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E-Waste Management in India

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ABSTRACT

The electronic waste or e-waste is one of the fastest growing in the world. The e-waste containing toxic material that can have adverse impact to human health and environment, if not treat properly. In India e-waste generation rate is 15% increase and to cross 800,000 tons in 2012. Major amount of e-waste is recycle and recovery by informal sector using basic methods such as open burning and acid stripping method. The both methods are harmful to the human and environmental. Many legislation and regulation available in global and national level, but no legislation is governed in the informal sector. These articles provide scenario, legislation and regulation in national level, e-waste recycling formal and informal sector in national level.

KEYWORDS: E-waste legislation, Formal and informal sector, Scenario

INTRODUCTION

The electronic devices reach at the end of their useful life; they become a waste (e-waste) or Waste Electrical and Electronics Equipments (WEEE) [1]. Globally the e-waste is growing by 40 million tons (MT) a year. In developed countries, e-waste constitution is 1 to 2% of the total municipal solid waste (MSW) generation and United State is 1 to 3% of the total MSW. In European Union in total amount of e-waste generation is 5-7 million tons per annum. In India e-waste generation is growing at about 15% and is expected to cross 800,000 tons per year in 2012.A Central Pollution Control Board (CPCB) report said 65 cities in India generate more than 60-70% of the total e-waste, which comes from 10 states, that's are followed by Maharashtra, Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab in the list of e-waste generating states in India [2], [3]. The composition of e-waste is very diverse and contains over 1000 different substances, which falls under organic and inorganic fractions.

SCENARIO

National scenario:

The growth of electronic waste is high in India, since it has emerged as an IT giant and due to modernization of lifestyle. However, there is no proper disposal system in our country that has led to enormous amount of electronic waste. There is a need to find a proper recycling and disposal technique, so that reduce the environmental pollution and health hazards [4]. Estimated the total number of Personal Computers (PCs) emanating each year from business and individual households in India will be around 1.38 million, according to a report of confederation of Indian industries, the total waste generated by obsolete electronic and electrical equipment (EEE) in India has been estimated to be 146,000 tons per year. The results of field survey conducted in Chennai, metropolitan cities of India to assess the average usage and life of PC, Television (TV) and mobile phone shows that the average household usage of the PC ranges from 0.39 to 1.70 depending on their income. In case of TV, it varied from 1.07 to 1.78 and for mobile phones it varied from 0.88 to 1.70. the low income households use the PC for 5.94 years, TV for 8.16 years and the mobile phones for 2.34 years while, the upper class income uses the PC for 3.21 years, TV for 5.13 years and mobile phones for 1.63 years. Although the per-capita waste production in India is still relatively small, the total absolute volume of waste generated will be huge. The growth rate of the mobile phones 80% is very high compared to PC 20% and TV 18%. [6].

According to TRAI, India added 113.26 million new cellular customers in 2008, with an average of 9.5 million customers added every month. Cellular market grew from 168.11 million in 2003-04 to 261.97 million in 2007-08. Microwave ovens and air conditioners registered a growth about 25% and refrigerator sales amounted to 4.2 million in 2006-07. Washing machines have always seen poor growth and the penetration level of colored televisions are increased three times in 2006-07. Solid waste management, which is already a mammoth task in India, has become more complicated by the invasion of e-waste, particularly computer waste in India. The preliminary estimates suggest the total WEEE generation in India is approximately 146,180 tons per year and which is exceeded 800,000 tons in 2012 [7]. The top states, in order of highest contribution to WEEE, include Maharashtra, Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab is shown in Fig 1. The city wise ranking of largest WEEE generators is Mumbai, Delhi, Bangalore, Chennai, Kolkata, Ahmadabad, Hyderabad, Pune, Surat and Nagpur is shown in Fig 2. The quantity of WEEE generation in different states in India is shown in Table 1[7].

Table 1: E-waste generation in top ten cities in India

City	WEEE, Tons per year
Mumbai	11017.1
Delhi	9790.3
Bangalore	4648.4
Chennai	4132.2
Kolkata	4025.3
Ahmedabad	3287.5
Hyderabad	2833.5
Pune	2584.2
Surat	1836.5
Nagpur	1768.9

3.MANAGEMENT OF E-WASTE IN INDIA

3.1 E-waste legislation

The issue of EEE disposal, import and recycling has become the subject of serious discussion and debate among the Government organizations, environmentalist groups and the private sector manufacturers of computers and consumer electronic equipment's [7].

- India enacted its first comprehensive environmental law namely Environmental Production Act (EPA) in 1986. The Rules under the EPA gives upon the Union Government comprehensive powers to "take all such measures as is necessary or expedient for the purposes of protecting and improving the quality of environment and preventing, controlling and abating environmental pollution". The implementation of the objectives of the EPA, the Hazardous Waste Management and Handling Rules were enacted in 1989. It was felt that it was essential to have a dividing line between waste and by-product streams. Bringing further amendments to the Hazardous Wastes Management and Handling Rules, 1989, the draft amendment Rules, 2002 were notified as "The Hazardous Wastes Management and Handling Rules, 2003" on 20 May 2003. Since e-waste or its constituents fall under the category of 'hazardous' and 'non-hazardous waste', they have been covered under its purview. As per the Rules, 'hazardous waste' is defined as any waste which by reason of any of its physical, chemical, reactive, toxic, flammable,

explosive or corrosive characteristics causes danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances.

- The Department-related Parliamentary Standing Committee on Science & Technology, Environment & Forests in its 192nd Report on the Functioning of the Central Pollution Control Board (CPCB), has concluded that e-waste is going to be a big problem in the future due to modern life style and increase in the living standards of people and augmentation of economic growth. The Committee has suggested a more proactive role for the CPCB by stating that it "should conduct studies to make future projections and devise steps to check the menace". With the progressive stride that the country has made in the Information Technology sector and the electronic industry, the issue of import of e-waste and its handling and disposal has assumed significance. The issue was brought to the notice of Parliament and Government when on 23 December 2005; a Private Member's Bill on 'The Electronic Waste (Handling and Disposal) Bill, 2005' was introduced in RajyaSabha by Shri Vijay J. Darda, Honorable Member from Maharashtra.
- Ministry of Environment and Forests (MoEF), Government of India is the nodal agency for policy, planning, promoting and coordinating the environmental program including electronics waste. The management of e-waste was covered under the Environment and Forests Hazardous Wastes (Management and Handling) Rules 2008. An exclusive notification on E-waste (Management and Handling) Rules, 2010 under the Environment (Protection) Act, 1986 has been notified on 12th May 2011 to address the safe and environment friendly handing, transporting, storing, and recycling of e-waste and also to reduce the use of hazardous substances during manufacturing of EEE.
- The Central Pollution Control Board (CPCB), India had released guidelines during 2008 for environmentally sound management of e-waste, which should apply to all those who handle the e-waste [8]. The Guidelines have been formulated with the objective of providing broad guidance for identification of various sources of e-waste and the approach and methodology for handling and disposal of e-waste in an environmentally sound manner [7].

3.2 E-waste regulation

Internationally, various legal frameworks have been enacted and enforced to regulate the WEEE. The EU is framing two important directives, WEEE directive and Restriction of Hazardous Substance (RoHS) in EEE regulation directives. In globally WEEE directives implemented with detailed guidelines to assist the producers and consumers in understanding their duty to handle e-waste in environmentally sound manner.

India: Ministry of Environmental and Forest (MoEF) is the national authority responsible for legislation regarding waste management and environmental production. The guidelines for environmentally sound management of e-waste with an objective to provide guidance for identification of various sources of WEEE and prescribed producers for handling e-waste in an environmentally sound manner.
The Ministry of Environment and Forests (MoEF) has issued the following notifications related to hazardous wastes:

1. Hazardous Wastes (Management and Handling) Rules, 1989/2000/2002
2. MoEF Guidelines for Management and Handling of Hazardous Wastes,1991
3. Guidelines for Safe Road Transport of Hazardous Chemicals,1995
4. The Public Liability Act, 1991
5. Batteries (Management and Handling) Rules, 2001
6. The National Environmental Tribunal Act, 1995
7. Bio-Medical Wastes (Management and Handling) Rules, 1998
8. Municipal Solid Wastes (Management and Handling) Rules, 2000 and 2002

4. CONCLUSION

Based on the literature survey, following are the salient conclusions:

- The e-waste increase day by day is much higher than the recycle, recovery and disposal. The most number of wastes recycle and recovery by informal sector is much higher than the formal sector. The informal sector has more manpower with unskilled employee and not governed by any health and environmental regulation.
- More pollution, while recycle, recovery and disposal of e-waste in informal sector.
- Finally, to creating awareness informal sector and public for disposal of waste.
- The discarded material collect, separate and transport by the informal sector and recycling, recovery and disposal by the formal sector is the way of reduction of pollution.

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