

Solid Waste Management Challenges in India Comparing with Other Developing Nations – A Review



Engineering

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ABSTRACT

India is now one among the top ten in generating solid waste due to growing urbanization and high consumption. 0.1 Million tons of municipal waste is generated in India every day. Most of the latest efforts focus on "Zero Waste" and/or "Zero Land filling" which is certainly expensive for India. Composting or anaerobic digestion with energy production and composting of the digestate were the two best options with composting being neutral in terms of carbon emissions and anaerobic digestion being carbon negative. Many methods have been proposed in different countries for the sustainable development of their country. This paper indicates the challenges faced by India in the solid waste management and how it can be solved.

Introduction

During recent years, interest in industrial waste as an important source of energy and material has increased. Today, most manufacturing plants are in need of detailed analysis of their waste management system at all stages of production. Increasing population, changing consumption patterns, economic development, changing income, urbanization and industrialization result in increased generation of solid waste and also a diversification of the types of the solid waste generated. Increased waste generation creates more environmental problems in this area, as many cities are not able to manage wastes due to institutional, financial, technical, knowledge and public participation shortcomings (Uyen et al., 2009). Waste cannot be dumped without due concern and preparation, because not only is it unsightly, unhygienic, and potentially disastrous to our environment, it also requires the allocation of space and incurs costs related to the consequences of the waste disposal. It means that waste materials generated must be recovered for reuse and recycling, and the rest should be disposed at landfill sites. Unfortunately, disposal is not a sustainable solid waste management solution.

Several technological means exist to divert solid waste typically destined for a landfill, such as incineration with energy production, composting of organic wastes, and material recovery through recycling, all having the potential to be more sustainable methods by which to manage MSW than via landfill. However, with waste streams comprised of 55% or greater organic matter in developing countries, composting is being considered in many parts of the world (especially in the tourist and agricultural sectors) as a method to reduce waste destined for the landfill. Also, incineration for energy recovery can be a costly capital investment for most communities in the developing world, pose societal and environmental health risks if misused (e.g., burning toxic wastes causes harmful air pollution), and shows a less positive energy balance than transforming material via recycling (Oliveira and Rosa et al., 2003). The mass of waste produced in the world has been growing considerably for many decades especially in affluent countries as shown by the link between national gross domestic product (GDP) and waste generation per capita (World Development Report, 1992). Though waste data on waste arising is often incomplete and in some cases unreliable, recent estimates suggest that the municipal solid waste (MSW) alone generated globally exceeded 2 billion tons per year at the turn of the millennium. The continued development of recycling and recovery technologies, investment in infrastructure, the establishment of viable markets and participation by industry, government and consumers are all considered priorities of the highest order (Scheirs, 1998).

Waste management in developing countries

In most developing countries, solid waste management is undertaken by the local authority, and the service includes waste collection (either from households or communal collection points) to final disposal. However, the low financial base and human resource capacity of these local authorities means that in most cases these authorities are only able to provide a limited service. For example in Nairobi 25% of waste is collected by the city council (UNEP, 2005). In some of the larger cities, the private sector supplements the service, but in the small to middle-size towns where the profit margins for waste collection are smaller, the local authorities remain the only providers. In general, solid waste management costs are covered indirectly through taxes, permits and rates. The lack of capacity within local authorities for billing and revenue generally results in a very low portion of revenue being collected and thus a low financial base to cover salaries and running costs associated with SWM (Ogawa, 1996). The poor operation and maintenance therefore leads to local authorities only being able to service a small area of the urban centers, in most cases on the central business districts. Urban residents who do not receive a waste collection service are forced to either bury their waste, burn it or dump it in open spaces. In some cities and large towns in developing countries, most of the disposal sites are nothing more than open dumpsites. Open dumpsites are a resource for the urban poor; the scavenging and informal recycling of waste means that waste is being turned and thus aerated, and due to space limitation of the dumpsite waste it is often burnt thus emitting carbon dioxide, dioxins, furans.

Treatment of Municipal Solid Waste (MSW)

Several papers have addressed the processing technologies to treat the different types of MSW, these evaluations have considered the human, environmental and economic aspects; in this regard, (Young, 2010) evaluated and compared the economic aspects of five thermal routes to treat the MSW (Ramayah et al., 2012). Also, investigated some waste management alternatives in the city of Iasi in Romania from the environmental point of view based on the life cycle assessment (Ghinea et al., 2012). Furthermore, the costs and benefits of waste recycling in Portugal were presented by (Cruz et al., 2012), where the analysis included the return of the capital employed and the land filling activities. On the other hand (Ling and Poon et al., 2012) presented a study to compare the feasibility for using recycled glass. Finally, the assessment to obtain energy from wastes has been studied too, for example (Iakovou, 2010) concluded that biomass from wastes to energy production is an attractive solution; however, very few studies have addressed critical supply chain management issues.

Waste management methods employed in developing nations.

Informal waste recycling

Informal waste recycling is carried out by poor and marginalized social groups who resort to scavenging/ waste picking for income generation and some even for everyday survival. This is widespread throughout urban areas of the developing world and it is reported that up to 2% of the population in Asian and Latin American cities depend on waste picking to earn their livelihood (Medina, 2000). This is an adaptive response to scarcity by disadvantaged populations. Informal recyclers often form discrete social groups or belong to minorities, examples of which include the Zabbaleen in Egypt, Pepenadores, Catroneros and Buscabotes in Mexico, Basurriegos, Cartoneros, Traperos and Chatarreros in Colombia, Chamberos in Ecuador, Buzos in Costa Rica and Cirujas in Argentina (Medina and Dows, 2000; Berthier, 2003). A typical informal system is shown in Figure 1.

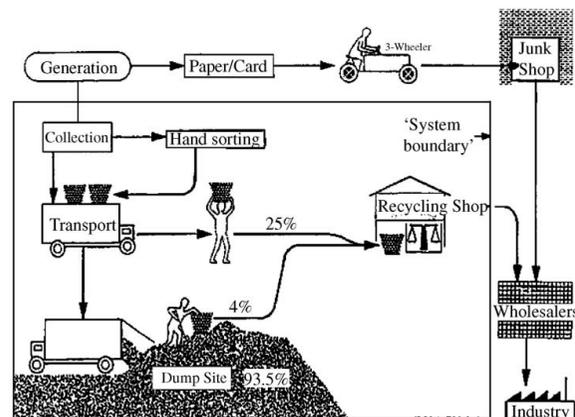


Figure 1: Example flow chart of an informal recycling system, showing four types of informal recycling [reproduced from Wilson et al., (2001)].

Conclusion

Standardized classification of municipal waste will lead to proper treatment. This review helps to find out the status of developing countries in the waste management. Recycling is the one of the best way to minimize waste as well as to recovery valuable materials from waste. Novel innovations are costly to practice in large scale manner. Gasification process is used in all process industries but will leads to formation of ash. Employing all suitable process for the MSW will minimize solid waste and improve standard of the nation.

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