International Journal of Scientific Research in Computer Science, Engineering and Information Technology
© 2017 IJSRCSEIT | Volume 2 | Issue 1 | ISSN : 2456-3307

E-Waste Recovery, Reuse, Recycle, Management and Treatment An Insight

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ABSTRACT

India is one of the fastest growing economies. The progress in information and technology sector in India is fast and continuous. In the computer and I.T. sector, the people should know various interdisciplinary aspects and effects of waste generated due to these industries and their effects. Solid waste management is already a grey area in India. The components of the computer assembly contain many heavy metals. Many of these metals are precious. Solid waste management and its various aspects are studied by various researchers and scholars. The formal recycling facilities are inadequate and obsolete. Informal recyclers are treating 95% of the E-waste generated with hazardous practices. The rapid growth of technology, upgradation in technical innovation and high rate of obsolescence in electronic industry calls for better and competitive technology. Current review summarizes research and studies carried out on reuse, recovery and treatment of E waste.

Keywords : Hazardous waste, recycling systems, contaminants, disposal, formal and informal sector

I. INTRODUCTION

E-waste is the waste generated due to the discarded, obsolete, end of life electrical and electronics equipments. India is one of the fastest growing economies. The progress in information and technology sector in India is fast and continuous. Attention is being paid towards technical and manpower requirement of I.T. sector. Many Indian companies are coming with competitive and technically sound solutions to many industrial and educational problems. Many Indian firms are doing well globally. In the computer and I.T. sector, the people should know various interdisciplinary aspects and effects of waste generated due to these industries and their effects. Solid waste management is already a grey area in India. The components of the computer assembly contain many heavy metals. Many of these metals are precious. Solid waste management and its various aspects are studied by various researchers and scholars [1-5]. Also a study on recovery of precious metals from waste is an interesting area of research with huge potential [6-10]. Current review summarizes research and studies carried out on reuse, recovery and treatment of E- waste.

II. E -Waste Recovery, Reuse, Recycle, Management And Treatment : An Insight

Shagun et.al., discussed solution to E-waste management problem [11]. According to them, one of the most threatening thing in the e -waste is lead. Other heavy metals such as cadmium, chromium, mercury, barium are also present in E-waste. According to them, there is need to develop structure, tie recycling in with take-back product. It is important to promote recycling units to ease process and to encourage generators to have proper e-waste disposal. Recyclers need to assume fixed responsibilities. Sinha-Khetriwal et.al. compared electronic waste recycling in Switzerland and in India[12]. According to them, discarded computers, television sets, microwave ovens and other such appliances need to be recycled. They provided insight into the disposal of end-of-life appliances in both countries. They found that there is no one-and-only solution for e-waste recycling systems. The economic

and cultural context many times governs the optimal solutions. According to them, there is a need for more quantitative measures in the area of e-waste recycling. Borthakur and Singh discussed problems and policies in treatment of electronic waste in India [13].The problems of E-waste in India are further increased due to illegally imported E-waste from developed countries. They observed that some people discard E-waste with regular municipal solid waste. In India, people are yet to realize the associations between the cause of generation of E-waste and its effects including detrimental health and environmental effects. In the eleventh international waste management and landfill symposium, Joseph discussed issues and strategies related to electronic waste management in India [14]. According to him, inventorisation, and unhealthy conditions of informal recycling, inadequate legislation, poor awareness and reluctance on part of the corporate to address the critical issues are few drawbacks in waste management in India. In his paper, he highlighted the associated issues and strategies to address this emerging problem, in the light of initiatives in India. According to Ramachandra and Saira E-wastes are dangerous, as certain components of some electronic products contain materials that are hazardous, depending on their condition and density [15].Their studies indicated that discarded computers, televisions. VCRs, stereos, copiers, fax machines, electric lamps, cell phones, audio equipment and batteries, can leach lead if improperly disposed. Their paper highlighted the hazards of E-wastes, the need for its appropriate management and options for treatment. They discussed various aspects of E-waste management such as volume reduction and recycling. Begum reviewed electronic waste (E-Waste) management in India [16]. The existence of contaminants such as lead, cadmium, beryllium, or brominated flame retardants in scrap components, such as CRTs (cathode ray tubes) is very important aspect in E-waste management. According to her, there is significant risk to workers and communities from E-waste. Government policies and individual responsibilities together can minimize E-waste problem. According to Kumar et.al., E-waste has emerged as one of the fastest growing waste streams world-wide [17]. India, in 1013 produced 3.8 lakh tons E-waste, which can be predicted to be around 7 lakh tons in 2016. According to them it is crucial to have proper implementation of policy level initiatives. They examined the exposure levels to lead (Pb), cadmium (Cd), chromium (Cr), etc. in the E-waste recycling communities. Investigations also indicate that the E-waste is increasing at a rate 3 times more than solid municipal waste. Nair and Hari discussed management of informal E-waste recycling in India [18]. According to them, new formal E-waste recycling frameworks ought to come into structure. 65 per cent of the electronics market is in urban areas. According to their studies, television and electrical equipment contributes to 75 per cent of E-waste followed by 20 per cent by computers. The composition of this waste as mentioned in this paper is, iron and steel amounting to 50 per cent, plastics 21 per cent, non-ferrous metals 13 per cent and other constituents 16 per cent. Kumar and Karishma discussed current Scenario of E-waste management in India [19]. According to their studies, India is the fifth biggest producer of E-waste in the world. The E-waste sector recycling in India is only 10 percent of total recycling business. There is huge scope to recycle the E-waste and explore effective and profitable recycling and reuse methods. They emphasized need for a detailed assessment of the E-waste. Kumar and Shah investigated recycling of waste printed circuit boards in India [20]. According to them, the crude recycling activities cause irreversible health and environmental hazards. Also valuable metals are not properly recovered. They emphasized need to establish effective and efficient methods for recycling the metals presented in the waste PCBs. Raghupathy et.al. carried out studies on E-waste recycling in India [21]. In their paper they presented options for bridging the gap between the formal and informal divide in E-waste management in India. According to them, E-waste recycling in the informal sector provides jobs to thousands of people. They expressed optimism that formal sector recyclers would be able to manage E-waste in an environmentally sound manner by using best available technologies. They presented a model that allowed the integration of the informal and the formal sectors in India. An increased cooperation between the formal and informal sector can have mutual gain. They expressed need for the collection, segregation and primary dismantling of nonhazardous fractions of E-waste. One should focus on these aspects, more prominently in the informal sector. Jayapradha reviewed E-waste management in India [22]. According to her, E-waste has become of the fastest growing waste streams in the world due to the rapid growth of technology, up gradation in technical innovation and high rate of obsolescence in electronic

industry. It calls for better and competitive technology. She discussed the scenario of E-waste in India and some new recycling approaches. She also carried out studies on the health hazards of E-waste and various management methods for handling this hazardous waste. Vats and Singh studied E-waste treatment in India [23]. According to them, knowhow and compatible infrastructure for E-waste treatment is limited in India. Many components in E-waste are hazardous. Wherever present in uncontrolled conditions, these substances endanger the human health, environment. The formal recycling facilities are in adequate and obsolete. According to their estimates, informal recyclers are treating 95% of the e-waste generated with hazardous practices. They reiterated that E-waste contains a good amount of valuable recyclable materials. According to them, it has potential to become lucrative business in the country.

III. CONCLUSION

The progress in information and technology sector in India is fast and continuous. Attention is being paid towards technical and manpower requirement of I.T. sector. Many India companies are coming with competitive and technically sound solutions to many industrial and educational problems. Many Indian firms are doing well globally. Solid waste management and its various aspects are studied by various researchers and scholars. Also a study on recovery of precious metals from waste is interesting area of research with huge potential. Current review summarizes research and studies carried out on reuse, recovery and treatment of E-waste. The formal recycling facilities are in adequate and obsolete. Informal recyclers are treating 95% of the E-waste generated with hazardous practices. The rapid growth of technology, upgradation in technical innovation and high rate of obsolescence in electronic industry calls for better and competitive technology.

IV. REFERENCES

[1] Dr. Abhaykumar S Wayal, Mudassir. D. Wagle, "Use of Waste Plastic and Waste Rubber in Aggregate and Bitumen for Road Materials", International Journal of Emerging Technology and Advanced Engineering, Vol.3, No.7, pp.301-306, 2013.

[2] Kulkarni SJ., "A Review on Studies and Research on Use of Plastic Waste", Int. J Res Rev., Vol. 2, No.11, pp.692-696, 2015.

[3] Mane Ashish Vilas, "A Critical Overview of Legal Profile on Solid Waste Management in India", Int. J. Res. Chem. Environ., Vol.591, pp.1-16, 2015.

[4] John Sutherland Earle, "Rotary Kiln Incineration of Hazardous Wastes: Pilot-Scale Studies at Louisiana State University", A Dissertation Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Doctor of Philosophy, Louisiana State University, pp.1-176, December 2003.

[5] Kulkarni SJ., "Review on solid waste management with emphasis on hazardous waste", International Journal of Research and Review, Vol.3, No.12, pp.16-19, 2016.

[6] Abhishek Tripathi, Manoj Kumar, D. C. Sau, Archana Agrawal, Sanchita Chakravarty, T. R. Mankhand, "Leaching Of Gold From The Waste Mobile Phone Printed Circuit Boards (Pcbs) With Ammonium Thiosulphate", International Journal Of Metallurgical Engineering, Vol.1, No.2, pp. 17-21, 2012.

[7] S. Chatterjee and Krishna Kumar, "Effective Electronic Waste Management And Recycling Process Involving Formal And Non-Formal Sectors", International Journal Of Physical Sciences, Vol.4, No.13, pp.893-905, 2009.

[8] Rohini N. Hongal, Roopa G. Sunagad, Shruti A. Gombi, Rohankumar Patil, K.Bhat, "A Technical Method Of Extraction Of Gold From E-Waste: A Multi-Sensor Based Method Using Microcontroller", International Journal Of Research In Engineering And Technology, Vol.3, No.7, pp.94-97, 2014.

[9] Kulkarni SJ., "A Review on Studies and Research on Gold Recovery from Industrial Solid Waste", International Journal of Science & Healthcare Research, Vol.1, No.2, pp.53-56, 2016.

[10] Sunil Jayant Kulkarni, "Solute Uptake, Kinetic and Isotherm Studies for Copper Removal: A Review", International Journal of Research (IJR), Vol.2, No.1, pp. 718-723, January 2015.

[11] Shagun, Ashwani Kush, and Anupam Arora, "Proposed Solution of E-waste Management",

International Journal of Future Computer and Communication, Vol. 2, No. 5, pp. 490-493,October 2013.

[12] Deepali Sinha-Khetriwala,, Philipp Kraeuchib, Markus Schwaninger, "A Comparison of Electronic Waste Recycling Inswitzerland and in India", Environmental Impact Assessment Review, Vol. 25, pp. 492– 504, 2005.

[13] Anwesha Borthakur, Pardeep Singh, "Electronic waste in India: Problems and policies", International Journal of Environmental Sciences, Vol.3, No. 1, pp. 353-362, 2012.

[14] Kurian Joseph, "Electronic Waste Management in India–Issues and Strategies", Proceedings Sardinia 2007, Eleventh International Waste Management and Landfill Symposium S. Margherita di Pula, Cagliari, Italy; 1 - 5 October 2007,1-9, 2007.

[15] Ramachandra T.V., Saira Varghese K., "Environment Ally Sound Options For E-Wastes Management", Energy & Wetlands Research Group, Centre for Ecological Sciences, Indian Institute of Science Bangalore.,1-8,https://www.researchgate.net/publication/257137715_ENVIRONMENTALLY_SOUND_OPTIONS_FOR_E-WASTES_MANAGEMENT,2004.

[16] Dr. Kousar Jahan Ara Begum, "Electronic Waste (E-Waste) Management in India: A Review", IOSR Journal Of Humanities And Social Science (IOSR-JHSS), Vol.10, No. 4, pp.46-57, May - Jun. 2013.

[17] Saurabh Kumar, Rajesh Singh, Dhananjay Singh, Rajmohan Prasad and Tushar Yadav, "Electronics-waste Management", International Journal of Environmental Engineering and Management, Vol.4, No.4, pp.389-396, 2013.

[18] Anju Nair, Neetu Hari, "Management of Informal E-waste Recycling with Special Reference to India", International Journal of Innovative Science, Engineering and Technology, Vol. 2, No. 3, pp.45-52, March 2015.

[19] Rajesh Kumar, Karishma, "Current Scenario of E-waste Management in India: Issues and Strategies", International Journal of Scientific and Research Publications, Vol.6, No. 1, pp. 424-430, January 2016.

[20] Rashmi Kumar, Dahyala. J. Shah, "Review: Current Status of Recycling of Waste Printed Circuit Boards in India", Journal of Environmental Protection, 5, pp.9-16, 2014.

[21] Dr. Lakshmi Raghupathy, Mrs Christine Kruger, Dr. Ashish Chaturvedi, Dr. Rachna Arora, Mr Mikael P. Henzler, "E-waste Recycling in India–Bridging the Gap Between the Informal and Formal Sector", http://www.iswa.org/uploads/tx_iswaknowledgebase/Krueger.pdf, 1-10,2015.

[22] A. Jayapradha, "Scenario of E-waste in India and Application of New Recycling Approaches for E-waste Management", Journal of Chemical and Pharmaceutical Research, Vol.7, No.3, pp.232-238, 2015.

[23] Mahesh C. Vats, Santosh K. Singh, "Status of E-Waste in India - A Review", International Journal of Innovative Research in Science, Engineering and Technology, Vol.3, No. 10, pp. 16917-16931, October 2014.