
Globalisation and Waste Management Interface in India

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Abstract

Globalisation has brought potential opportunities as well as challenges in waste management sector. On the one hand, it has facilitated by knowledge dissemination in the form of best practices, technologies for waste hierarchy framework, strengthening of global recycle markets, signing of various treaties and conventions to manage waste in an environmentally sound manner. On the other hand, it is tremendously contributing to waste footprints, pressuring (interfering) the regional governments to follow international standards, overlapping of various treaties and laws, exploitation of waste workers and resulting to various global externalities. The major challenge is to manage the process of globalisation in such a way that it promotes environmental sustainability and equitable human development. Thus, the paper encapsulates the globalization and waste sector interface from three dimensions- economy, knowledge and governance.

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1. Introduction

Solid waste management is an important environmental health service and also an integral part of basic urban services in India. There are two way linkages between globalisation and waste management: not only does globalisation influence and change waste management practices (e.g. the worldwide spread of recycling and waste prevention), but also waste management practices affect the way globalisation works (e.g. global recycling markets and waste trafficking). This two-way interaction and interdependence between globalisation and waste management leads us to study three dimensions of globalisation's interactions with waste management, i.e. with the economy, with knowledge and with governance.

Methodology

As mentioned earlier, the paper aims to study the three kinds of interaction between globalisation and waste management as shown in Figure 1.

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Figure 1 Relationship between Globalisation and Waste Management

The paper has been divided into three sections. The **first** section explores the relationship between economics of waste management and globalisation. In this section, special emphasis is placed upon global recycling markets and role of informal sector in waste management. The **second** section highlights the importance of knowledge dissemination in the form of good practices and advanced technologies for a waste hierarchy framework. International treaties and conventions as well as national laws of India along with the institutional framework of waste management have been discussed in the **third** section on globalisation and governance. The challenges pertaining to each aspect have been discussed at the end of the respective sections.

Limitations of the Study

Desk based approach has been followed in the paper using wide variety of secondary sources such as reports published by national and international research and governmental organisations, articles, books and internet sources.

The relationship between Globalisation and Waste Management has various dimensions; only three dimensions have been explored. Each dimension has its own complete universe, while also being inter-related and inter-connected. Therefore, this paper has addressed limited activities of each selected dimension; there is huge scope for further research in this area.

Section I

Globalisation and Economy

Globalisation can be described as “strong cultural, technological and especially economic interconnection between people and countries”. The concepts of interconnection, interaction, and interdependence hold a central place in the analysis regarding globalisation. Globalisation is leading to a “world as a single place”, where changes in distant lands affect people around the globe more quickly and with greater frequency and intensity. This does not assume that the process of globalisation is even or equal within or across countries (International Solid Waste Association, 2012)

Waste is part of the economy – it is a by-product of economic activity, by businesses, government and households. Waste is also an input for economic activity – whether through material or energy recovery (Department of Environment, Food and Rural Affairs, 2011). The economics of waste management implies ‘reduce, reuse and recycle (3R)’ waste matter in to the value chain leading to economic benefits (Urban Governance, 2012) (detailed discussion in Section II).

Globalisation has contributed to waste management in several ways such as direct increase of international financial flows including foreign direct investments (FDI), grants as well as loans by international institutions like the World Bank; Official Development Assistance (ODA) is usually one of the major ways where those financial flows take place (International Solid Waste Association, 2012).

In developing countries, millions of people are working in informal recycling activities and making their living in difficult and risky conditions. On the other hand, their activities contribute to global recycling rates and create employment opportunities for marginalized populations. The global recycling markets have benefitted the informal sector of waste management. Table 1 shows that there are two major aspects in waste management that have been affected by globalisation. First, growth of informal sector as global recycling partner because it plays a key role in upping recycling rates. Second, it directly affects the recycling activities and rates worldwide and is also crucial for the sustainability of waste management (International Solid Waste Association, 2012). This is discussed below in sections 1.1 and 1.2.

Key-Aspects	Comments
Informal sector as a global recycling partner	Informal sector plays a crucial role in building global recycling rates.
Global recycling markets and resource recovery	It directly affects recycling activities worldwide and becomes crucial for the sustainability of waste management systems.

Since 1972, efforts have been made by local NGO's to organise the waste pickers, but the results do not yet extend across India. Due to the predominant role of women in waste picking, women's organisations were the first to throw light on waste pickers and their interests. These early approaches encouraged waste pickers to transfer to work less demeaning to their dignity and less hazardous to their health. The key activities were formation of cooperatives for contract cleaning and housekeeping, collection of waste paper from government offices and institutions and waste paper trading.

In 1990 the *Project for the Empowerment of Waste pickers* of the Women's University in Pune in Western India started organising waste pickers around their work issues. Amongst other initiatives, the project issued identity cards to waste pickers and promoted source segregation of waste and its door-to-door collection by waste pickers.

In subsequent years waste picker organisations were formed in Delhi, Bangalore and other cities, based on the understanding that waste pickers have a customary right to recyclable scrap and asserting that waste pickers' livelihoods could best be protected and enhanced by promoting source segregation of waste and its door-to-door collection. All the organisations underscored the value and the work of informal sector waste recyclers (Report of Partnerships for Recycling Management , 2008).

- iii. **Working Conditions of Informal Waste Sector Workers:** The majority of the waste workers constitute the lowest level of society. Working conditions are beyond imagination and include enduring exposure to dangerous, toxic and contagious substances. Frequently, waste pickers are bitten by dogs, subjected to aggravation from officials, and subjugated by traders; they have neither legal standing nor support. They live in inhuman and humiliating circumstances and generally lack sanitary services, health care and social benefits. Table 2 presents a fairly comprehensive list of the occupational health hazards faced by waste pickers.

Table 2 Occupational Health Hazards to Waste Pickers
Some of the more commonly reported occupational health and injury issues in solid waste management: <ul style="list-style-type: none"> • Back and joint injuries from lifting heavy waste-filled containers; • Respiratory illness from ingesting particulates, bio-aerosols, and volatile organic substances during waste collection, and from working in smoky and dusty conditions at open dumps; • Infections from direct contact with contaminated material, dog and rodent bites, or eating the meat of waste-fed animals; • Wounds exposing them to tetanus, hepatitis, and HIV infection; • Injuries due to surface subsidence, underground fire at dumpsites; • Headaches and nausea from anoxic conditions where disposal sites have high methane, carbon dioxide, and carbon monoxide concentrations; and • Lead poisoning from burning of materials with lead-containing batteries, paints, and solders.
Source: http://siteresources.worldbank.org/INTUSWM/Resources/up-2.pdf accessed on 15 May 2016.

1.2 Challenges of Waste Management in a Globalised Economy

There are certain challenges and issues for concern related to waste management in globalised economies such as increasing waste quantity, increasing the rate of recycling, working conditions of waste pickers, environment degradation, increasing inequalities etc. The major issue is that waste is not considered as a valuable resource; therefore appropriate methods are not followed to recover the cost that is being spent in this sector.

- i. **Waste Footprint:** Globalisation has de-linked production centers from consumption places. Chemicals, electronics and plastics are increasingly being manufactured in Asian countries, which are emerging as major production centres for the global North. The waste generated in the production processes are dumped locally, even though the production caters to international consumers (International Solid Waste Association, 2012).
- ii. **Recycling markets:** Recycling is always placed above disposal in the waste management 'hierarchy'. Most, if not all, western countries allowed their earlier informal recycling systems to disappear, and have struggled over the last 10 years to re-establish more formal systems to rebuild recycling percentages to former levels and meet what are now ever-increasing recycling targets. The informal waste recycling systems that already exist in many developing countries reduce the cost of formal waste management systems as they reduce the quantity of waste for collection, resulting in less money and time spent on collection and transport. Void space at disposal sites is preserved and only used for wastes with no potential value as recycled materials are diverted for reuse. For the most part, these economic benefits are achieved at no direct cost to the tax-payers (Wilson et al, 2006).

This evolution of the recycling market has created global recycling hubs, like China and Asia, which support recycling efforts worldwide. At the same time new problems and challenges concerning the quality and the final use of recyclables have emerged. A key issue regarding the global recycling market is the role of the informal sector as a major recycling provider in globalised economies.

- iii. **Informal Sector:** Many cities of the world are unable to manage their waste management system without their myriad waste pickers, scrap collectors, traders and recyclers. Although they are not officially documented, yet they form the very basis of waste collection services. Organically grown informal sector activities are extremely adaptable, flexible, and able to respond quickly to demand-driven forces. However, waste pickers are the most vulnerable as they do not have an organised supportive network. They have limited capacity for processing or storing materials and are easily exploited. Family-organised activities are common in dump scavenging and in situations where waste collection is provided by the informal sector. This often involves vulnerable sections such as women, children and the elderly and exposes them to increased health risks. It also often prevents children from having any chance of a formal education. However, family-organised activities reduce individual vulnerability by providing a level of social and economic support (Partnerships for Recycling Management, 2008)
- iv. **Globalized Externalities:** The globalized economy can create globalized externalities. Local environmental and financial decisions can contribute in global solutions and to the growth of prosperity, but the environmental impacts and the financial consequences can be externalised in sites and people that are far away. International inequalities can be reinforcing. Another effect of globalisation is the incorporation of environmental standards in trade agreements which now represent a major negotiation issue between developed and developing countries (International Solid Waste Association, 2012).

Section II Globalisation and Knowledge

As economies open up, more people become involved in the processes of knowledge integration and the deepening of non-market connections, including flows of information, culture, ideology and technology.

2.1 Creation of NGOs and citizen networks: Global interactions facilitate exchange of environmental knowledge and best practices. That is true for waste management as well, where a lot of international scientific and professional networks do exist, providing huge amount of information every year. Environmental consciousness increases with emergence of global environmental networks and civil society movements. Non-governmental Organisations play a very important role, especially the global ones; especially accidents, failures and waste mismanagement stories are rapidly spread worldwide (Taskforce Report, 2011).

2.2 Good Practices and Technology Dissemination in India: Globalisation facilitates the spread of existing technologies and the emergence of new technologies, often replacing existing technologies with more extractive alternatives. Greener technologies may also be spurred. In the case of waste management technologies- thermal, bio-logical, recycling must be used (Zaman, 2010). The waste hierarchy (Fig.3) refers to the "3 Rs" reduce, reuse and recycle, which classify waste management strategies according to their desirability in terms of waste minimisation. Activities at source like prevention, re-use and source reduction are given the highest priority in solid waste management practices. Energy recovery from the waste is given the second priority, and finally the waste should reach the safe disposal sites.



Waste Prevention and Minimisation: Prevention is the most desirable waste management option, as it eliminates the need for handling, transporting, recycling and disposal of waste. Also it helps the optimization of environmental resources. Minimisation is any process or activity that avoids, reduces or eliminates waste at its source or results in reuse or recycling. These two management options can be applied at all stages in the life cycle of a product. A case study suggested that "extended producer responsibility" criteria can be used in the selection of resources and the design of products, in the context of 'cradle to grave' evaluation of economic and environmental costs and benefits. The study suggested special tools like life cycle analysis and value chain analysis for the same*.

Reuse is preferred over recycling if the purpose of use is same, as both energy and matter is saved. But the efficiency of the product may reduce in reuse and also certain products become hazardous in the long run, pointing to the versatility of waste prevention and minimisation. For instance, the reuse of a building after

remodelling is a sustainable option to minimise the construction waste (United Nations Department of Economic and Social Affairs (UNDESA), 2012).

Recycling involves the treatment or reprocessing of discarded waste to make it adequate for reuse. It conserves resources and energy but is sometimes tedious, time consuming and results in net energy loss. General office waste like paper and cardboard are easier to recycle because they contain lots of strong fibers that can be reused to make new sheets, papers etc. (Zaman, 2010).

Waste Disposal and Treatment Technologies: Various waste treatment and processing technologies are available for processing of waste in an environmentally sound manner. The choice of technology depends on the waste characteristics, needs and resources of any particular city.

Table 4 Waste Disposal and Treatment Methods followed in India		
Types	Sub-categories	Description
Dumps and Landfills	Sanitary Landfill and Controlled dumps	A landfill is divided into a series of individual cells and only a few cells of the site are filled with trash at any one time. The daily waste is spread and compacted to reduce the volume, a cover is then applied to reduce odours and keep out pests. The bioreactor landfills use enhanced microbiological process to accelerate the decomposition of waste.
Biological Waste Treatment	Composting, and Anaerobic digestion	Composting is the controlled aerobic decomposition of organic matter by the action of micro organism and small invertebrates. There is a number of composting techniques. Anaerobic digestion like composting uses biological processes to decompose organic waste.
Thermal Processing Technologies	Incineration, Pyrolysis/gasification, and Open burning.	Incineration is the combustion of waste in the presence of oxygen. Pyrolysis and gasification decompose organic waste by exposing it to high temperature and low amount of oxygen. Open burning is the burning of unwanted materials in a manner that causes smoke and other emissions to be released directly into the air without passing through a chimney or stack (Sharloy et al, 2008).

Source: Compiled from various sources.

After the waste treatment, the residual waste is dumped into dumps or landfills. Landfill is a land that is built up from deposits of solid refuse in layers covered by soil. The organic waste dumped in a landfill site will decompose with time, but the inorganic constituents will remain for long time. The main environmental problem associated with land fill is the pollution of ground water. Hence the sanitary landfill design should include expensive and carefully constructed impermeable layers which prevent the leachate from contaminating the ground water resources. The United Nations Environmental Programme (UNEP) study showed that leachate recirculation landfills (landfill bioreactors) are superior to the conventional single-pass leaching landfills.

Government of India had made special efforts to promote biological waste treatment. Thermal processing technologies are also used at wide scale in India. More recent technologies that have improved safety include vehicle GPS tracking and inspection systems and high-definition camera systems that record data and have removable storage.

2.3 Challenges of Globalised Knowledge and Waste Management

New technologies can solve old problems, but they can also create new ones. Technologies of environmental care can move across boundaries quicker, but so can technologies of environmental extraction. Information flows can connect workers and citizens across boundaries and oceans (e.g., the rise of global social movements as well as of outsourcing), but they can also threaten social and economic networks at the local level.

Globalisation brings the need for combining global principles with local conditions and practices. One of the most important challenges in terms of globalisation and knowledge is how to utilise global thinking and the enormous available knowledge in order to find out sustainable local solutions based on local resources, without ignoring the roots of innovation based on local applications and customized practices. The example of Naples (City in Italy) waste management is a representative one (Taskforce Report, 2011).

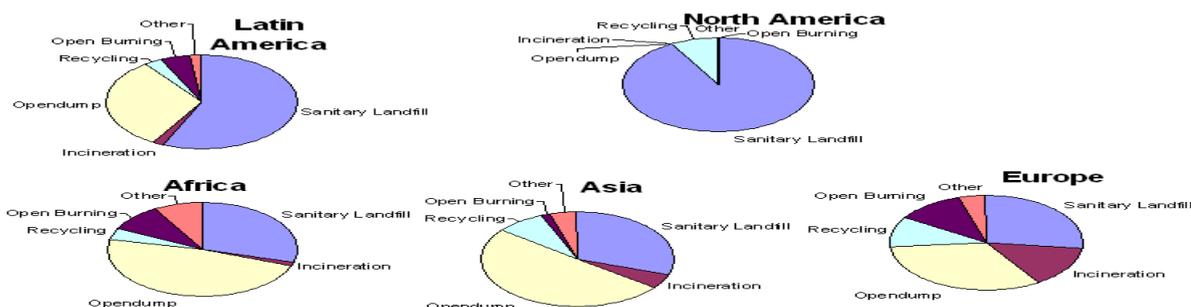


Figure No. 3 Waste Management Practices in Different Parts of the World (Chandak, 2010)

Figure 3 shows some global practices of waste management. It is clear that open dumping is widely used in the Asian Continent; though this method is least preferred in the waste hierarchy framework. Open dumps leads to severe health problems to residential communities living nearby and are also a cause of environment degradation.

Section III

Globalisation and Governance

Governance has been described as a system of values, policies, and institutions by which a society manages its economic, social, and political affairs through interactions within and among the state, civil society and private sector. Three actors are involved in governance: the **State**, which creates a conducive political and legal environment; the **private sector**, which generates jobs and income; and **civil society**, which facilitates social and political interaction. The essence of governance is to foster interaction between these three types of actors to promote people-centered development (Cheema, S. 2004).

3.1 Role of Global Governance in Waste Management

Globalisation has strengthened the competitive pressures across national borders by economic integration such as providing commodities at lower prices, improving services and increasing choice. However, these pressures at times threaten to overwhelm the regulatory capacities of national governments and thus necessitate intergovernmental coordination of domestic policies and cooperative management of the global commons. Local problems can best be addressed at the same scale; but even in these cases, there is a clear advantage of learning from other nations that have managed to tackle similar issues. In other cases, the problems are so inextricably international that a coordinated multi-country response is required. This response, however, must always be backed up by effective action at the national and local levels.

Four more specific areas can be identified where the link between globalisation and governance is obviously affecting waste management.

- First, globalisation makes it increasingly difficult for states to rely only on national regulation about waste management in order to ensure the safety of their citizens and their environment.
- Second, there is a growing demand and need for global regulation, especially for the means to enforce existing agreements and build upon their synergies to improve environmental performance. This is more than obvious in the case of hazardous and e- waste.
- Third, globalization facilitates the involvement of a growing diversity of participants and their coalitions in addressing waste management issues, including other governments and international organizations, global market players and local - global civil society actors.
- Fourth, the direct increase of international financial flows dedicated to waste management creates a new arena for local decision-making, especially for the countries that are receivers of grants, foreign direct investment and loans (Taskforce Report, 2011).

Therefore, effective global governance may intensify economic, social, political and environmental harms wherever national regulatory structures are inadequate and co-operation from other nations is required.

3.2 International Conventions on Waste Management

There is long term experience from international cooperation agreements regarding waste management such as Basel Convention and a lot of new initiatives by United Nations and other institutions that must be assessed in order to have a clear picture on how the link between globalisation and governance influences waste management worldwide. The global nature of the environment demands global environmental governance, and indeed a worldwide infrastructure of international agreements and institutions has emerged and continues to grow. But many of today's global environmental problems have outgrown the governance systems designed to solve them. Many of these institutions, however, struggle as they have to respond to an ever-increasing set of global challenges while remaining constrained by institutional design principles inherited from an earlier, more state-centric world. The Basel Convention deals with the trans-boundary movement and disposal of hazardous wastes as well as other chemical wastes by regulating and controlling the movement of scheduled hazardous wastes from OECD countries to non-OECD countries. India ratified

this convention in 1992 thus demonstrating its commitment to solve the problem of transboundary movement and disposal of hazardous wastes through international cooperation. Restrictions imposed by the Basel Convention aim at encouraging the signatory countries to reduce generation with proper treatment and disposal in an environmentally safe manner. The Rotterdam and Stockholm Conventions also aim at reducing or eliminating various types of hazardous emissions. Basel convention banned the export of hazardous wastes. However, it does not put an import ban of such wastes. After ratification of this convention, If India desires to import hazardous waste it will be unable to source these wastes from OECD countries because of the ban. However, the convention is unable to prevent the inflow of hazardous wastes into India from countries that have not ratified the agreement. USA, not being party to the Basel Convention, is a major exporter of hazardous wastes into India (Taskforce Report, 2011).

3.3 Governance of Waste Management in India

The Environment (Protection) Act of 1986 (EPA) came into force soon after the Bhopal gas tragedy and is considered an umbrella legislation as it filled many gaps in the existing laws. The major regulatory framework of the country is depicted on a timeline (Figure 4) showing the development of the major environmental and waste management regulations in India regulations specific to water, air, forests, and wildlife.

The Department of the Environment (DoE) was established in India in 1980 to ensure a healthy environment for the country. It became the Ministry of Environment and Forest (MoEF) in 1985. The government constituted the Central Pollution Control Board under the Ministry of Environment and Forest. The states have also been empowered to have State Pollution Control Boards/Committees (SPCB) to meet the challenges relating to environmental issues. (Figure 5) The constitutional provisions are backed by a number of statutes, rules and notifications.

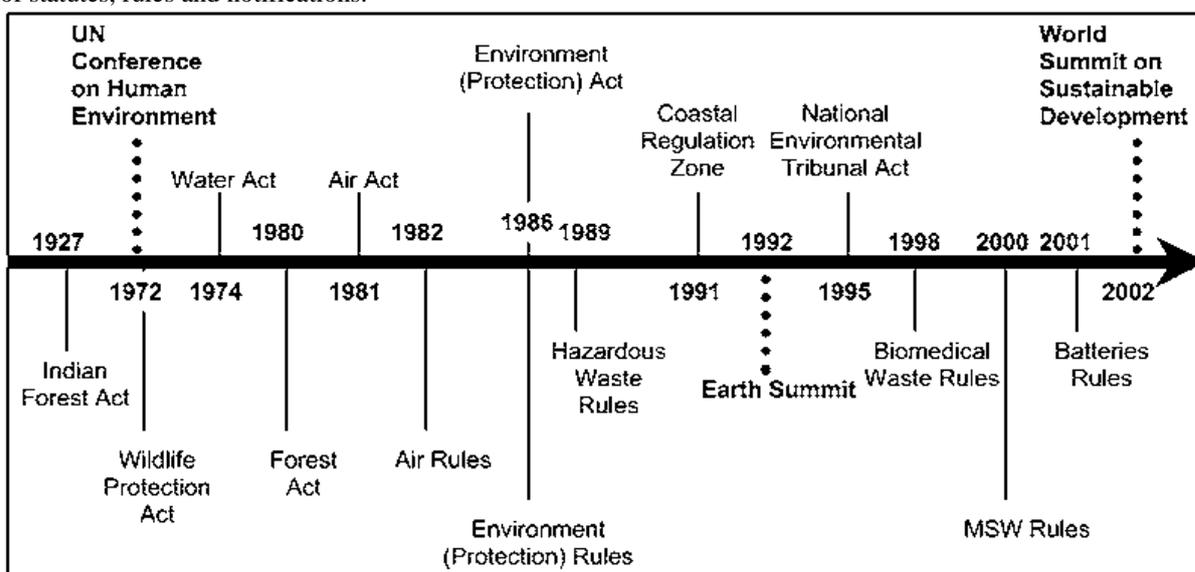


Figure 4: Development of the major environmental and waste management regulations in India (Report of the APO, 2007).

The Government of India has taken various steps to improve solid-waste management. The National Waste Management Committee was constituted in 1990 with the objective of identifying the contents of recyclables in solid waste picked up by rag pickers through Kabariwalas (scrap dealers). A High Powered Committee was constituted in 1995 and headed by Dr. Bajaj with the objective of suggesting a long-term strategy for the collection, loading, transportation, composting, treatment, and disposal of solid waste using appropriate technology. Ministry of Environment and Forests is the nodal agency to handle the environment matters in India. Central Pollution Control Boards ensures the compliance to the rules and issue guidelines from time to time. Figure 5 clearly shows the institutional framework of waste management in India.

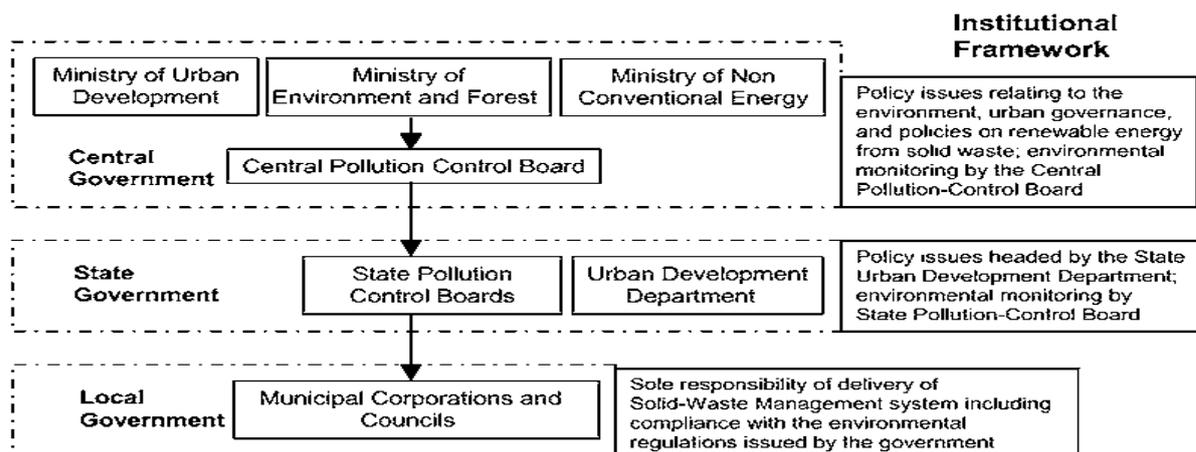


Figure 5: Institutional Framework of Waste Management in India (Report of the APO, 2007)

Supplementing the regulatory framework the rules pertaining to solid-waste management are as follows.

- i. Hazardous Waste (Management and Handling) Rules (1989, amended January 2003, 2016): These rules deal with controlling the generation, collection, treatment, disposal, import, storage, transport, and handling of hazardous waste.
- ii. Biomedical Waste (Management and Handling) Rules (2016): India was one of the first countries to formulate and implement Bio-Medical Waste (Management and Handling) Rules, 1998 and the Rules are amended in 2016. The Ministry of Environment and Forests notified the BMW Rules in July 1998 (later amended in 2003 and 2011) under the Environment Protection Act, 1986. These rules apply to all those who generate, collect, receive, store, transport, treat, dispose or handle bio-medical waste in any form (Bio-medical Rules, 2016).
- iii. The Batteries (Management and Handling) Rules (2001): These rules apply to every manufacturer, importer, re-conditioner, assembler, dealer, recycler, auctioneer, consumer, and bulk consumer involved in the manufacture, processing, sale, purchase, and use of batteries or components thereof. (Report of the APO, 2007).
- iv. The E-waste (Management and Handling) Rules, 2016 aim at putting in place an environmentally sound e-waste management system by regulating issues of disposal, import and recycling of e-waste. The E-waste Rules apply to every producer, consumer or bulk consumer (including factories under Factories Act) involved in the manufacture, sale, purchase and processing of electrical and electronic equipment, along with all collection centres, dismantlers and recyclers of e-waste (Chapter I of the E Waste (Management and Handling) Rules, 2016).
- v. Solid Waste (Management and Handling) Rules, 2016: These rules have replaced the Municipal Solid Waste (Management & Handling) Rules, 2000. These rules apply to every urban local body, all statutory towns, outgrowths in urban agglomerations as declared by the registrar general & census commissioner of India, notified areas/notified industrial townships, notified area committees, area under Indian railways, defense cantonments, special economic zones in the country and every waste generator. These rules are comprehensive in nature with respect of integration of informal economy as well as building infrastructure for waste to energy industry (Solid Waste Management Rules, 2016).

3.4 Challenges of Globalised Waste Management

Naturally, there are instances where waste producers or waste transporters break the law by producing incorrect transport documents or misinterpreting existing law etc. Some of these misunderstandings and errors might be explained by the complexity of the present laws and regulations but even so a large fraction of the illegal exports of waste are suspected to be the result of consciously and continuously committed illegal actions. The issue of illegal international traffic of waste is of considerable complexity including in relation to defining the illegality of such traffic. The lack of appropriate data and the difficulty to define waste trafficking is a major problem and a number of financial and monetary values need to be considered. The basic mechanism to control transnational movement, the Basel Convention, is twenty years old. At the time it was amended, the basic problem was the movement of chemical waste, while today the main problem is e-waste. Figure 6, in showing e-waste dumping routes, shows that certain destinations of e-waste disposal are unknown. It has been pointed out that the possibility of import of second-hand electronics makes such devices available to those who cannot afford new products. However, due to the difficulty in distinguishing second-hand products from e-waste and since many developing countries may not easily acquire the know-

how needed for environmentally sound material recovery from e-waste, the trade in second-hand electronics should be strictly restricted to products with confirmed functionality (International Solid Waste Association, 2012).



Figure 6 E-Waste Dumping Routes (International Solid Waste Association, 2012)

Although a vast majority of all waste producers are believed to act in good faith, they face complexity in determining what should be the most appropriate means of meeting their obligations. Therefore, criminals and criminal organizations are able to take advantage of this complexity and producers' lack of knowledge or lack of care. In addition, the complexity of the present legislation and regulations, as well as complicated administrative environmental and customs procedures, may lead to unintentional illegal waste handling and export of waste. In this sense it is of great importance to enable waste producers by making it easier to do right is an important step in reducing the amount of waste illegally exported (International Solid Waste Association, 2012).

Conclusion

Globalisation brings with it potentially large benefits as well as threats. Globalisation dynamics offer many opportunities to improve human conditions, but also involve significant potential threats. The challenge is to manage the process of globalisation in such a way that it promotes environmental sustainability and equitable human development.

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