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A Perspective about E- Waste and the Regulations with Special Reference to SME's

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Abstract:

Pune finds a significant place in the national as well as international scenario attributing to the educational institutes, industries and history. Pune Municipal Corporation has incorporated the Swachh model, decentralized segregation and no open dumping as part of waste management. As per the recent reports approximately 17,000 tons of waste generated only 950 tons is segregated. The major challenges faced by the corporation are lack of the formal Scrap dealers, non-segregation at source and participation of the stakeholders and availability of landfills in managing the waste. Managing wet waste is comparatively easy as compared to the solid waste due to the presence of EOL electronic products(e-waste) along with plastics, glass, metals etc.

Pune houses a many SME's catering to different requirements and these SME's use a variety of diverse electronics equipment's like computers, printers, fax machines, electronic watches, inverters, TV, mobiles and many more. Undoubtedly these SME's get benefited by the use of ICT and related electronic products which ease many business processes and operations. The lack of knowledge about handling the EOL electronic products and legislation the products are found in second hand market and finally add to the solid waste which find their way to the dumping ground. The difficulty of treating these EOL products increases due to their toxic and complex nature pose a serious threat to human health and environment Landfilling the solid waste with e-waste is a serious issue not only locally but also at global level which needs attention and involvement of all stakeholders in the cradle to grave cycle of e- products.

E-Waste (Management & Handling) Rules 2011 enforced by Ministry of Environment and Forests (MoEF), Government of India focus on the EPR(Extended Producers Responsibility) clause which puts the onus of handling the obsolete e-products on the bulk consumers and the producers for with clear role definitions . It is mandatory for all the business organizations to give details of e-waste inventory. It is followed by big business organizations but many small and medium businesses go untraced here. The authors in the present paper attempt to understand the current scenario of e-waste with perspective to SME's as bulk consumers. The primary data collected is from more than 40 small and medium businesses show that e-waste awareness is relatively good, but lack of understanding of EPR ,effects of improper disposal, lack of infrastructure lead these items to either second hand markets , or scrap dealers and finally land up in landfills. The involvement of the small and medium houses is the need of the hour in understanding their roles handling e-waste in an environmental friendly by means implementation of sustainable model for E-waste management.

Keywords: E-waste, E-waste (Management & Handling) Rules, 2011, EPR, SME's Sustainable model

1. Introduction

Businesses are the backbone of the nation's economy and help in shaping the future of the country and their people. In recent years there is a transformation in the way the business organizations whether small or big carry out their businesses. It is important to accept and walk along this change which is an outcome of globalization and liberalization not only in the global arena but also for Indian economy which is witnessed in almost all spheres of trade, industry and commerce. In their constant endeavour to generate profits and be competitive the modern businesses rely upon the automated processes aided by the electronic products like Computers, Printers,

Laptops, Fax machines etc. for their day today business activities. Certainly it has changed their way of working and has given an edge over but at the same time there is also a challenge and a problem to be solved: What do you do with outdated electronic products? This is a question asked by Businesses and consumers every day. Advancement in technology with a rapid pace forces the users to change the electronic equipment and so the earlier usable or EOL products become outdated and inefficient at a much faster rate. Managing outdated electronic products is an immediate step that every business has to take to improve their carbon footprint and help in creating sustainable environment. Most electrical and electronic equipment are made up of components with toxic metals in them. Disposal of electrical appliances and electronic equipment produces e-waste or WEEE, which if not treated properly, can harm humans and the environment at large. WEEE or E-waste is a generic term encompassing various forms of electrical and electronic equipment (EEE) that are old, end-of life electronic appliances and have ceased to be of any value to their owners.”(UNEP ,2007). E-waste includes all the waste electrical and electronic equipment, whole or in part or rejects from their manufacturing and repair process, which are intended to be discarded (Govt. Of India- MoEF’s E-waste (Management & Handling Rules), 2011

1.1. E-waste: A Problem or an Opportunity

The E-waste generation is between 20-50 million tons annually (Greenpeace, n.d.a; Ketai et al., 2008) and is estimated at ~40 million tons annually (Schluep et al., 2009). In the developed countries, E-waste constitutes to 1-2% of total solid waste generation and expected to grow to 2% by 2010. (UNEP Report, 2007).E-waste equals to 1% of total solid waste on an average in developing countries and is expected to grow to 2% by 2010 (UNEP Report, 2007).E-waste generated is 380,000 tonnes with a Growth rate of 15% annually (Greenpeace Report,2008) . As per the earlier predictions e-waste is expected to cross 800,000 tonnes by 2012(UNEP, 2005). The report also 500% increase in e-waste by 2020. (UNEP Report, 2010). In India alone E-waste Output jumps 8 times in 7 years – 8 lakh tonnes and 50,000 tonnes e-waste illegally imported from developed countries (Times of India Report, 3rd April 2012). Sources of e-waste are both residential and commercial organizations. Factors like increasing demand for the newer electronic appliances due to change in incomes, life style, fashion etc. both in developed and developing countries result in high volumes of the e-waste mountains being built in developing nations.

The composition of e-waste is diverse and differs in products across different categories. (Hidy et.al, 2011). It contains more than 1000 different substances, which fall under ‘hazardous’ and ‘non-hazardous’ categories. (Wath, 2010)

Iron and steel constitutes about 50%plastics (21%), non-ferrous metals (13%) (Copper, Aluminum, Silver, gold, Platinum etc.). Classified as hazardous if the toxic elements like lead, mercury, arsenic, cadmium, selenium, and hexavalent chromium and flame retardants are present beyond permissible quantities (Bhat et. al 2012). E-waste contains valuable materials such as precious metals. Early generation PCs used to contain up to 4 g of gold each; however this has decreased to about 1 g today. 1 ton of e-waste contains up to 0.2 tons of copper, which can be sold for about 500 Euros at the current world price (Soderstrom, 2004). Manufacturing of mobile phones and personal computers consumes 3% of gold and silver mined worldwide each year; 13% of the palladium and 15% of cobalt. E-waste contains toxic metals like lead, cadmium, mercury, Polyaromatic hydrocarbons (PAH), beryllium cause immediate risks to human health and environment (Li et al., 2008). Release of substantial quantities of toxic heavy metals and organic compounds to the workplace environment affect surrounding soils, and drainage water (Shen et al., 2009). Table 1 summarises the impacts in brief

Metal/ Gases/ Acids Present	Environmental Impact	Health impact
Lead, Barium	Leaching into ground water and release of toxic phosphor Disposal leading to soil contamination and thus affecting the agricultural activities	Toxicity of workers leading to serious problems related to neuro systems, genitourinary system and the reproductive systems
Tin	Air pollution and effect on ground and surface water	Toxicity of workers leading to problems which affect them in their entire lifespan
Cadmium	A long term cumulative poison affecting the surroundings which affect the population living in the vicinity	Toxic cadmium accumulates in the human body in kidneys and affect them
Hydrochloric acid, nitric acid	Polluting the air and raising the acid levels which are above dangerous levels for human living	Permanent injury due to contact with eyes/skin, respiratory irritation, circulatory failure and death
Polyaromatic hydrocarbons (PAH)	Soil, water, air, life forms affected	Affects bladder, causes Skin and lung cancers
Copper/ Iron/ Gold/ Silver	Increases the demand for the metals lead to depletion of precious resources, increase in mining activities threaten the earth’s crust	Health hazards in mining which are passed to the next generation due to their hidden nature. Dismantling / recycling workers/ children exposed to gases while burning process affect the neurological developments Non availability of these metals which are very useful in medicines lead to an unhealthy population

Table 1: Impacts of e-waste on health and environment

WEEE or E-waste is one of the fastest growing solid waste streams in the urban environment worldwide. Globally, E-waste is growing by about 40 million tonnes a year, hence managing E-waste is a critical process due to its fast growth and also complex nature. The nature of E-waste makes it a rich resource of Trash - >Treasure and provides opportunity for a serious business in the developing countries, worth billions. Cheap labour, business opportunity and low standards of environmental protection attract the e-scrap across the boundaries mainly from developed to developing countries (Janani 2005). Managing E-waste in a formal, systematic and eco-friendly manner by way of removing/recycling the precious metals from waste streams is an urgent need and hence there is a great business opportunity and scope for academicians in developing sustainable models. (Patiletal, 2015). There are technical, Financial, Strategic and information related challenges in managing e-waste. It requires involvement from all the stakeholders. One of the major challenges in handling e-waste is lack of awareness of the users about the disposal practices.

The growth rate of discarded electronic waste is high in India since it has emerged as an Information Technology giant and due to modernization of lifestyle (S.Wath et al., 2010). The total e-waste generated in India amounts to more than 1,46,180 tons per year as on 2010. (<http://envis.maharashtra.gov.in>, S.Wath, 2010)The projected growth for e-waste generation for India is about 34% year on year' (Sinha, Toxics Link). Maharashtra tops the e-waste generation list (envis.mah.in). The deadline for the enforcement of new electronic waste (e-waste) management norms of 2011 is 1st May 2012 BUT most of the sector's stakeholders seem quite unprepared and mainly unaware (Business Standard, 29/03/2012). EPR (Extended Producer Responsibility) in "E-waste (management and handling) rules-2011" puts the onus of e-waste disposal onto the producers of goods to be monitored the State Pollution Control Board to monitor the implementation. Most top companies have a global policy on waste management and demonstrate responsible behaviour by setting up efficient systems in most parts of the world. In India, however, the same companies follow a totally different yardstick, which leaves much to be desired resulting in non – compliance of EPR the e-waste management in 2011

The current e-waste management practices followed in India are disorganized in manner, which may cause deleterious impacts on human health and ecology and hence there is an urgent need to manage e-waste in a formal, systematic and eco-friendly manner. The challenge is multifold due to the complex nature, inadequate capacity building, technical, financial constraints and very importantly the business opportunities available for the organized and unorganized sector for retrieval and recovery of the precious metals present in e-waste.

There are many initiatives both globally and at the national level to tackle the issue of e-waste. Some of them are OECD : 'Environmentally sound management of used and scrap PC's guidelines' , Basel Action Network (BAN) 1994, Solving the E-waste Problem (StEP), an initiative of various United Nation organizations with the overall aim to solve the e-waste problem, PROMISE is an international Protocol to facilitate the embedding of information in microchip technology which should include the materials used and potential secondary markets with instructions for disassembly, ISO 11469 for labelling conventions for polymer constituents and additives, Environmental Protection Act 1986 (Polluter Pays policy – EPR EU), Central Pollution Control Board regulations, Industry Initiatives (MAIT), E-parisara (KPCB) etc. There are local initiatives at Delhi (IRG India, Toxic Links), Chennai (TNPCB, Trishiraya, ARF), Hyderabad (APCB). Taking cognisance of the seriousness of the issue Government of India issued (MoEF e-waste guidelines Draft, Government of India, 2008 and now we have E-waste Management and Handling Rule (Issued May 2011), Effective from May 1, 2012). In order to make the legislation effective it is important to understand the involvement of the stake holders and their roles in the process. The authors in this paper have studied the behaviour of the SME's in and around Pune city, which ranks 8th in e-waste generation in India. Pune city has many Small and medium scale businesses which support the large businesses in the automobiles, ITES, educational, manufacturing sectors.

2. Research Methodology

Successful implementation of any policy requires awareness of the stakeholders for their active involvement to achieve objective of the Repair, Reuse, Refurbish and Recycle – 4R approach.

2.1. Objectives of the Study

- To understand awareness levels in SME's of Pune City with reference to
 - E-waste
 - E- waste disposal practices
 - E- waste policy
 - Extended Producer Responsibility
 - E- waste impact on health and environment

Primary data was collected by survey of SME's from surrounding areas of Pune city regarding their usage of electronic equipment and awareness levels, ill-effects of using and improperly disposing e-waste. The target was 100 but the responses were received only from 40 SME's. The sampling is convenient sampling which is one

3. Data and Analysis

The data was collected as a primary survey by visiting the SME's and also through Google form. Total of 40 SME's responses was collected and the data is analysed.

3.1. General Awareness of E-waste

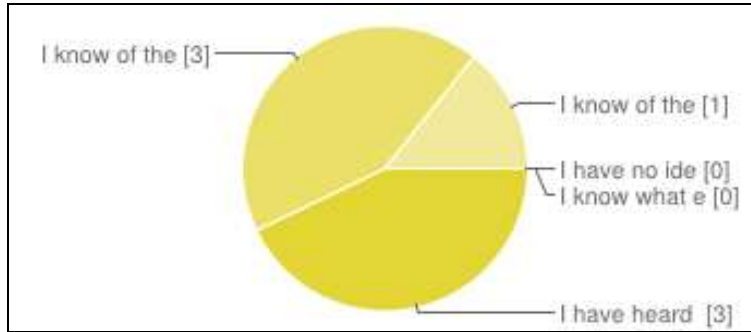


Figure 1

I have no idea what e-waste is	0%
I have heard of the term e-waste but do not know what it is	43%
I know of the term e-waste but I am unsure of what items fit into that category	43%
I know of the term e-waste but do not know how it applies to my company	14%
I know what e-waste is, how items are categorized as such, and that it does apply to certain electronics used by my company	0%

Table 2

3.2. Awareness of the Significance of e-waste Issues

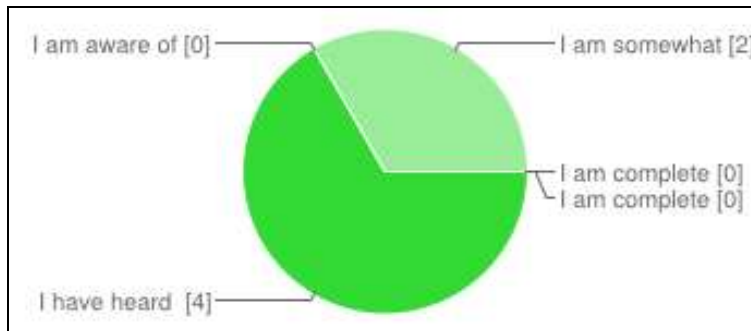


Figure 2

I am completely unaware of e-waste issues	0%
I have heard of e-waste but am unaware of the related issues	67%
I am aware of e-waste issues but did not realize the level of importance	0%
I am somewhat aware of e-waste issues	33%
I am completely aware of the issues and the level of importance	0%

Table 3

3.3. Knowledge of Govt. of India, MOEF e-waste Regulations

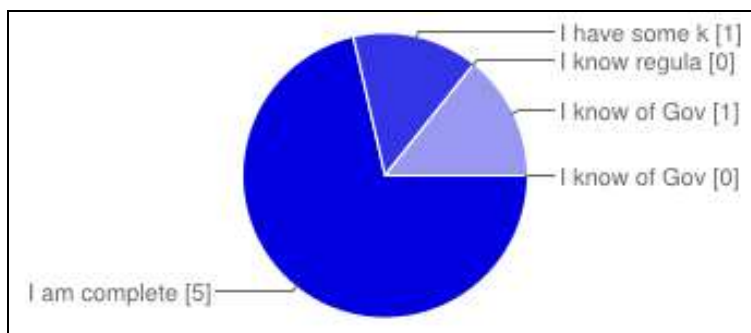


Figure 3

I am completely unaware that regulations exist in Govt. Of India, MOEF	71%
I have some knowledge of Govt. Of India, MOEF regulations regarding e-waste	14%
I know regulations exist but I have difficulty interpreting the law	0%
I know of Govt. Of India, MOEF e-waste regulations and I somewhat understand the law	14%
I know of Govt. Of India, MOEF e-waste regulations and I completely understand the law	0%

Table 4

3.4. Company's Current Disposal Practices for e-waste

Recycle with a reputable electronics recycler	13%
Recycle with an electronics recycler (reputation unknown)	0%
Send electronics to be reused	38%
Dispose electronics as hazardous waste	0%
Dispose of electronics in trash to be sent to the landfill	0%
Donate electronics to non-profit groups	13%
Stores unwanted/obsolete items	25%
Other	13%

Table 5

3.5. If your Organisation does recycle e-waste, which Recycling Firm and/or Collector Do You Use?
Silicon, Pune (Local vendor)

3.6. Does Your Company Pay to recycle e-waste?

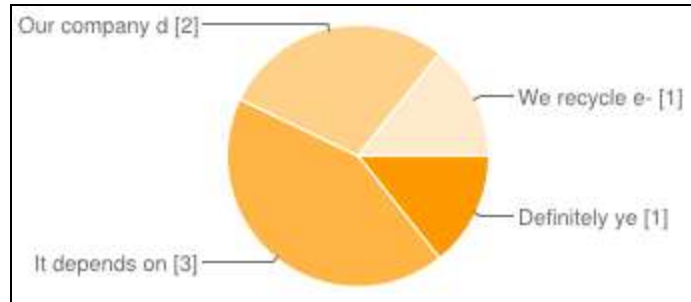


Figure 4

Definitely yes	14%
It depends on the item	43%
Our company does not recycle e-waste	29%
We recycle e-waste but do not pay for the service	14%

Table 6

3.7. What do You See as Obstacles to Proper e-waste Recycling for Your Business?

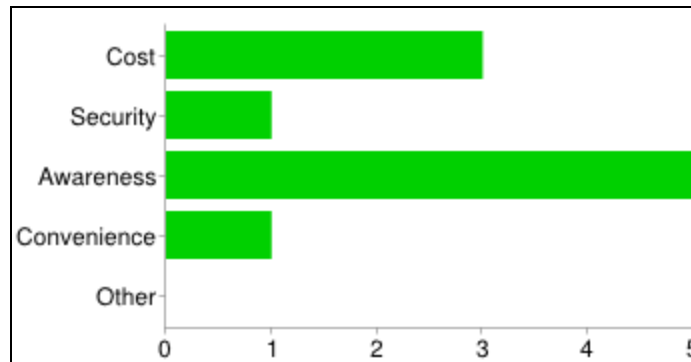


Figure 5

3.8. Does your Company Take the end-of-life Requirements into Consideration when Making Purchasing Decisions?

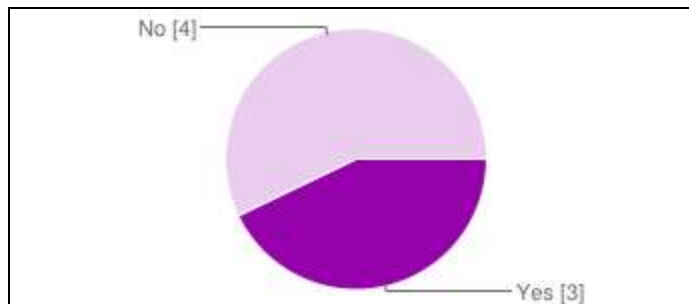


Figure 6

4. Conclusion

With the rapid changes in technology and the growing profits, SME's find it necessary to update their products to improve their quality of service. With modernization comes obsolescence. When used e-products are not disposed properly, hazardous materials such as plastic, lead, cadmium, chromium and mercury are produced by electronic waste (e-waste). Generation of huge quantities of e-waste presents an enormous environmental and health hazard to the community. After the enactment of the Environment Protection Act (EPA), 1986, under the purview of the Central Pollution Control Board (CPCB) in India, the division of Hazardous Waste Management has been overseeing the management of e-waste. Though there are rules in place for disposal and use of hazardous materials, e-waste is not properly treated, mainly due to unawareness. It was thus found necessary to study the electronic product needs of the hotel industry and make them aware of the proper methods and places for e-waste disposal (EPR-2011), as a step to e-waste management, since proper methods of disposal reduce health hazards and environmental hazards and recycling of e-waste helps in retrieval of precious metals such as gold, silver, platinum, and more.

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