

AFTER USE MANAGEMENT OF MOBILE PHONES: AN ANALYSIS OF THE EXISTING TAKE BACK INITIATIVES IN RIO CLARO - SP, BRAZIL

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Abstract

Management of e-waste has been an issue of growing concern in the last decade. The EEC approved the RoHS directive setting up limits for hazardous substances (heavy metals and brominated flame retardants) used in the manufacturing of electrical and electronic devices exported to European countries. In Brazil this issue is regulated by the National Policy on Solid Waste that demands that e-waste encompassing hazardous substances are required to be returned to the manufacturer for further remanufacturing or recycling. This paper is aimed to analyze all the existing initiatives for mobile phone take back in Rio Claro city, Brazil, from the standpoint of their organization and efficiency in furthering these devices to remanufacturing and recycling industrial plants. Interviews were carried out with managers of three public ecopoints, four mobile phone stores (Vivo, Oi, Clar, Tim), the local Planning and Development Agency (Sepladema), one department store (C&A), one mobile phone servicing company (Gouveia and Gouveia), and a logistic company (GM&C) that transports and distributes the collected handsets and accessories to companies that perform remanufacture (Suzaquim) and recycling (Umicore, Belmont). The Brazilian Association of Electrical and Electronic Industry (ABINEE) that presently is starting an e-waste take back program in several states were also interviewed. As a result of this study a bill on management of e-waste was submitted to the Board of Alderman and an environmental education program is presently underway on public and private schools.



OUTLINE

- Critical points of the presentation
- Research problem and research questions
- Objective of the study
- Brief characterization of Rio Claro city
- Motivations of the study
- Research methodology
- Brazilian major regulations pertaining to e-waste
- Important aspects of mobile phone recycling
- Mobile phone take back programs in Rio Claro
- Results /Final remarks / recommendations
- References



CRITICAL POINTS OF THE PRESENTATION

- Lack of e-waste recycling technologies in Brazil and the high cost of packing, sorting, transporting, remanufacturing of mobile phones, batteries and accessories have inhibited the emergence of businesses in this area countrywide
- The procedure of reverse logistics is to return mobile phones, batteries and accessories to the dealer, importer or the manufacturer itself, but this articulation has proved difficult in practice because people still keep the old devices at home

CRITICAL POINTS OF THE PRESENTATION

- Due to the recent support of the local media to e-waste management in Rio Claro, the municipal Planning and Environmental Development Secretariat (Sepladema) is doing a partnership with a private company specialized in collecting and transporting mobile phones and other e-waste for recycling
- Both the Planning and Environmental Development Secretariat and the Education Secretariat of the Rio Claro municipality are presently supporting an environmental education program on e-waste at the high school level proposed as a result of this study

THEORETICAL AND REGULATORY FRAMEWORK

- The “Cadmium Crises” – blocking of a Sony’s entire shipment of Playstation game system in 2001 due to an unacceptable amount of cadmium found in the cables of the game controls; fine: €17 million (Esty and Winston, 2006) [1]
- Concerns on risks posed by e-waste grew up in importance worldwide after the approval of the RoHS (2006) and WEEE (2002) directives by the EEC (Hu and Hsu, 2010 [2]; Nawrocka, 2008 [3]; IEC, 2007 [4])
 - RoHS – Restrictions on Hazardous Substances (Cd, Pb, Hg, Cr-VI, BFRs = Brominated Flame Retardants)
 - WEEE – Waste Electrical and Electronic Equipment
- Brazilian Council on the Environment - CONAMA's Resolution 401/2008 - sets up maximum acceptable limits for Cd, Pb and Hg in mobile phone batteries; also states that used batteries have to be returned to manufacturers or importers [5]



RESEARCH PROBLEM

- The National Policy on Solid Waste - NPSW (Law 12,305 passed in 2010) introduced mechanisms to accomplish the shared responsibility for the lifecycle of batteries (and other products) and reverse logistics. This law classified batteries into the category of toxic waste [6]
- The existing take back initiatives in Rio Claro are still limited to mobile phone servicing companies, drugstores, and convenience stores and have not yet reached the level recommended by the NPSW
- No mobile phone was found in the public ecopoints because either they have been kept at home or disposed of in ballots in mobile phone servicing companies, drugstores and convenience stores
- There is a lack of environmental programs properly structured and supported by the public and / or private sector to ensure the effective take back of mobile phones and their accessories



RESEARCH QUESTIONS

- What are the major challenges regarding environmental management of discarded mobile phones and their accessories in the context of the recent approved Brazilian Policy on Solid Waste?
- What is necessary to be done in order to face these challenges and improve some take back initiatives at the municipal level taking Rio Claro-SP, Brazil, as a reference?

OBJECTIVE

- This paper is aimed to analyze all the existing take back initiatives for mobile phone collection in Rio Claro city, Brazil, from the standpoint of their organization and efficiency in furthering these devices to remanufacturing and recycling envisaging the proposition of both a bill on e-waste management and an environmental education program at the municipality level

BRIEF CHARACTERIZATION OF RIO CLARO, SÃO PAULO STATE, BRAZIL

- Medium-sized city with about 190,000 inhabitants (IBGE, 2011) [7]
- Located in southeastern area of Sao Paulo State, Southern Brazil
- All e- waste were deposited with other types of wastes in a landfill up to 2010 [8]

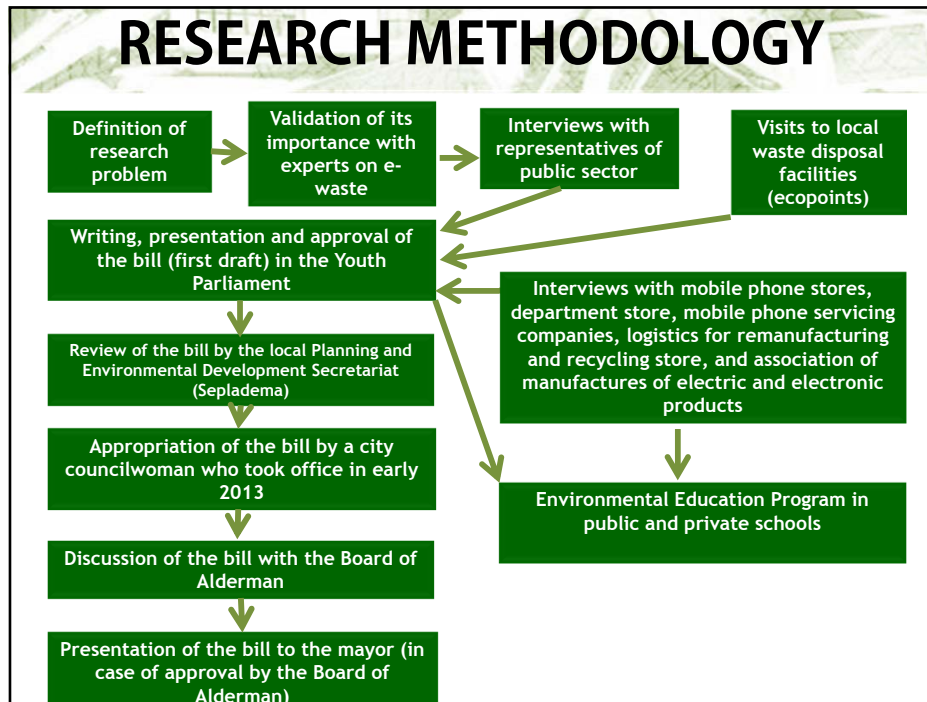


MOTIVATIONS OF THE STUDY

- Rapid growth of the mobile phone market in Brazil; in 2010 there was at least one mobile device per capita in the country on average [9]
- Recent approval (2010) of the National Policy on Solid Waste (Federal Law 12,305) requiring that e-waste with hazardous substances to be returned to the manufacturer for further remanufacturing or recycling [6]

MOTIVATIONS OF THE STUDY

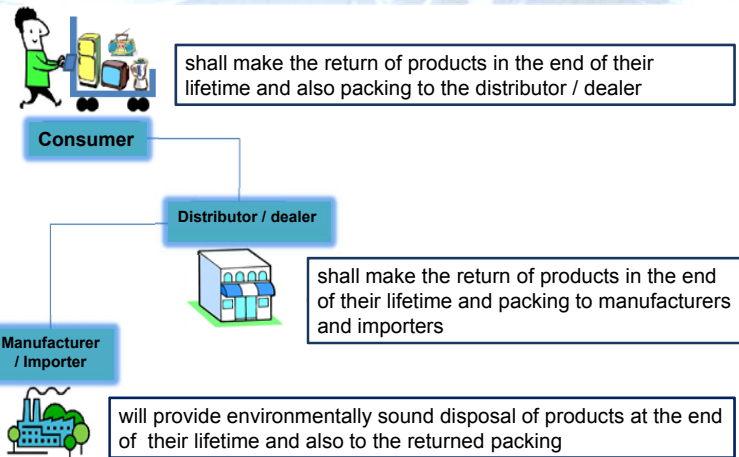
- Brazilian Council on the Environment - CONAMA's Resolution 401/2008 mentions that establishments that sell mobile phone batteries as a network of authorized service by manufacturers and importers of these products are expected to receive the used batteries to be transferred to the respective manufacturers or importers [5]
- Little public awareness about the importance of proper disposal of mobile phones and mobile phone batteries *versus* rapid growth of e-waste generation due to rapid obsolescence of these devices [10]
- Need of policy strategies as concerns to e-waste management to implement the National Policy on Waste Management at the local level



BRAZILIAN FEDERAL POLICY ON SOLID WASTE MANAGEMENT

- Introduced *shared responsibility* on the lifecycle of products considering that
 - the community must assume different responsibilities by doing specific treatment of solid wastes
 - wastes have to be reduced since the beginning of the productive chain, via clean technologies, change in consumer's perception and behavior, and consumer commitment to legislation [5]

BRAZILIAN FEDERAL POLICY ON SOLID WASTE MANAGEMENT

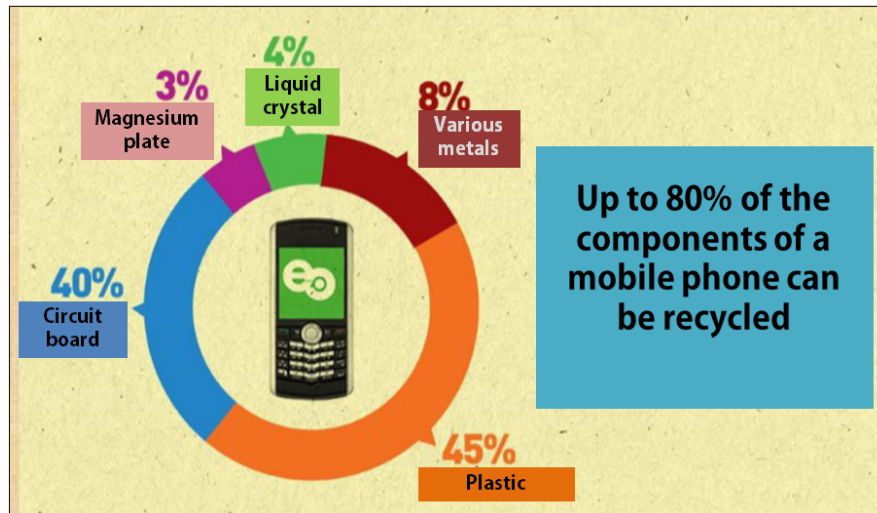


Source: [11] Brescansin (2012)

CONAMA'S RESOLUTION 401/2008 REQUIREMENTS

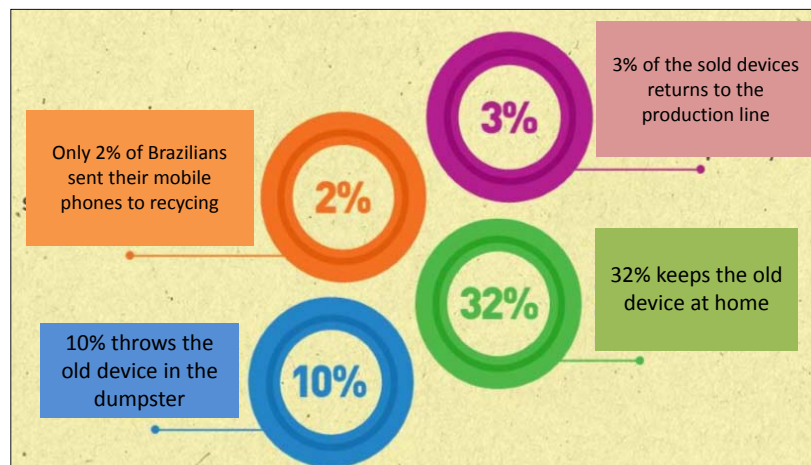
- It establishes that batteries sellers and networks service authorized by their manufacturers or importers are required to receive used batteries from consumers
- These batteries, received by the importer or manufacturer, should have an environmentally adequate disposal
- Manufacturers, importers, distributors and traders of these batteries are required to promote environmental education programs [5]

IMPORTANCE OF MOBILE PHONE RECYCLING

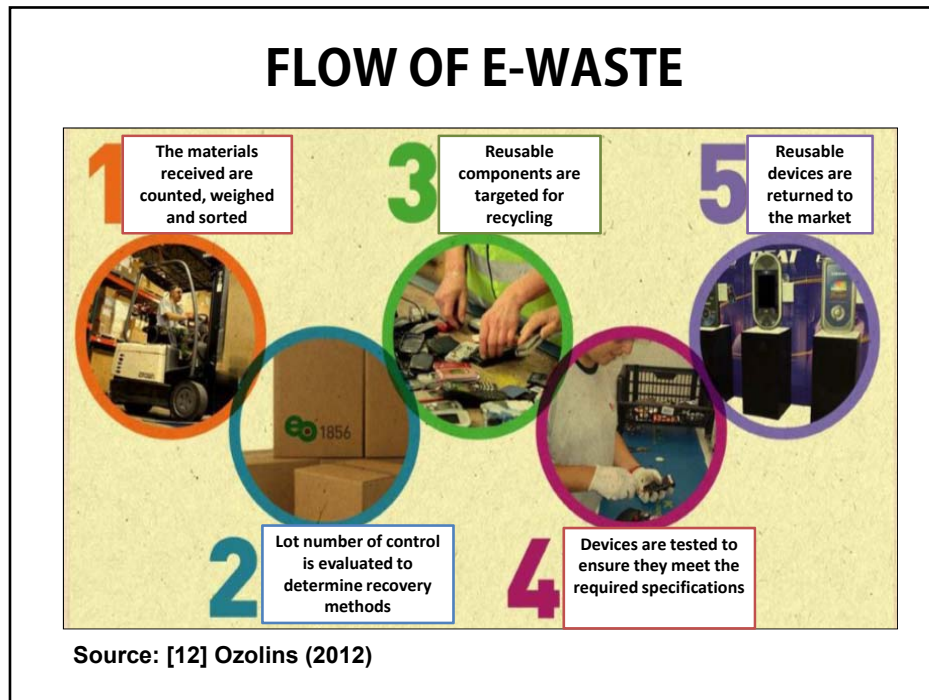


Source: [12] Ozolins (2012)

DESTINATION OF OLD MOBILE PHONE



Source: [12] Ozolins (2012)



MOBILE PHONE TAKE BACK PROGRAMS IN RIO CLARO

STORE	PROGRAM	DETAILS
VIVO	Recycle Your Mobile Phone (Rio Claro Mall)	3,400 collection points in VIVO's stores and resellers countrywide
OI	Say Hello to the Planet (Rio Claro Mall)	Collection points in OI's stores and resellers
CLARO	Claro Recycle (Rio Claro Mall)	2,000 collection points in CLARO's stores and resellers countrywide
TIM	Recharge Your Planet (Rio Claro Mall)	It stopped collecting in the store at Rio Claro Mall in 2012 due to low return of used handsets and accessories
C&A	No specific name (Rio Claro Mall)	It began collecting mobile phones and accessories with its Eco store in Porto Alegre in 2009 (C&A, 2010)
GOUVEIA & GOUVEIA	No specific name (downton)	It collects mobile phone from various mobile phone manufacturers (Nokia, Samsung, Motorola, LG)

Source: [13] Ruiz (2012)

MOBILE PHONE TAKE BACK PROGRAMS IN RIO CLARO



Collector of mobile phones and electrical accessories at **Vivo Store**



Collector of mobile phone, batteries and other accessories at **Claro's Store**



Cardboard collectors to batteries, mobile phones and accessories at **OI's Store**

RESULTS REGARDING TAKE BACK PROGRAMS

- Mobile phone servicing companies from Rio Claro are articulated with logistics companies that transport e-waste
Oi, TIM and NEXTEL have contracts with GM&C
VIVO and CLARO have contracts with Belmont Trading (USA)
- Information on these programs are only available in the operator's websites
- Collecting ballot boxes are not properly displayed in the stores
- Store managers have shown little concern on the quantification of the collected mobile phone and accessories

RESULTS REGARDING THE BILL ON WASTE MANAGEMENT FOR RIO CLARO

- Bill writing and approval in Youth Parliament in October, 2011
- Amendments made to the bill by the Planning and Environmental Development Secretariat (Sepladema) in November 2011
- Bill submitted to state deputy Aldo Demarchi from Rio Claro in August, 2012
- Commitment of councilwoman Raquel Picelli in forwarding and presenting the bill in the Board of Alderman in the first half of 2013

RESULTS CONCERNING OBSTACLES TO THE IMPLEMENTATION OF THE FEDERAL POLICY ON SOLID WASTE IN RIO CLARO

- There is only one licensed place for storing e-waste including mobile phones and accessories
- Little information is available about both the existing public ecopoints and the private e-waste collecting programs
 - No discarded mobile phones were found in the ecopoints
 - Only a few mobile phones discarded were found in the waste collectors at the operator's stores
- Lack of incentives for e-waste recycling
- Low awareness of the population due to lack of an environmental education program

FINAL REMARKS

- Environmental education is important to give effect to the National Policy on Solid Waste and its implementation at the state and local levels since it requires new knowledge, perspectives and attitudes of the whole society
- As mentioned in the Conama's Resolution 401/2008 manufacturers, importers, distributors and traders of e-waste are required to promote environmental education programs [5]

FINAL REMARKS

- Based on the results, it is possible to conclude that there are opportunities for
 - (i) improving current processes for taking back mobile phones, batteries and accessories, via environmental education
 - (ii) extending the reach of the take backs, as part of the communication of the programs, the process of recycling and environmental sound disposal of the left overs

RECOMMENDATIONS

- A well structured environmental education program in schools and public places involving the local government in partnership with mobile phone operators, stores, mobile phone servicing companies, malls, supermarkets, department stores, drugstores [14] is necessary to guarantee part of the implementation of the National Policy on Solid Waste

RECOMMENDATIONS

- Implementation of the education program in both public and private schools to support the collection of e-waste for further recycling
- This program is being supported by the local Education Secretariat and the Planning and Environmental Development Secretariat - Sepladema



Maira, author of the bill on e-waste management of Rio Claro (Youth Parliament participant)



Maira giving a lecture in the Environmental Education Program in a public school (november, 2012)

RECOMMENDATIONS

- Taking into consideration that the public initiatives (ecopoints) concerning the collection of mobile phones and accessories are not working and that the take back carried out by some stores are still not efficient to meet the requirements of the NPSW, it is recommended that the local government
 - internalize the underway environmental education program as part of a municipal law providing funds for its continuation over time
 - join the program for reverse logistics and recycling of mobile phones, batteries, wires and cables (Reciclelog) of GM&C, a company that is specialized in enabling the full reverse logistics of mobile phones ensuring that all its components are recycled, including parts and components that need to be sent to refineries abroad



RECOMMENDATIONS

- Since the NPSW considers that traders, consumers and members of the public urban cleaning and solid waste management have also to be engaged in the reverse logistics of e-waste countrywide, and also considering that public initiatives are emerging within the government for municipalities to submit their integrated plans on solid waste management in order to get access to federal funds for investments in public cleaning services, then
if the proposed bill in Rio Claro becomes a law, this initiative will probably favor the approval of the city waste management integrated plan, this way becoming a “reference law” to be pursued by other municipalities
- Considering the rapid growth of the mobile phone market in Brazil, R&D investments should be done to develop new technologies for recycling parts or components of mobile phones that presently are sent to refineries abroad

REFERENCES

- [1] Esty, D. C. and A. S. Winston. The environmental lens. **Green to gold: how smart companies use environmental strategy**. Yale University Press: New Haven and London, p. 1-4,2006.
- [2] Hu, A. H.; C. W. Hsu. Critical factors for implementing green supply chain management practice: an empirical study of electrical and electronics industries in Taiwan. **Management Research Review**, v. 6, n. 33, p. 586-608, 2010.
- [3] Nawrocka, D. Environmental supply chain management, ISO 14001 and RoHS. How are small companies in the electronics sector managing? **Corporate Social Responsibility and Environmental Management**, v. 6, n. 15, p. 349-360, 2008.
- [4] IEC - International Electrotechnical Commission. **Procedures for the determination of levels of regulated substances in electrotechnical products**. Geneva: IEC, 2007.

REFERENCES

- [5] Brazil. Ministry of Environment, National Council on Environment. CONAMA Resolution No. 401 passed in November 4, 2008. It establishes limits for lead, cadmium and mercury batteries sold in the country and also the criteria and standards for their environmentally safe management. **Official Gazette** n. 215, Brasília, November 5, 2008.
- [6] Brazil. **Federal Law No. 12,305**, passed in 2 August 2010. It established the National Policy on Solid Waste, amending Law No. 9605 of February 12, 1998, and other provisions. Brasília, August 2, 2010.
- [7] BRAZILIAN INSTITUTE OF GEOGRAPHY AND STATISTICS. **Cities**. available at <<http://www.ibge.gov.br/cidadesat/painel/painel.php?codmun=354390>>. Retrieved in October 2, 2011.
- [8] Zancheta, J. G. et al. An analysis of the conditions of urban sanitation in **the city of Rio Claro-SP**. Workshop paths for urban sustainability: discussing the city Rio Claro, 2011.

REFERENCES

- [9] Koga, G. A. **Evaluation of consumer perception as regards to disposal and recycling of handsets in Brazil**. New York: Institute of Directors, 2011, 68p. (monograph).
- [10] Lima, M. C. F. **The reverse logistics as a mean of management of post-consumer waste: an analysis of the mobile phone sector**. Sao Paulo: Uninove 2008.
- [11] Brescansin, A. **A Survey on the segment of mobile phones and accessories**. Uninove. São Paulo, 24 January 2012. Interviewed by Mauro Silva Ruiz.
- [12] Ozolins, A. L. Lecture at the National Meeting on Business Management and Environment. **Session on Waste Management**. Uninove. São Paulo, November 27, 2012.



REFERENCES

[13] RUIZ, M. S. Solid Waste Management: Proposition of a Bill on e-waste in the city of Rio Claro-SP. **Brazilian Science and Engineering Fair**. Issue 10. São Paulo, 2012.

[14] Silveira, G. T. R. and S. Y. Chang. Cell phone recycling experiences in the United States and potential recycling options in Brazil. **Waste Management**, n. 30, 2010, p. 2278 -2291.



THANK YOU!

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