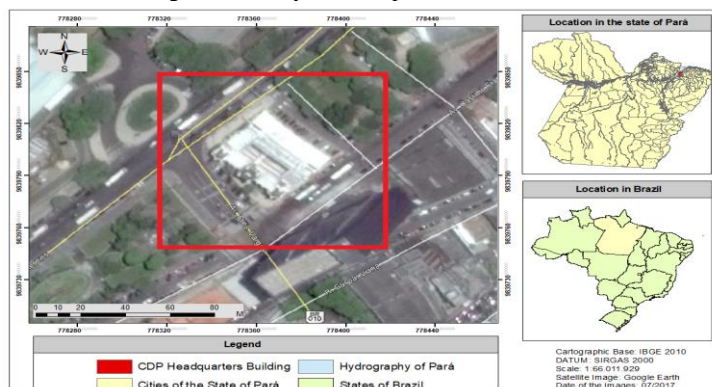
The Companhia Docas do Pará - CDP is a public company of mixed economy, founded in 1967, responsible for the administration and commercial exploitation of port facilities in the state of Pará, in the Brazilian Amazon. CDP implemented selective collection in 2008, with the creation of a selective collection commission, the acquisition of selective collectors in accordance with CONAMA Resolution No. 275, of April 25, 2001, which establishes the color code for the different types of waste, to be adopted in the identification of collectors and transporters, as well as information campaigns for selective collection.

In this context, the objective of the present study is to survey and identify the economic benefits that the CDP obtained in the period from 2012 to 2017, through calculations of costs that the company was responsible for the transportation and disposal of solid wastes before and after the implantation of the selective collection, besides the identification of the results obtained from the implantation of the collection of recyclable residues.

## MATERIALS AND METHODS

The work has as its study area Companhia Docas do Pará - CDP, at its Headquarters Building located at Avenida Presidente Vargas, 41 - Campina, Belém / PA, where the administrative services of all port units under this responsibility the company (Figure 1).

Figure 1 - Study area adopted in the research.



Sources: Authors (2017).

The research was developed in two stages. The first step was divided into two phases. In phase 1 a bibliographic research was carried out on articles, thesis, dissertations and documents made available by CDP as the contract signed between CDP and outsourced company to carry out the collection, transportation and final destination of solid waste. In phase 2, were verified the residues inventories of the Headquarters Building during the period of 2012 to 2017, payment processes including invoices and certificates of final destination and interview with one of the then managers of the environment sector of CDP.

The second step was the tabulation of data, as well as the statistical work and formulation of calculations performed using the program Excel 2010, as well as the generation of quantitative data for monthly and annual waste and their respective costs of final disposal and still made the necessary comparisons with the aid of that software.

## **RESULTS**

The environmental management sector reports that after the provision of selective collectors in all rooms of the building and the conducting of environmental awareness lectures, positive results were obtained, causing a progressive decrease in the number of weekly collections by the contracted company. Initially, in 2007 an average of five (5) weekly collections of waste per contracted company were carried out, around 20 monthly and in 2017, it started to do on average 1 (one) weekly collection, around 5 per month.

Taking into account that the cost of each collection in the year 2007, prior to the implementation of the selective collection was R\$ 300.00 (three hundred reais) and from 2014 the value of the collection was changed to R\$ 399.00 (three hundred and ninety-nine reais), and comparing, for example, the year of 2007 with an average of 20 monthly collections and the year of 2016 with an average of 5 monthly collections, there was an economic advantage of R\$ 48,060,00. This represents a reduction of 75% of the residue that is destined for final disposal.

As to the residue that has been selected, i.e., separate waste at source, which ceased to be destined for landfill, highlights the main materials generated in an administrative feature, such as paper, cardboard, plastic, metal and long-life packaging.

The recyclable materials are donated to a cooperative in the region, after cleaning and sanitizing them, which represents significant gains for this cooperative, such as paper, which attributes a gain to the cooperative in 2016 of R \$ 374, 00 and the plastic of R \$ 2,205.00.

During this period, it was evaluated that the employees of the CDP began to collaborate actively in the process, gradually increasing the total of recyclable waste, thus, the cost savings with the destination of non-recyclable materials.

The tabulation of data and statistical treatment performed with information relating to the quantity of solid waste generated, as well as with the financial values spent with the monthly collections by the contractor will be submitted in the complete job.

## **CONCLUSION**

This research reveals positive results with the implementation of a selective collection system in CDP, Because they understood the economic factor by means of the reduction in 75% of the waste generated, fostered social inclusion of members of the cooperative that receives the recyclable materials, the increase of their income, as well as the advances in the educational context with the notorious environmental awareness that some employees have developed and the benefits to the environment with the contribution to the extended life of the controlled landfill, reduction of the use of raw material, consequently reduction of the costs of production; mitigation of soil, water and air pollution. Therefore, it is concluded that the selective collection is an adequate alternative of environmentally favorable destination of the recyclable solid residues generated in administrative institutions in the Amazonian context.

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