Aplication of reverse manufacturing in Brazil with electronic equipment

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Abstract
Seeks to analyze the demand for reverse manufacturing in Brazil, considering economy, technology and higher production capacity of electronics. The study came after checking high global rate of production of electronic waste, leading to a review of the literature and cases; evaluating positive actions implemented and propose best sustainable.

Keywords: sustainable, reverse manufacturing, electronic waste, extension project

Introduction

The uncontrolled growth of world population boosted demand for goods and services, resulting in a consumer society endowed with waste. It is important to say that a category of waste collection in the world's fastest growing is e-waste (Sommer 2005).

In Brazil, we adopt the policy of digital inclusion, directly related to consumerism electronics. The democratic communication should also be a sustainable communication.

Expands the number and variety of these products and models offered to consumers. In order to maintain the steady growth of the market, to produce huge numbers of electronic products, due to the remarkable development of technology and everyday life more convenient; upgradeable or replacement, causing negative impacts to the environment, among other sectors.

To control this scenario of large environmental impact, organizations, government and society in general need to unite efforts to implement recycling programs and thus carry the awareness of all individuals regarding their importance.

So today applies a new concept that involves the reverse flow of materials, walking the end user, or other previous point, until a new use or reuse. Arises the concept of reverse logistics as there are concerns about the handling and management of equipment, components and materials to be recovered.

Recovery can occur in various ways, such as simplified resale, recycling or remanufacturing. It is important to state that the practice of reusing materials and products, as well as reuse partial equipment.

The Council of Supply Chain Management Professional - (CSCMP 2006) believes that the Reverse Logistics (RL) consists logistics management and believes that when performing the management of the supply chain is necessary to plan, deploy and manage efficiently, traditional flows and reversal of goods, services and information seeking to satisfy the desires of customers. It relates to the activities of the reverse logistics concept of reverse manufacturing.

The concepts involving this process can be applied to good environmental practices for the Extension Project Recicla UNESP through a partnership with a company that specializes in reverse logistics and recycling of electronics in the city of Bauru - SP, assisting in the management of waste in the Faculty Engineering - FEB UNESP.

Thus, one can say that it is possible to disseminate knowledge and experiences for students, faculty and staff regarding the management of electronic waste.

Objectives

The objective of this work is to provide continuity to the sustainable management of electronic waste that students, faculty and staff used previously, in partnership with the above company specialized in the field and through the study linked to the management of solid waste generated in conjunction with the Extension Project Recicla UNESP.

Methodological Proposal

In research approach to theoretical knowledge and current practices of schools as forerunners in this area following the Sao Paulo University. The CEDIR - Central Disposal and Reuse of Waste Computers, on the campus of Sao Paulo. Already Recicl@tesc - Recycling Technology of Sao Carlos is an example of partnership involving public management. It is supported by the city council of the city in partnership with social projects and SENAC.

The first implements the practices of sustainable reuse and disposal of electronic waste, such as telecommunications and computer goods that become obsolete. The second is a project that receives and recycles computer equipment enabling the digital and social inclusion through the reuse of equipment that would be scrapped.

There is concern when the environmental aspect, because the equipment that are not recycled and its components will correct destination. One can therefore propose a modified version of the management of electronic waste used by the academic community of the FEB.

The reality in question occurs as a partner in the project company performs actions reliable and environmentally sound solutions to the disposal of electronic waste, with the participation of those involved in the lifecycle of these materials gains and meaning of sustainability and environmental preservation through Reverse Logistics and Recicla UNESP.

Theoretical Foundation

Organizations are responsible to fulfill the commitment to environmental conservation, not only action being temporary, but essential part of them. The targets belonging to the sustainable development challenge contemporary companies.

According to (Bellen 2005), definitions and tools that address the sustainability should consider the lack of knowledge of how the system operates, and we can only verify the environmental impacts of activities and interaction with human welfare, with the economy and the environment.

As examples of the tools mentioned, referring to the area of Reverse Logistics came to contribute to the proper disposal of products. Below Figure 1 illustrating the cycle in question.

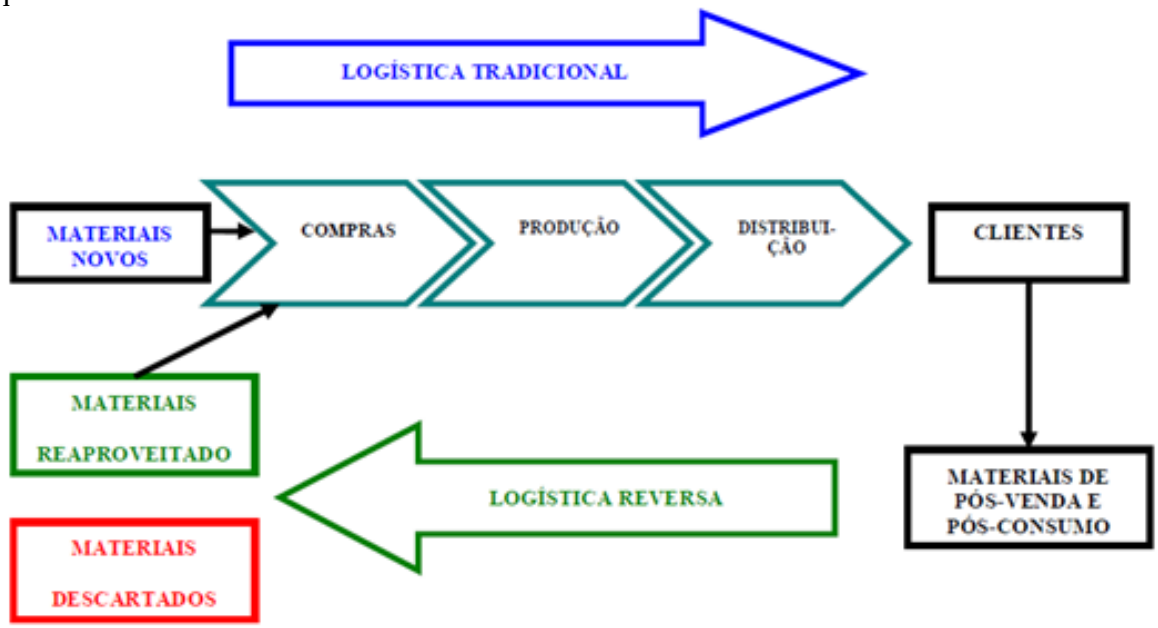

Figure 1 – Reverse Logistics Process. Source: Rogers e Tibben-Lembke (1998)

This study relates the concepts of manufacturing and reverse logistics with the electronic equipment, the emerging "junk". The same is the quick update of the remaining waste and possible replacement of electronic equipment (Brazil 2010).

Currently, it is considered junk e-mail as a solid waste that requires special collection mandatory, representing a major problem for health and the environment, because these materials collected, contained highly toxic heavy metals. Then, may be termed the silent such villains: beryllium, cadmium, lead and mercury. There are risks to employees who work in this activity and the communities surrounding industries.

Second (Pavarin 2008), electronic waste or e-waste is everything from electrical and electronic equipment that no longer have use, including cell phones, computers, printers, DVDs, CDs, fluorescent lights and cameras, among others.

Such waste is commonly disposed of in landfills and contribute negatively to the environment and the scavengers who survive the sale of collected materials in landfills (Siqueira and Moraes 2009).

Good Manufacturing Practices Reverse

Such practices can be verified within a university campus. Thus, one can compare a company that needs elements essential to its operation as water, energy, sanitation and infrastructure. Therefore, you need an environmental management system that works, and that is disclosed.

It is up to institutions of higher education play a positive influence to the society in which it is embedded, seeking to pursue environmental measures that students, future decision makers, get to know and worry about sustainable development in their professions.

Some universities already are concerned about the waste generated and its disposal to the environment, specifically the junk, featuring sustainability projects on campus, such as the USP, with projects involving electronic waste - in the case of Project CEDIR campus Sao Paulo. Already Recicl@Tesc has aid public management. It is developed by the City of Sao Carlos in partnership with SENAC and Social Projects.

This topic will be addressed also the success involving recycling and practice between the Reverse Manufacturing Extension Project Recycle and UNESP company specializing in proper disposal of electronic waste - both belonging to the city of Bauru - Sao Paulo.

CEDIR

The project is a pioneer in the field of treatment of electronic waste at a public institution of higher education. Appearing in 2009, the Center for Waste Disposal and Reuse of IT implements best practices of reuse and disposal of electronic waste, based on sustainable development.

The goods in question are usually obsolete computer or telecommunications. Its inauguration took place in December 2009. This is a pioneer project for treatment of electronic waste in public agency and institution of higher education.

The equipment and parts that are in appropriate conditions of use will be evaluated and sent to social projects, providing an opportunity for disadvantaged individuals to access education and information. When you end the life of them, should be referred to CEDIR. The process involves the junk described above is divided into three stages.

Collection and Screening

First receipt of parts and equipment, aimed at assessing the possibility of being reused. If they are, forwards to social projects through loans. We adopted this course of action in order to ensure that this right of return to CEDIR computer and have a sustainable destination. Already, those who were not reused for social projects, will be forwarded to the second stage - categorization.

Categorization

The equipment is heavy, disassembled and separated by type of material (plastics, metals, printed circuit boards, cables, etc.). The materials are of equivalent type uncharacterized and compressed. The compression is due to the need to reduce the volume and then reducing its cost of transportation.

Recycling

On the third, related materials by type, are stored until collection occurs by recycling companies duly accredited by USP and specialized in specific materials such as plastic, metal or glass.

Recicl@tesc

The creation of this project was due to a partnership between the City of St. Charles and St. Charles Social Network, which goes by the name of Our Home, with support from SENAC.

It consists of a recycling project that aims to welcome technological and recycle computer equipment, enabling digital inclusion through the reuse of such equipment to be scrapped. It is concerned with the environmental area, it needs to have the correct destination for components or products that can not be recycled. Analyzing the data from this project is that the years 2009 to 2011 were the following records:

- 16 complete computers donated in 2009
- 20 complete computers donated in 2010
- 30 complete computers donated in 2011

Important information: about a ton of electronic equipment is collected monthly and the project has the support of 52 people trained for the activities mentioned.

When the devices are not able to donate, there is a flow of waste sorting and segregation proper parts, verifying the procedures of the posterior aspects of Logistics / Manufacturing Reverse.

Forwards up in a later step to specialized clients and selling the lots. Remaining material, or form a new lot or the components are shipped to technological craft project.

Seeking to add value to the process, such numbers make all the difference:

- 22 people trained in Computer Maintenance and Network Deployment in 2009
- 06 people trained in Computer Assembly and Maintenance in 2010
- 09 people trained in Basic Airbrushing in 2010
- 15 people trained in Training Hardware in 2010

In the next section, we will describe the daily life of the Faculty of Engineering, UNESP, with its extension project that focuses on concepts of recycling in general and the company specializes in REE - electronic waste.

Recicla UNESP and Eletrolixo

The Project Recicla UNESP, deployed in 2007 and in force until today, proposes changes in everyday habits and attitudes of teachers, students and university officials, thus promoting and encouraging joint initiatives with the campus community regarding the environmental preservation through some practices.

Among them, inform about the importance of preserving the environment through lectures, informative emails, folders and tracks, use of selective collection, continues through the separation of recyclables such as paper, plastic, metal, batteries and distribution of plastic mugs as a way of replacing disposable plastic cups used at the university.

Thus, through their environmental practices, allows not only to stimulate community unespiana, but all involved directly and indirectly in this project to have a bigger and better perception and understanding of our reality.

Analyzing the current reality check is noteworthy that waste electronics get more and more prominence and attention from the media and government. This new look can be justified by the concern of the government in general these materials present highly dangerous substances to health and the environment and also due to the uncontrolled increase of generation of this type of waste.

Make the environmentally sound management of waste technology becomes a necessity and one of the challenges of urban environmental management. There was always a desire to partner with companies in order to contribute financially to the project and socially for the environment. According to the daily described above, we chose this branch to seek such an agreement.

In early 2012, there was the opportunity to partner with a company that specializes in reverse logistics, specifically in the field of e-waste, which had settled in the same city that this college is installed.

The company in question has expertise in managing industrial waste, particularly electronic waste - REE, according to the National Solid Waste (Law 12.305/10).

Among the services it offers have: Plan for Solid Waste Management, Waste packagers; management REE (transportation, storage, and disposal mischaracterization) as well as lectures and training to other companies. Such actions can be described below:

Plan for Solid Waste Management

There the offering to customers of preparing the Plan of Solid Waste Management in accordance with the Law 12.305/2010 - National Policy on Solid Waste, based on the Integrated Waste Management. This system integrates the entire value chain of the residue in its different sources, from its generation to its final destination, aiming at environmental risk management, ensuring the sustainability activities.

Packaging Waste

The company's representative in the region of Bauru dumps Mecca ecological plaque - made from scrap tubes of toothpaste (75% plastic (PE) and 25% aluminum), drawn from manufacturing companies. Among the advantages, it has the mechanical strength to impact, waterproof, not propagate flames and resistant to chemical agents.

Disposal of Waste Electrical and Electronic

The concepts Eletrolixo specializes in reverse logistics and recycling of electronics, particularly computer waste, offering its customers efficient service:

- Collection;
- Transportation;

• Manufacturing reverse;
• Final destination of technological waste - hazardous.

Taking contact with the theory, one can say that the flow is thus analyzing the description above and also attended ecopoint. See Figure 2.

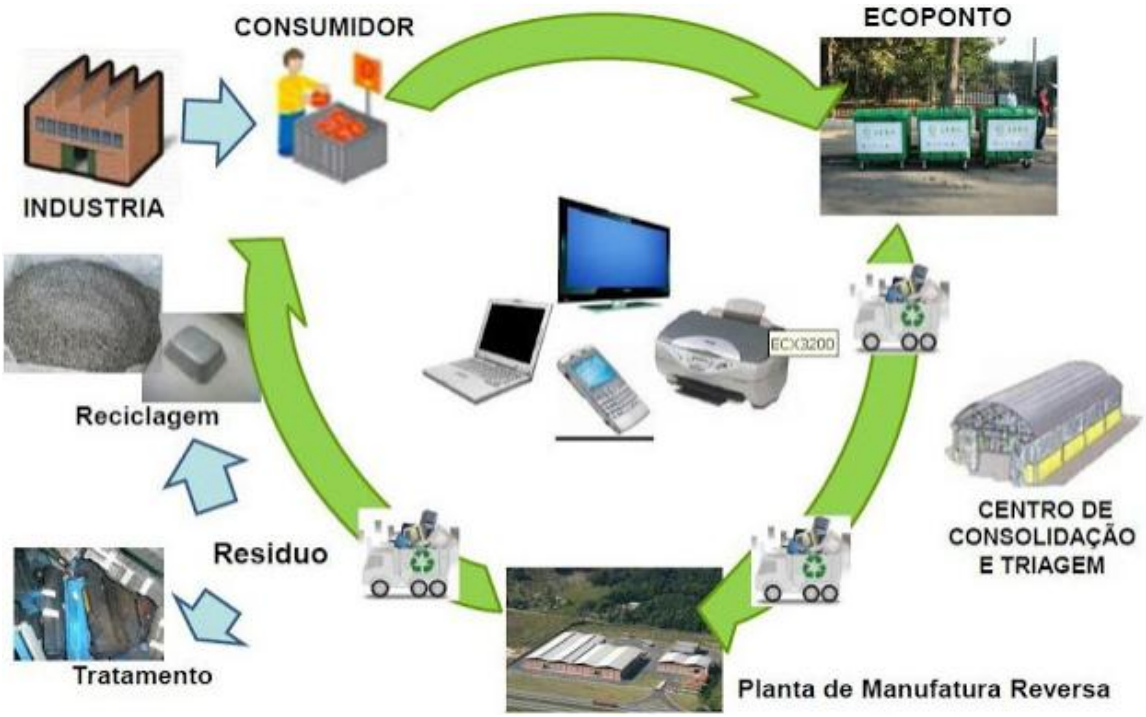

Figure 2: Reverse Logistics – Electronic Waste. 2012.

The implementation of the partnership began with a visit from members of the project at the company's premises, knowing the actions and establishing future proposals for joint action and the same project.

It was established through study of areas with increased movement of people, where the disclosure would be greater, the two fixing ecopoints duly appointed with the company logo and with proper explanations The two sites chosen were: the library, where gathers individuals not belonging only the College of Engineering and Informatics technical Section - where is concentrated the largest contingent of electronic equipment and specialized personnel in the technical area related to electronics. The figures 3 and 4 envision this description.

Figure 3: Recycling point in the campus library - UNESP Bauru

Figure 4: Recycling point in the Technical Section of the School of Computer Engineering

In these "cages" can be deposited: various electronic waste, scrap electronics maintenance, batteries, cartridges and toners for copiers and printers. The eletrolixo is a company licensed by the Environmental Company of the State of São Paulo _ CETESB for the receipt and processing of electronic waste, municipal Besides environmental permit from City Hall and joined Bauru technical IBAMA.Quantifying participation throughout the year of 2012 in partnership with the project, has the following data:

Table 1: Tariff total items collected in the two ecopoints

TOTAL DE ITENS COLETADOS	
MONITOR	18
TV	3
KEYBOARD	10
MOUSE	8
SOURCE	8
STABILYZER	7
DRIVER HD	14
DVD	10
PRINTER	13
DRIVER CD	8
TELEPHONE	5
CELLPHONE	1
MICROWAVE	1
NO-BREAK	1
VIDEO TAPE	2
CALCULATOR	2
CPU	1
OTHERS	11

As shown in the table above, 123 items were collected, cataloged and sent to the company in order to perform the correct destination of the items in question. Students forwarded to the project extremely favorable response to this action by seeking justification facilitate the daily lives of ourselves when the obsolescence of some of his electronic items and assist both in environmental education / awareness in general.

Final Thoughts

While the Reverse Logistics is concerned with the handling and management of equipment, products, components and materials to be recovered, this concept guided activities are marked by recycling electronics - particularly computer waste by students who study and / or working in the electronic area, with full support of engineer active in the area, having the knowledge necessary to dismantle the materials collected at the Faculty of Engineering.

It can be argued that occurs qualitative and quantitative analysis of the material, which is collected at two points in this section of the campus: Library and Informatics Technical Section.

The amount collected by the company is investing in employee seeking continuous improvement and refinement of the techniques mentioned, so you can continue with good sustainable practices held today, meaning gains in sustainability and environmental preservation through the Reverse Logistics.

Thus do the environmentally sound management of waste technology becomes a necessity and one of the challenges of urban environmental management.

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