

# Discussion of a New Management System for WEEE in Developing Countries: Promoting Social and Environmental Benefits

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**Abstract**—A new approach to the waste electrical and electronic equipments management in developing countries is discussed in this paper based in experiences of medium cities in Brazil, consisting in the integration of trained and specialized waste pickers cooperatives to the process. The aim of this study is to find out the community acceptance to the new system and to propose the basic steps for the implementation in further cities. The benefits of the system include social and environmental benefits. Questionnaires were applied to a community sample in Uberaba, MG, Brazil, consisting of 108 people, and 92.6% of the participants were favorable to the implementation of the system. It is expected that this study should be useful for decision makers in similar cities as well as a source of data on WEEE alternative management systems in a developing country, such as Brazil.

**Keywords**—Environment, Recycling, Solid Waste Management, Waste Electrical and Electronic Equipment.

## I. INTRODUCTION

ONE of the most serious environmental issues featured nowadays consists of the lack of appropriate solid waste management, especially in developing countries. It has been estimated that solid waste generation globally in 2010 was approximately 1.3 billion tonnes and this amount is expect to rise to 2.2 billion tonnes by 2025 [2]. Several countries still dispose solid waste in an unsound manner.

Waste Electrical and Electronic Equipments (WEEE) is a term used to define items of electrical and electronic equipment that have been discarded as waste with no reuse purposes [4]. It is known that WEEE is a fast-growing waste stream which has been creating significant challenges to waste management in developed and developing countries. Brazil, for instance, generated in 2014 1.4 million tonnes of waste electrical and electronic equipments, whereas the global generation is reported as 41.8 million tones [1]. Nonetheless, actions for the correct management of this sort of waste in that country are still punctual and insufficient. A national plan for such management is inexistent, although discussions on the establishment of an agreement between the government and private sector aiming for the reserve logistics

of WEEE are currently ongoing [3]. Many of the activities related to collection and recycling of WEEE in Brazil are inefficient and lack environmental, health and safety standards and WEEE often is collected by waste pickers, which are not prepared to manipulate these materials. On the other hand, initiatives involving capacitating and training waste pickers to safely handle WEEE are currently arising in Brazil.

## II. MATERIAL AND METHODS

A questionnaire form were prepared containing five questions to assess the acceptance of the sample community to the proposed system, involving trained waste pickers cooperative members in the process. Data were tabulated using Microsoft Excel. The questionnaires were applied between 9<sup>th</sup> and 20<sup>th</sup> December 2013, in one neighborhood in the city of Uberaba, MG, Brazil.

## III. RESULTS AND DISCUSSION

The questions and answers to the questionnaire should be read at Table I.

57.5% of the participants already have the habit of separating recyclable materials, mainly plastic bottles and aluminum cans which are collected by the waste pickers, known in Brazil as “*catadores*”. Those waste pickers are often members of the community and are organized in a cooperative working in partnership with the Municipal government. The cooperative is responsible for collecting recyclable materials in at least 5 areas in Uberaba.

The majority of the participants, 95.4% claimed to know what WEEE means, referring to items such as cell phones, computers and televisions. 4.7%, however, could not explain the meaning of the term WEEE.

Question 3 aimed to assess the participants’ knowledge of the possible harmful effects of WEEE on the environment and human health. As Table I shows, most of the participants (77%) believed it can cause negative impacts.

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TABLE I  
ANSWERS TO THE QUESTIONNAIRE

Questions	Answers	Frequency	Percentage (%)
Q1. Do you separate recyclable materials from non recyclables?	Yes	62	57.5%
	No	46	42.5%
Q2. Do you know what is WEEE?	Yes	103	95.4%
	No	5	4.7%
Q3. WEEE is harmful to the environment	Strongly Disagree	5	4.7%
	Disagree	11	10.2%
	Neutral	9	8.3%
	Agree	28	25.9%
	Strongly Agree	55	51.0%
Q4. Do you separate WEEE from other waste?	Yes	40	37.0%
	No	68	63.0%
Q5. Would you dispose your WEEE in the collection point?	Yes	100	92.6%
	No	8	7.4%

Regarding to the destination participants give to occasional WEEE they produce, 37% claimed to either keep it stored or give it to waste pickers that could eventually collect recyclable materials in their area, while 63% of the participants dispose it as domiciliary waste, which is collected by the municipal service and, therefore, destined to the sanitary landfill. Finally, when asked if they would be favorable to direct WEEE to a collection point to, posteriorly, be manipulated by trained individuals who would be able to provide the best destination for each material that composes WEEE, 92.6% answered positively.

The results suggest that a WEEE management system involving the cooperative could work well. One of the reasons for such statement lays on the fact that the community of certain areas already accepts well the work of the waste pickers cooperative in regards to plastic and aluminum. Therefore, the following activities should guide the implementation of such systems:

First, the establishment of a partnership between the municipal government, private and third sectors, in order to improve the infra-structure in the collection points, when they exist, is crucial. Secondly, training the appropriately the interested individuals from the waste pickers cooperative is a key activity. In order to achieve that goal, the academia has to be included. Funding that process can be accomplished when submitting the WEEE management Project for the city, to funder agents such as Municipal, Estate or National Funds for the Environment. Again, partnership with the academia or the third sector is needed in order to produce the WEEE management Project. The community leaders should be encouraged to take part in the process, and activities aiming to increase population awareness on environmental and social issues regarding to WEEE lack of management are essential.

#### IV. SUMMARY

WEEE management schemes involving the participation of waste pickers cooperatives in certain cities of Brazil should promote social benefits, such as increase of income for waste pickers' families, and environmental benefits as WEEE will be deviated from municipal sanitary landfills to a more appropriate destination. In Uberaba, Brazil, it has been shown that 92.6% of the participants who answered the questionnaires were favorable to the system proposition.

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