

Study of viability in recycling electronic boards focusing on reuse of components

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Abstract

In this project, recycling mechanisms were analyzed to make possible that the Electrical and Electronic Equipment (EEE), that are part of our daily life, could have a sustainable cycle, also attempting to the return of raw materials for the production chain, obtained from the recycling of Waste Electrical and Electronic Equipment (WEEE). Contacts were made with companies in the sector in order to understand how they are dealing with the challenge to comply with the National Policy on Solid Waste (PNRS - Law 12.305 of 2010). In this research, we also worked out a proposal for a recycling process.

Key words: Reverse Manufacturing, Recycling, Electrical Electronic

Introduction

Recycling begins when consumers or companies discard their electronic equipment or production leftovers. Currently in Brazil 8kg/inhabitant/year of WEEE [3] are generated and the potential impact on the environment is too high due to incorrect handling and disposal of these wastes. In this way, the use of reverse manufacturing in WEEE becomes necessary.

Results and Discussion

The manufacturers, when implementing recycling, aim to protect the image of their brand, get raw materials at a lower cost in order to get competitive advantage in the preservation of the environment.

The implementation of reverse manufacturing requires planning, analysis, working capital and time to the whole chain become efficient. Table 1 presents the basic material extracted in a recycling process [1]. They are separated by milling processes, pyrometallurgical and hydrometallurgical processing, leaching and ventilation. Gold, copper and aluminum are the financial boosters of recycling. The reuse of electronic components focuses on EEE's repair.

Table 1. Computer recycling

Material	Where	%of all	Recyclable	R\$/kg of WEEE
Gold	Connector	0,0016	99%	0,40
Cooper	Conductor	6,9287	90%	0,68
Aluminum	Structure	14,1723	80%	0,24
Silver	Conductor	0,0189	98%	0,21
Silica	Fiberglass	24,8803	0%	0,12

The viability of reverse logistics today strikes with responsibilities assignments between manufacturers, dealers, consumers and the government. Law specifies the process, but many companies still treats the waste management as

just an expense or even sell their leftovers to recover some expenses, without worrying about the proper disposal of WEEE.

Therefore, we propose a new process chain and the theoretical construction of a small machine and a recycling process chain, (Figure 1), that extracts five basics raw materials of WEEE's, without the need to accumulate large stocks of WEEE [2].

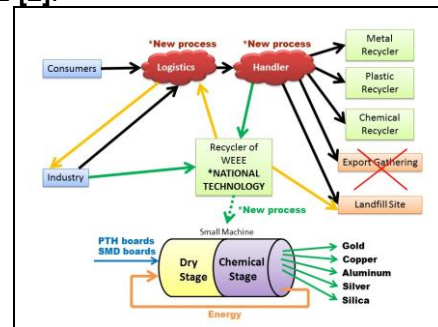


Figure 1. Developed process chain.

Conclusions

After some research, interviews and visits it was concluded that reverse logistics is feasible. Many materials' separation processes that are currently executed independently can be integrated, resulting in time saving, space and therefore money, by combining existing methods to new ideas, instructing technical assistance, educating consumers and promoting easy access to the WEEE's collection points.

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¹XAVIER, L.H. *Gestão de resíduos eletroeletrônicos*. RJ: Elsevier, 2014.

²Jianzhi L. "Printed circuit board recycling: a state-of-the-art survey", IEEE Transactions on Electronics Packaging Manufacturing, vol27, Issue 1, 2004

³<<http://www.sebrae2014.com.br/Sebrae2014/Alertas/N%3A%3A3o-joguemos-a-opportunidade-para#U01YKtKKLU>>. Accessed on July 21, 2015.