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Management of E-Waste in Smart City, Udaipur

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ABSTRACT

E-Waste comprises of wastes generated from used electronics devices and house hold appliances which are not fit for their original intended use and are destined for recovery, recycling or disposal. Such wastes encompasses wide range of electrical and electronics devices such as computers ,hardware, hand held cellular phones, personal stereos, including large household appliances such as refrigerators, air-conditioners etc.

In the present paper we revise the guidelines apply to all those who handle e- waste which includes the generators, collectors, transporters, dismantlers, recyclers and stakeholders of e-wastes irrespective of their scale of operation. It also shows Legislations/Framework governing e-waste, its finding and application with special ref to proposed smart city Udaipur.

We also tried to develop new set of guidelines with special ref. to proposed smart city such as Udaipur. If we effectively implement it we will get our green smart city.

KEYWORDS :

1. Introduction

Globalization and information technology are being widely recognized as main drivers of the human civilization in the later part of twentieth century and the 21st century. The Information Technology (IT) has been the power house of the global economy particularly since early 1990s. Software and hardware part of IT has touched most of the parts of social, technical, economic and natural environment. Exponentially increasing production of computer hardware has posed major challenges of proper disposal of the waste (e-waste) produced by this industry. Current study focuses on the effect of usage, dumping and recycling of the electronic waste on the natural environment and how effectively it can be manage for proposed smart city such as Udaipur.

2. Hazardous impact of chemicals caused by computers

Electronic Waste (e-waste) is the term used to describe old, end-of-life electronic appliances such as computers, laptops, TVs, DVD players, mobile phones, mp3 players etc. which have been disposed of by their original users. The reality of computer life cycle reveals a hazardous life cycle. The dark side of high technological development of electronic industry, especially computer technology, is revealed in the form of polluted drinking water, waste discharges that cause harm to fish, birth defects, high rate of miscarriage and cancer among cluster workers. Large amounts of dangerous chemicals are present in computer and other electronic goods. The toxicity is due to lead, mercury, cadmium, hexavalent chromium (Chromium), brominates flame retardants, plastic, PVC etc. A typical computer monitor may contain more than 6 percent lead by weight. Each computer display contains an average of 4-8 pound of lead (MCC: 1996). Monitor glass contains about 20 percent lead by weight. When these components are illegally disposed and crushed in landfills, the lead is released into the environment, posing a hazardous legacy for current and future generations.

3. India's informal E-waste recycling sectors

India is the second most populous country in the world, with over 1 billion people, and one of the major e-waste producing and importing countries. Moreover, India is one of the fastest Growing economies of the world. There are no public waste service systems for municipal waste. The formal recycling sector is still small; currently there are 16 units licensed by the Central Pollution Control Board (CPCB), and most of them do only partial processing and recycling. However, while the waste sector overall is highly informal, it is also highly organized. The informal e-waste sector is well networked but unregulated. The financial flow in the sector is highly organized and the huge network of collectors, traders and recyclers make financial gain through re-use, Refurbishment and recycling. Over 95% of the e-waste is treated and processed in the majority of urban slums of the country, where untrained workers carry out the dangerous procedures without personal protective equipment, which are detrimental not only to their health but also to the environment. Recycling and treatment facilities require a high initial investment, particularly those fitted with technologically advanced equipments and processes.

4. Introducing Green Electronics

The most urgent challenge domestic manufacturer's face is to use "greener" design. The Legislative process embodies two considerations: one is to encourage the recycling and reuse of resources, and second the other is environmental protection, a clear principle is that sending e-waste to landfills or incinerators will be strictly prohibited.

5. E-waste Treatment Technologies

Environmentally sound E-waste treatment technology was identified at three levels. The first level includes decontamination, dismantling and segregation. The second level included shredding and four special treatment processes like electromagnetic separation, eddy current separation, CRT breaking and treatment and density separation using water. The third level treatment included recovery of metals and disposal of hazardous E-waste fractions including plastics with flame retardants, CFCs, capacitors, Mercury, lead and other items.

6. Establishment Of Integrated E-Waste Recycling & Treatment Facility

Establishment of E-waste Recycling & Treatment Facility shall be in line with the existing Guidelines/best practices /requirement in India for establishment and operating "Recycling and Treatment and Disposal Facilities" for hazardous wastes. Such facilities shall cover collection, storage, dismantling & segregation, recycling, and treatment &disposal of e-wastes.

7. Extended Producer Responsibility (EPR)

Before they can sell new equipment, the producers must take back old equipment for proper disposal. The cost of such "end-of- life" processing must be a part of the sale price, not listed as a separate fee. This gives manufacturers an economic incentive to devise the most efficient methods of coping with the problems of old equipment. Implementation of such measures would require the employment of large number of people, and could potentially mean the expansion of

a new economic sector in developing countries. The new re-use technologies could provide a source of new jobs in developing countries, and call on Civil Society to help by lobbying at the national level and in international forums for recognition of the e-waste problem and potential solutions. Unless the Indian Government comes up with legislation compelling vendors to initiate a take back and recycle mechanism, the Indian IT dream could well end up in an ecological nightmare. IT advancement would, then, mean environmental disaster.

8. Various legislations cover different aspects of e-waste

The hazardous waste (management and handling) rules, 1998 as amended in 2008 for Toxic content – registration mandatory for recyclers Municipal Solid Waste Management & Handling Rules for non-Toxic content Basel convention for regulating transboundary movement Foreign Trade policy restricts import of second-hand computers and does not permit import of e-waste

9. 'Guidelines' by Central Pollution Control Board (2008)

The guidelines notified in April 2008 - basic guidance document identifying and recognizing fundamental principles:

Producer Responsibility

RoHS (Restriction on Hazardous Substances)

Best practices

Insight into technologies for various levels of recycling

The guidelines explicitly mention the need for a separate legislation for implementing 'Producer Responsibility'

10. Need for a separate/dedicated legislation for Smart City

e-waste is 'distinct' as it is an end-of-consumption waste while hazardous waste results from a distinct industrial process specially in smart city as Udaipur

Environment Protection Act provides for separate regulations for waste in context of Smart city with 'distinct' characteristics - Biomedical Wastes (M&H) Rules- 1998 , lead acid batteries, the Batteries (M&H) Rules- 2001 etc.

The e-waste value chain is rather complex as it involves multiple players - producers, distributors, retailers, end consumers, collection system, recyclers while hazardous waste chain involves only the 'occupier/ generator' and the 'operator' hence responsibilities must be defined for all the players

Recovery of non-ferrous metals and reprocessing of used oil are the only two major activities in hazardous waste recycling while e-waste recycling involves refurbishment for reuse, dismantling and precious metal recovery which is a complex process

11. Proposed e-Waste Rules: Title: E-waste (Management & Handling) Rules to be published under the Environment Protection Act

OBJECTIVE :To put in place an effective mechanism to regulate the generation, collection, storage, transportation, import, export, environmentally sound recycling, treatment and disposal of e-waste. This includes refurbishment, collection system and producer responsibility thereby reducing the wastes destined for final disposal.

ESSENCE: the producer of electrical and electronic equipments is responsible for the entire life cycle of its own branded product and in particular the environmentally sound end-of-life management and facilitating collection and take back.

12. Salient points of proposed e-waste Rules:

Responsibility of each element in the e-waste Value Chain:

a. Producers – Extended/Individual Producer Responsibility
b. Dealers
c. Collection agencies/ collection Centres
d. Dismantler
e. Recycler
f. Consumer and bulk consumers

Procedure for Authorization of producers, collection agencies, dismantlers, recyclers and enforcement agencies

Procedure for registration/renewal of registration of recyclers

Regulations for import of e-waste

Liability of producers, collection agencies, transporter, dismantlers and recyclers

Information & Tracking

Elimination of hazardous substances used in e-equipments

Setting up of Designated Authority to ensure transparency, audit and inspect facilities, examine authorization/ registration etc.

13. Implication and Suggestions

Smart city concept of central govt. Looks very fabulous but implementation in India is not as easy special in small city like Udaipur. But if in phased manner if we can implement some rules regulation and if we will strict enough to apply it we will achieve our goal. Reusing and recycling the raw materials from end-of- life electronics conserve s natural resources and avoids solid waste, air and water pollution, as well as greenhouse gas emissions. By donating your used electronics, you allow schools, non-profit organizations, and lower- income families to use equipment that they otherwise could not afford. We need to improve the environmental performance of all economic operators involved in the lifecycle of the electrical and electronic equipment (EEE).

Some environmental issues are of global proportions, and the "wait and see" philosophy is simply too dangerous because the impending environmental disaster could be beyond our means to repair. Problem cannot be solved by only purchasing a few sets of fancy recycling machines from developed countries. Lacking in advanced technology yet rich in labour, India should develop a path for e-waste recycling that is suitable to its current situation. There is an immediate need for collaboration between industry, government, environmental groups, and citizens to solve the problems of e-waste, e-scrap, e-surplus, e-junk, and e-discards