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E-Waste Recycling Process and Issues

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Abstract

Electronic waste (E-waste) is that the fastest growing waste stream, which include discarded electrical and electronic devices. While accounting for an E-waste, computer equipment accounting for almost 70 percent of it, followed by communication system (12 percent), electrical equipment (8 percent) and medical equipment (7 percent). E-waste materials signify huge health and environmental hazards. Hence, recycling of E waste has become a significant part. Several steps are followed to recycle the products either manually or automatically. Numerous private sectors involved in recycling E- Waste. However, proper process should be followed to avoid health hazards during handling.

Introduction

Electronic waste simply E-waste includes the discarded electrical or electronic devices. It includes discarded computer monitors, motherboards, mobile phones and chargers, compact discs, headphones, television sets, air conditioners and refrigerators. These materials contain potentially harmful heavy metals like lead, cadmium, beryllium etc. also valuable materials when recycled. India generates about 2 million tonnes (MT) of e-waste annually and ranks fifth among e-waste producing countries, after the US, China, Japan and Germany. In 2016-17, India treated only 0.036 MT of its e-waste (Blade *et al.*, 2017). India is the fifth largest e-waste producer and its e-waste generation is anticipated to annually grow at 30 percent to the touch 5.2 million metric tonnes (MT) every year by 2020. Most of the people are unaware of disposing e-waste to informal sector that end up in severe hazards to humans especially children (Perkins, 2014). Hence, recycling and proper management of e-waste is mandatory in current situation.

Sources of E-Waste (Figure 1)

- Products used for processing like computers, monitor, speakers, keyboards, printers etc.
- Electronic devices used for entertainment like TV, DVDs, and audio and visual components.
- Equipment or devices used for communication like mobile phones, landline phones, and fax.
- Household equipment's like refrigerator, home appliances, microwave ovens, washing machines, air conditioners etc.

Recycling Process

The e-waste recycling processes is very labour intensive and contain several steps ranging from waste collection to final material processing (Figure 2) so as to get the required recycled products or raw materials for reuse.



Figure 1: E-Waste materials

The E-waste recycling process is practiced commercially either manually or automatically. The products retrieved from recycling process may reuse as plastic, metal, mercury. The computer circuit boards from reused process may smelted to recover non renewable resource such as silver, tin, gold, platinum, copper and other valuable metals. Another product from the recycle *i.e.*, hard drives are shredded in whole and processed into aluminium ingot to be used in automotive industry.

Issues

Several private industries are engaged in India to recycle the plastic waste. In that, more informal sector of e-waste recycling having unregulated process and e-waste recycling often is conducted by people with little to no protective equipment or technology (Wong *et al.*, 2007). Informal e-waste recycling is commonly home-based and family-run. During this unregulated network, not all the materials that would be potentially recovered. Additionally there are serious issues regarding leakages of poisons into the environment and workers' safety and health. Some e-waste workers don't seem to be fully responsive to the potential health risks attached with e-waste recycling. Seelampur in Delhi is that the largest e-waste dismantling centre of India. Adults furthermore children spend 8–10 hours daily extracting reusable components and precious metals like copper, gold and various functional parts from the devices. E-waste recyclers use processes like open incineration and acid-leaching. This condition may be improved by creating awareness and improving the infrastructure of recycling units together with the prevalent policies.

Conclusion

E-waste-connected health risks may result from direct contact with harmful materials of heavy metals, hazardous chemical and carcinogens. In addition to its hazardous components, being processed; e-waste can give rise to a number of toxic by-products likely to affect human health. Furthermore, recycling activities such as dismantling

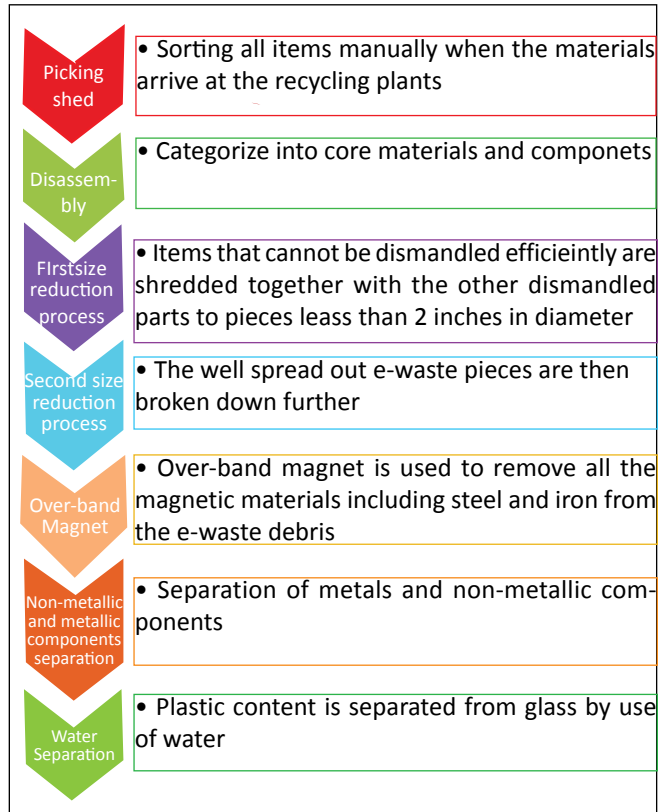


Figure 2: Steps involved in e-waste recycling process

of electrical equipment may potentially bear an increased risk of injury. Less than 20% of e-waste is formally recycled, with 80% either ending up in landfill or being informally recycled. E-waste recycling is necessary at the same time it should be conducted in safe and standard procedure. Regulations should be followed while processing. Public awareness and co-operation of manufactures are essential for the advancement of e-waste management system.

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