

Role of Extended Producer Responsibility in context of electronic waste-Case of India

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Abstract- Electronic waste is one of the fastest growing waste streams in the world. Due to the absence of effective and suitable treatment technology, this waste can pose a serious health and environmental hazards. Developing countries such as India is facing enormous challenges and problems related to the rapid generation and disposal of electronic waste. The present study attempted to identify the current challenges and constraints of electronic waste in India. This paper also identifies and analyze the significant role of Extended Producer Responsibility (EPR) policy in handling and effective management of electronic waste.

Index Terms- Electronic waste, Extended Product Responsibility, Recycle, Management, India

I. INTRODUCTION

As the Asian countries industrially and economically grow, the new emerging waste streams such as industrial waste, electronic waste, plastic waste in coastal and marine environment, construction and demolition waste, hazardous and chemical waste have become a matter of serious concern for sustainability. The electronic waste includes the discarded electronic and electrical equipment/appliances. The rapid economic growth, coupled with urbanization and industrialization results the increasing consumption and production of electronic waste and its rapidly growing increase in the near future. Robinson [1] stated that changes in technology will affect the global mass of electronic waste produced. This study also specifies that the electronic waste describes the waste electronic goods such as computers, televisions and cell phones, and also indices traditionally non-electronic goods such as refrigerators, ovens and washing machine. With the aiming to ensuring the proper and effective management of electronic waste, some framework and targets of reuse, recycle and recovery are acknowledged. Ongondo and Williams [2] provide a detailed analysis of electronic waste management practices in various countries and regions around the world, concluding that the rate of initiating legislation to deal with electronic waste is advancing very slowly around the world and is indeed inconsistent in some cases.

India is one of the rapidly growing economies of the developing countries. Since 1990, the first phase of economic liberalization, the problems associated with electronic waste in India have started manifesting [3]. The continuing growth, challenges and problems of electronic waste, causing a serious problem to the environment and human health. Electronic waste is new and emerged stream of waste as compared to municipal waste.

Conventional waste management technologies and policies are more suited to handle and treat the municipal waste as compared to electronic waste because of its different characteristics. Electronic waste contains toxic substances which pose a threat to the environment and human health, as well as the valuable raw material which can be recovered by using proper and effective treatment technologies. In India, electronic waste is one of the highest rank in the domestic generation and import include legal or illegal imports. Extended Producer Responsibility (EPR) is one of the best policy which is increasingly recognized worldwide as an effective and efficient electronic waste management policy with the applicability in the area of end-of-life management of the product.

In order to tackle the problem of e-waste management, it is necessary to first develop a better understanding and discuss the challenges and opportunities of electronic waste recovery, embarking on an Extended Producer Responsibility (EPR). In addition, we have also discussed in detail of EPR impact and efficiency, especially in case of India.

II. EXTENDED PRODUCER RESPONSIBILITY (EPR) AND ITS SIGNIFICANCE

Extended Producer Responsibility is defined as an environmental protection strategy that makes the manufacturer of the product responsibility for the entire life cycle of the product and especially for the take back, recycling and final disposal of the product [4]. EPR is an environment policy approach that attributes responsibility to manufactures in taking back products after use, and is based on polluter-pays principles. Thus, the producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle [5]. With the aim to reduce the environmental impact of the life-cycle of the product, EPR pays its attention to the pollution emerging from the last stage of product disposal and recycle. EPR is most commonly applied for home appliances under Home Appliances Recycling Law in Japan [6], for packaging waste under Packaging Ordinance in Germany [4] and for Automobile waste in under Sweden Law [7]. Matsuto [8] examined domestic efforts to recycle used home appliances in Japan, focusing on recent legislation (the Home appliances Recycling Law) that requires appliance producers to take responsibility for the collection and recycling of end-of-life products. It shows that the electronic waste is highly enforced with EPR policy and law. Recycling and transportation fees are paid by consumers and discarded appliances are sent to recycling facilities.

There are main two tasks of EPR- (a) to increase the collection and reuse and recycle the product; and (b) financial responsibility

throughout the life cycle of the product. EPR includes the four main approaches- Product take-back approach, market-based approach, quantity standard approach and economic approach. In the region of western Canada, the EPR is managed by companies which would pay for the environmental handling charge when import oil and also a rewarding fee to benefit the collector and processors recycling the oil [9]. The recycled oil further processed as lubricating oil or other petrochemical goods, and the revenue is used for environmental handling cost. In developing countries, government and municipalities play an important role in product take-back approach and providing recycling infrastructure [10]. For progressive EPR policy, the producers have full responsibility of the environmental impacts in the whole life-cycle of the product [11].

III. BENEFITS OF RECYCLING PROCESS

The continue development in recycling and recovery technology establish the investment in infrastructure of the country. A life cycle assessment approach of plastic waste would assist in identifying the environmental impacts associated with management and EPR policy. In other words, plastic reused products have been able to benefit society in terms of economic activity, jobs and quality of life. Recycling activities of plastic waste could help reduce energy consumption and greenhouse emissions and packaging applications. The recycling activities needs to be carried out in a sustainable manner, which provide a wide variety of recycled plastic applications and the market would grow rapidly. In addition, the recycling activities input the interest in terms of economic impact by raising the recycling sector and potential increase in economic growth and social impact is anticipated to be associated as a health and environmental risks.

IV. CHALLENGES AND CONSTRAINTS OF ELECTRONIC WASTE –CASE OF INDIA

Waste management is a very massive task in India, and becoming more complicated with invasion of electronic waste, which contains hazards and toxic substances. In addition, the electronic industry has emerged at a higher rank in terms of production, consumption, import and export. The main source of electronic waste are divided into main two sectors, formal sector includes manufacturer, producer, retailer, consumers, traders and informal sector includes smelters, dismantlers and recycling facilities [12]. The transboundary movement of hazards waste, particularly contentious when the waste exports from developed to developing countries. Dwivedy and Mittal [13] try to evaluate the future trends of computer waste generation in India by utilizing their first lifespan distribution and historical sales data. The results of his study indicate that in the year 2020, about 41 to 152 million units of computers will become obsolete. Of the electronic waste imported into India, it is estimated that approximately 80 percent is imported from the US, while the remaining 20 percent is predominately imported from the EU countries [14]. Nonetheless, as the import of electronic waste is illegal and it is often shipped via third countries, that is unrealistic to expect these statistics to be exact [15]. In India, the Central Pollution Control Board (CPCB) puts forward the Draft guidelines for environmentally sound management of electronic

waste in 2007 and E-waste (Management and Handling) Rules, 2011 for public consultation and suggest the EPR policy [16]. EPR policy and programs introduce the producer's liability, physical, financial and informative responsibility are extended to cover the end-of-life of the product.

According to a Delhi-based non-governmental organization (NGO) Toxic Links, India annually generate 1.5billion \$ worth of electronic waste domestically, with the blooming IP sector being the largest contributor, as 30 percent of its machines reach obsolescence annually [12]. 70 percent of electronic waste is collected from export or dump by developed countries, because it's financially profitable to send electronic waste for reuse and recycle in developing countries [17]. Because lack of awareness of treatment and disposal of domestic electronic waste, citizens usually discard the electronic waste with the municipal waste stream, which is highly insignificant for the environment.

In this way, the first priority should be to reduce its generation, however, the consumers in exporting countries are changing their lifestyles. The reuse and recycle of electronic waste, mainly focuses on the characteristics of the product- quality, stability of reuse product, environmental impact of reuse product, socioeconomic impact of reuse product. Recycling involves the disassembly and destruction of the electronic item to recover the raw material [18]. Reuse and recycle are very lucrative business in the second-hand market of re-useable product in India. However, the EPR policy and program is limited to reuse and recycle options. The reuse 'redesign' helps to solve the obstacles of interface with the economic market in second hand and recycled market. However, the management of electronic waste has severe environment and human health implications. Usually stakeholders play an important role in managing the electronic waste but have a negligible role in the generation of electronic waste, whatever electronic waste is produced during the redesign.

V. IMPLICATIONS OF ELECTRONIC WASTE ON ENVIRONMENT AND HUMAN HEALTH

Leung et al. [19] focused on the adverse effects of the hazards substance that are contained in electronic waste. The emission/pollution is mainly caused from the primitive techniques such as open burning and open dumping of electronic waste. Open dumping, especially wires and cables, apparently may create persistent organic pollutants (POPs), which may result health effect and diseases of the skin, stomach and other organs. Informal sector plays a significant role in recycling practice. However, after recycling method, most of the leftover material are dumped and burned which create significant potential of health and environmental risks. The effect of improper disposal of electronic waste would observe relatively over a long period of time, which intensify the problem of hazards substances. Electronic waste, that is landfilled, produce contaminated leachates locates which eventually pollute the groundwater and causes acidification in soil. The open burning of plastic causes toxic affect for local environment and global environment. In other hand, incineration also poses threat for environment may emit toxic and harmful gases in the atmosphere.

VI. CONCLUSION

In conclusion, we have found that the electronic waste is one of the main concern in society of developing countries and it's one of the important concept of sustainable development. The volume of electronic waste is growing fast day-by-day because consumer demand of innovative technology is rapidly changing, so, generating massive amount of electronic waste. However, the management practices are poorly designed because lack of awareness in treatment and disposal method and inadequate policies and programs to reduce and manage the waste. The trans-boundary movement of electronic waste is differ in various socioeconomic condition of importing and exporting countries that helps to increase the limited utilization of natural resources. Most developed countries have a lot of success in implementing the EPR policy and program. The best method is knowledge transfer of policy in developing countries to manage their electronic waste problem should be undertaken. EPR policy could play an important role to formalize the strengthening of electronic waste with the initiative of producer take back approach and increase the economic aspects of the country.

NOTE

This work is not related with United Nations work and system.

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