E-waste Management Policy in India

Stakeholders' perceptions and Media attention

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Thesis for the fulfilment of the
Master of Science in Environmental Sciences, Policy & Management
Lund, Sweden, June 2008

MESPOM Programme:

Lund University – University of Manchester - University of the Aegean – Central European University

Erasmus Mundus Masters Course in Environmental Sciences, Policy and Management

MESPOM

This thesis is submitted in fulfillment of the Master of Science degree awarded as a result of successful completion of the Erasmus Mundus Masters course in Environmental Sciences, Policy and Management (MESPOM) jointly operated by the University of the Aegean (Greece), Central European University (Hungary), Lund University (Sweden) and the University of Manchester (United Kingdom).

Supported by the European Commission's Erasmus Mundus Programme

Published in 2008 by IIIEE, Lund University, P.O. Box 196, S-221 00 LUND, Sweden,
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ISSN 1401-9191

Acknowledgements

The last two years have been very exciting with new locations, new cultures, new foods and new friends and offcourse many new lessons to life. To the most I believe the lessons from the experience of doing thesis are much more. I got excellent guidance from my supervisors Panate, Thomas and Naoko. I wrote bundles of e-mails, maybe maximum mails addressed by me to any person so far in my life, to panate during this period. He was always there to help me in any situation. He constantly supported, guided and encouraged throughout all the phases. I am very grateful to Panate for his excellent guidance.

Thomas, the comments you made are always thought provoking and filled some gaps in my understanding. I am profoundly thankful for setting the direction of my work, for giving critical comments and posing important questions.

Naoko, I am very much thankful for your detailed corrections which taught me many things. I am grateful for your patient remarks, comments, and caveats.

I thank all my interviewees who have patiently spent their time to participate in my research. I thank Ms. Priti, Toxics Link, for her help and information on e-waste issues in India. I am thankful to Toxics Link for giving me access to its library. I thank Greenpeace for allowing me to attend workshop conducted by them in April, 2008. I am thankful to EMPA for showing me their inititiaves in India and for the information.

Though this research is not funded by anybody I should say that it is partially funded by my friends who offered their home, food and most important their wonderful company. I am very much thankful to my friends Srinivas, Vijay, Ashok and Priyadarshan.

Many Thanks to my friends at CEU and IIIEE whose company I cherish throughout my life.

I am indebted to my teachers who encouraged me to take-up this course and my friends who extended their cheerful friendship. A special person whom I can not forget and always thankful is Mr. Chandra Kiran, who encouraged and helped me a lot in choosing environmental field for my career.

Abstract

E-waste is one of the fastest growing waste streams in India due to an increase in consumption from businesses and domestic users. There is no separate law on e-waste management in India and it is presently interpreted under the Hazardous Waste (HW) rules. In practice, e-waste is largely handled by people in informal sector. In recognition of the need for separate policy on e-waste management, NGOs and bi-lateral agencies put concerted efforts in 2006 but the process has not considerably progressed in the last two years. This research has been conducted to understand the policy making process which is influenced by the perceptions of different stakeholders and media. The policy core beliefs of stakeholders on various topics such as threat of e-waste on health and environment, need of separate policy on e-waste, applicability of policy principle extended producer responsibility (EPR), responsibilities of various stakeholders and the most affected parties due to policy are investigated through semi-structured interviews and questionnaires. The media has been analyzed to understand the reasons for variation in media attention during 2003-2007. The study finds that policy making process has not considerably progressed due to (1) the differences in the beliefs of civil servants and experts and those of NGOs and bi-lateral agencies and (2) a decrease in the media coverage of the issue in the last two years. In addition, the principle of EPR has been misconceptualised as mere take-back schemes and the WEEE Directive in the European Union has been, unfortunately, viewed as 'the model' of EPR legislations. This misinterpretation of EPR policy principle has also contributed to the slow down of the development of separate e-waste policy in India.

Executive Summary

India is one of the fastest growing economies in the world. In the recent years the growth of information and communication technology[1] (ICT) sector is unprecedented in India. This has fuelled the consumption of electrical and electronic equipment (EEE) both from the institutional users and households. With the advent of this higher rate of consumption, and the shortened product lives due to rapid advancement of technology, electronic waste (e-waste), such as discarded television, mobile phones, computer and related equipment etc., has emerged as a fastest growing waste stream. In India, e-waste quantity is expected to be more than 800,000 tons by 2012.

E-waste contains many hazardous substances such as lead, arsenic, mercury, hexavalent chromium, cadmium, barium and phosphorous. These substances are not only affect environment but also the health of people if these substances are not properly treated at the end of life (Eol) of the equipment. In India, e-waste is mainly handled by people in informal sector. Informal sector uses crude techniques such as burning of cables and acid bath to recover precious metals. Effluents from these techniques pollute environment and cause harm to the health of the people. The resource efficiency of these processes is also abysmal.

Currently, there is no separate law on e-waste management in India. E-waste is interpreted under Hazardous Waste rules and the present recycling facilities are licensed under these rules. Recently a document on Guidelines for Environmentally Sound Management of E-Waste was released by Ministry of Environment and Forests (MOEF) and Central Pollution Control Board (CPCB). This is despite the fact that discussion on separate policy for e-waste has started since mid 2006 with a seminar on e-waste policy in India and an attempt to make draft legislation at the end of 2006. The bi-lateral agencies and NGOs have actively participated in this initiative but this issue has been sidelined and no important decisions were taken on policy in the last two years except the recent release of guidelines.

The purpose of this research is to understand the phenomenon of policy formulation process, mainly to find out the reasons behind why a separate piece of e-waste policy was initiated but not pursued further, by studying the stakeholders' beliefs and media attention. Policy formulation process consists of interaction between various interested parties and public debate through media. Thus we can see the influence of these interested parties on development of policy guided by the beliefs they hold. The stakeholders that have been considered in the study are information and communication technology equipment manufacturers, policy makers and civil servants in government, bi-lateral development agencies, civil society such as media and non governmental organizations, recyclers and institutional users. The perceptions of the stakeholders have been studied with the help of the framework of agenda setting and the concept of "belief system" derived from the Advocacy Coalition Framework (ACF). Extended producer responsibility (EPR), a preventive environmental policy principle, has been included in the research to see how the stakeholders want to allocate responsibility on producers. The perceptions of stakeholders are collected through semi-structured interviews and questionnaires. The media articles were collected from the archives for the duration 2003-2007.

[1] In 1998, OECD member countries agreed to define the ICT sector as a combination of manufacturing and services industries that capture, transmit and display data and information electronically. http://www.oecd.org/dataoecd/34/37/2771153.pdf

The research has tried to explain the perceptions of different stakeholders and the public at large through media on the issue of e-waste in India in the policy formulation process. In such a process, the stakeholders' actions are largely based on their perceptions or beliefs on the issue. Up till now, despite the efforts of NGOs and bi-lateral agencies for a separate framework, the process has not progressed considerably because of the perceptions of the policy makers or civil servants and experts who have greater influence on the process due to their continued involvement. The attention of the media, which to an extent reflects the salience of the issue in the public eyes, in terms of number of articles published on e-waste to demand the need of government action has also decreased in the last two years. These are the main reasons for the slow down in the process of making a separate policy framework for e-waste. In contrast NGOs, bi-lateral agencies and many producers feel the need of separate framework to consider the nature of e-waste and to get the attention of involved parties in solving e-waste problems, although the latter are more cautious on how the problem should be addressed, especially regarding to EPR. It is very important to understand that some stakeholders believe e-waste guidelines is a positive development in the area of e-waste policy and thus seen as a progress in the policy making process. On the contrary some other stakeholders believe issuing guidelines is a way of procrastinating or sidelining the separate framework on e-waste policy in the immediate future.

Contribution of this research lies in explaining the stakeholders' perceptions on the need of policy to solve e-waste problems and their respective understanding and views on EPR as a policy principle. Many stakeholders are under the notion that EPR principle can be implemented only in the form of the WEEE Directive. This notion has sidelined the flexibility and context specific usage of EPR as a preventive environmental policy principle that can solve the impending problems by allocating suitable responsibilities to various influential actors, such as producers and retailers, in the product life cycle. This misinterpretation of EPR principle as nothing but WEEE directive, which made producers responsible for takeback and recycling of their e-waste, has also contributed to the sidelining of the need of separate e-waste policy in India. This is mainly due to the fear of some interested parties that they might have to implement similar e-waste policy in India like WEEE in Europe. The main message is EPR policies can be designed in considering the socio-economic and cultural context of the country by choosing appropriate policy instruments rather than taking just one model of responsibilities allocated to producers as in the EU as 'the model'. But this does not mean that a policy process in India should be idiosyncratic, it should also draw policy lessons from other countries that have implemented the principle. This will help in assessing the suitability of the principle and in avoiding the problems of similar nature, if it would be followed, in the Indian context.

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1 Introduction

1.1 Background

India is one of the fastest growing economies in the world with its burgeoning population of more than one billion. In the recent years the growth of Information and Communication Technology (ICT) sector is unprecedented in India. Figure 1-1 gives a glimpse of this growth between 2004 and 2008 with the total number of personal computers (PC) sold in half yearly trend. This growth is not only reflecting the improved GDP of India but also financial capacity of many of its citizens to improve their quality of life with the usage of electrical and electronic equipment. For instance, figure 1-2 shows the consumption of desktop computers by businesses and households. From the figure it is evident that the household consumers start to have significant amount of share in total number of desktop computers sold.

With the advent of this higher rate of consumption by the businesses and individuals, and shortening product life due to rapid advancement of technology, the electronic waste stream has emerged as a fastest growing waste stream. Electronic waste, which is also called waste electrical and electronic equipment (WEEE), means electrical and electronic equipment and its components, subassemblies and consumables which are part of the product at the time of discarding, that become waste (Council Directive 2002/96/EC). For example: discarded television, mobile phones, computer and related equipment etc all comes under WEEE or e-waste. See Appendix A for the complete list of e-waste as per the WEEE Directive.

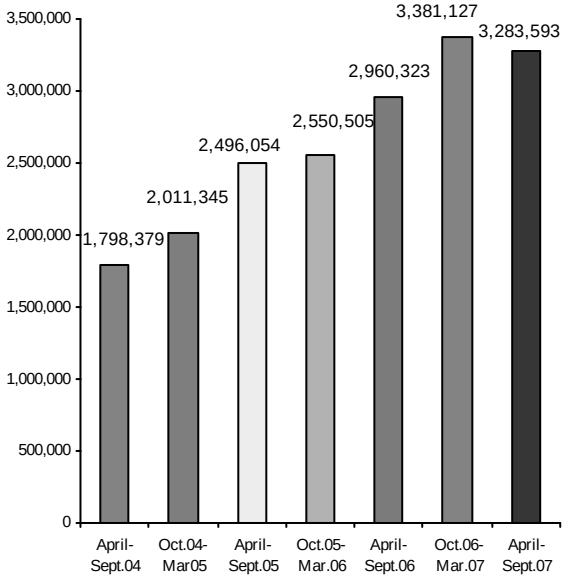

Figure 1-1Total PC half yearly sales
Source: MAIT, 2008.

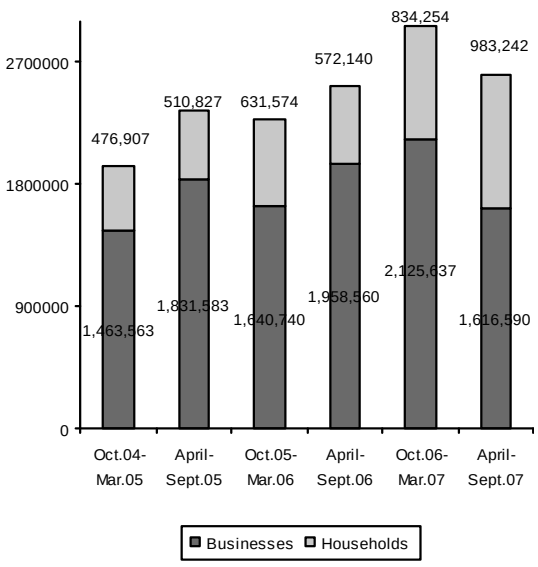

Figure 1-2 Desktop computer sales

E-waste constitutes more than 1000 different substances. The significant fractions are plastics, metals, glass, ceramics, and paper etc. It contains many hazardous substances such as lead, arsenic, mercury, hexavalent chromium, cadmium, barium and phosphorous. These substances cannot only affect environment but also the health of people if these substances are not properly treated at the end of life of the equipment. Upon contact with these toxic elements humans can have health problems such as breathing difficulties, respiratory irritation, coughing, choking, pneumonitis, tremors, neuropsychitric problems, convulsions, comas and even dealth (Halluite *et al.* 2005). Disposal methods such as landfilling can generate leachate that can contaminate the soil and ground water and incineration can give rise to dioxins that pollute air and cause health abnormalities to the people. E-waste also contains precious metals such as gold, silver, platinum and palladium and lucrative non-ferrous metals such as aluminium and copper. Considering the effects on health and environment and economic value e-waste recycling and disposal methods should be given proper care.

According to Widmer *et al.* (2005), though waste generation is estimated to be less than 1 kg e-waste per capita, due to higher population the absolute quantities of e-waste generated is very huge in India and China. From a recent study of MAIT-GTZ (2007), it is estimated that the total amount of e-waste generated in India is 382,979 metric tons. This amount only accounts for computers, TV and mobile phones. Considering other discarded electrical and electronic equipment under e-waste, this number is very conservative. E-waste quantity is expected to be more than 800,000 tons by 2012 (MOEF guidelines, 2008). It should be noted that this number is estimated from a different method than MAIT-GTZ study mentioned above. In India, more than 60% of its e-waste is generated from 65 cities. The top 10 cities that generate e-waste are Mumbai, Delhi, Bangalore, Chennai, Kolkata, Ahmedabad, Hyderabad, Pune, Surat and Nagpur (Chatterjee, 2007).

Besides being generated in the country, e-waste from developed countries lands in India as second hand goods and mixed metal scrap for recycling (Toxics Link, 2004). The main reasons for imports to India are its cheap labour cost and less stringent environmental laws (Ragupathy, 2006). Imports have been regarded as one of the major sources of PC scrap in India (IRGSSA, 2004). Though India is a signatory to Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal under which e-waste is also a component, it fails to stop the illegal imports to India. The main important reasons are listed below (IRGSSA, 2004).

1. Flexible rules have been formulated by Director General of Foreign Trade (DGFT) that allows customs authorities to take on the spot decisions. Custom authorities often fine the importer if he does not posses proper license to import but leave the possession of waste under his control thus the e-waste enters to India.

2. There is no separate export-import (Exim) code for new computers and second hand and junk computers. Importers often mix old computers with new shipments.

3. Imports that come under charity and donations are often classified as capital goods by the port authority due to the flexibility in rules. This gives free access and even tax benefits to the importer.

In India, e-waste is mainly handled by people in informal sector. Informal sector entities are those which are not registered with government and have small operations that might

not comply with environmental standards depending upon the type of operation such as collection and recovery of metals. There are a few authorized recyclers who conduct dismantling, recovery and recycling processes with environmental consciousness. There were four authorized recyclers until 2007 but a few new players have come in to the market in 2008 and the number is expected to increase in the future. It is interesting to see the amount of e-waste being handled by formal and informal sector in India. It is estimated that the total share of informal sector recycling of e-waste in India is around 95% (MAIT-GTZ, 2007). And the formal sector is operating under capacity.

The e-waste trade value chain starts from both institutional and domestic consumers then proceeds to collectors, transporters, bulk scrap dealers, dimantlers, resale and refurbishing of usables, and recovery of metals and disposal of non-value items (IRGSSA, 2004). Actually this chain does not always take the gradual flow as explained in the previous sentence. When any equipment or component is sold to the collectors or scrap dealers they decide the use of that equipment in the secondhand market and then send to dismantlers if it cannot be sold in the secondary market. Dismantlers use manual techniques to dismantle into components and subassemblies and send the usable fraction to the second hand market. The rest goes to material recovering where the precious metals, non-metals and plastics are recovered and sold to secondary material market to use in the production of any other equipment. In some cases, operations such as collection, dismantling and even recovery are also carried by one actor. After recovery of the metals and other material the residues are dumped in open dumpyards or buried in the backyard of the process site. The most important key driver of informal sector is the material recovery value of precious metals. For instance, it was found out that precious metal recovery value contributes to 80% of the materials' market of personal computers though the presence of precious of metals is very small (Streicher-Porte, Widmer, *et al.*, 2005).

Though some of the end of life (Eol) stages such as collection, storage and transport are not hazardous, when the equipment is dismantled, metals are recovered and waste fractions are disposed care must be taken. The informal recyclers, also called backyard recyclers, dismantle the equipment without protective gear and gloves (see figure 1-3) and expose themselves to inhalation of toxic dusts and contact with some hazardous substances such as lead and mercury. The cathode ray tubes that cannot be regunned are smashed, which expose heavy metals such as lead and cadmium, and sold to glass smelters. The PVC coated wires are open-burned to recover the copper fraction. The printing wiring boards (PWBs) are immersed in acid baths to recover the precious metals such as gold and silver etc (see figure 1-4). In a study conducted by Steiner (2004) in Delhi, India, it was assessed that open burning of PWB and cables release dioxins and furans and chronic exposure to them could lead to a higher-than-average risk of falling ill with cancer to the people in the vicinity of fire sites. Gold recovery techniques used in informal recycling employ hazardous substances such as cyanide and nitric acid and release highly concentrated metals to the environment. Research conducted by Keller (2006) on gold recovery techniques used in informal facilities of Bangalore, India, shows that the effluents from these techniques contain 5-370 times higher concentrations than maxium permissible value in Switzerland. In this way backyard recycling processes pollute environment and cause harm to the health of the people. Wastes from the above operations is dumped in the nearby drains, land or water bodies. For a list of hazardous processes in backyard recycling see Appendix B.

Figure 1-3 Dismantling without protection gear

Figure 1-4 Containers of acid

Courtesy: *Lindhqvist*

From the point of view of resource efficiency these rudimentary crude processes show high loss of material recovery. A recent study (cited by Rochat 2007) estimates that the overall efficiency of wet chemical process used for recovery of gold in India is around 20%. The same study shows that a state-of-the art facility in Europe has an efficiency of 95% with a potential to recover around 16 other precious metals.

In India problems of e-waste were initially raised by NGOs in 2003. NGOs have actively worked on e-waste assessment of various cities in India. Bi-lateral agencies have been contributing to e-waste management practices in the last four years funding projects and providing technical assistance etc. In 2004, Indo-Swiss collaboration has conducted a pilot level study in Delhi on e-waste assessment, management, handling and recycling practices. Recently a national level e-waste assessment study was commissioned by MAIT-GTZ to find out the generation, disposal and recycling patterns in India. Bi-lateral agencies have been collaborating with NGOs to raise the awareness of the informal sector and to conduct studies on health effects on informal sector people. A few students have conducted research on risk assemment of crude operations of informal sector, efficiency of gold recovery methods and case studies in major cities in India. Many workshops have been held on e-waste management and challenges and a few workshops on national e-waste policy in India. While the stakeholders have expressed their views in various meetings, seminars and workshops on some policy issues but there is no comprehensive study to determine the stakeholders' views at national level so far.

Despite concerted efforts from NGOs and bi-lateral agencies the discussions on policy front have not progressed considerably. Currently, there is no separate law on e-waste management in India. The existing law on Hazardous Waste (HW) rules 1989 prohibits the import of e-waste that exhibits the hazardous characteristics for disposal but allows for reuse and recycling with the prior informed consent. E-waste is interpreted under Hazardous Waste rules and the present recycling facilities are licensed under these rules. Recently a document on Guidelines for environmentally sound management of e-waste was released by Ministry of Environment and Forests (MOEF) and Central Pollution Control Board (CPCB). The objective of this document is to provide guidance to the various stakeholders involved in e-waste chain on different treatment options and methodologies for treating e-waste in an environmentally sound manner.

1.2 Purpose of this research

Discussion on separate policy for e-waste has started in mid 2006 with a seminar on e-waste policy in India and an attempt to make draft legislation was also initiated at the end of 2006. The bi-lateral agencies and NGOs have actively participated in this initiative but this issue has been sidelined and no important decisions were taken on policy in the last two years except the recent release of guidelines. This might indicate that the issue struggled to gain attention and response in the policy formulation process.

The purpose of this research is to understand the phenomenon of policy formulation process, mainly to find out the reasons behind why a separate piece of e-waste policy was initiated but not pursued further, by studying the stakeholders' beliefs and media attention. Policy formulation process consists of interacton between various interested parties and public debate through media. Thus we can see the influence of these interested parties on development of policy guided by the beliefs they hold. The stakeholders that have been considered in the study are information and communication technology equipment manufacturers, policy makers and civil servants in government, bi-lateral development agencies, civil society such as media and non governmental organizations, recyclers and institutional users. Please refer chapter 2 for the details. As one of the outcomes, this research can help to exchange ideas and perspectives between different stakeholders. This will raise awareness about other stakeholder's views so that discussion and debate can progress for a better e-waste policy in the future. A healthy debate in the society takes place when people exchange their knowledge and views with other interested parties.

1.3 Objective and research questions

With the aim of meeting aforementioned purpose the objective and research questions are framed as follows.

Objective: To understand the perceptions of different stakeholders on the problems of e-waste and its management.

Research questions:

1. What are the perceptions of the following stakeholders on the e-waste issue in India?

    a. How do ICT producers perceive the problems of e-waste and respond to its management?

    b. How do NGOs perceive the problems of e-waste?

    c. What is the perception and priority of policy makers (politicians, civil servants in CPCB and MOEF) in government on e-waste?

    d. How do bi-lateral development agencies perceive current e-waste problems?

    e. What are the views of authorized recyclers on e-waste?

f. What are the perceptions of institutional users such as IT and manufacturing companies on the problems of e-waste?

2. How can the difference in perceptions (if any) be explained?

3. What is the role played by media on e-waste issues?

1.4 Scope and Limitations

The ICT equipment covered in the study are limited to computers and related office equipment, television and mobile and land phone in order to narrow the scope of research since there are many more equipment types that come under the broad definition of ICT. These three types of equipment are most ubiquitous in businesses and households and their growth rates are more than any other equipment category. Yearly sales of colour television have increased from 1.8 to 15 million between 1995 and 2007, while yearly sales of personal computer have increased from 2.2 to 5.5 million between 2002 and 2006 (MAIT-GTZ, 2007). The total number of mobile subscribers increased from 678,460 to 121,431,166 between 1997 and 2007 respectively (DA, 2008).

The research has been conducted in four metropolitan cities in India: Bangalore, Chennai, Delhi, and Mumbai. These cities generate the highest e-waste among many other Indian cities (MOEF guidelines, 2008). Many organizations' business headquarters are also located at these places.

There are more than 2000 NGOs operating in India. Since this number is very big and many of them do not work on e-waste, NGOs that work on pollution, toxics and waste management as the focus areas have been selected for further study.

Policy makers and government representatives are limited to civil servants in key state and central government offices and ministries. The local governmental bodies were not studied in the research due to less availability.

The institutional users were mainly selected from the IT industry. The number of people employed and exports from this industry has been in rapid advancement in India. The employment by this industry has increased from 56,000 in 1990-91 to 650,000 in 2002-03 (NASSCOM, 2003). But due to the less availability of information the number of organizations that could be interviewed and approached for data collection were very limited. To address this short-coming, this group was also studied with the help of recent literature, MAIT-GTZ study in 2007.

Media study was limited to English and Hindi articles from national and regional dailies. Other regional language dailies were not covered in the research due to the language barrier.

The large geographical distances reinforced by intense infrastructure restructuring such as construction of metros etc have increased the travel time thus limited the possibility of meeting more persons in the time available (February-May 2008).

1.5 Organization of report

Chpater 2 will introduce the theoretical framework used to conduct the research, the concept of EPR as a preventive policy principle and the methodology of data collection and analysis.

Chapter 3 will explain the views of various stakeholders on the current problems, need of policy, policy principle suitable for India, and responsibilities of various stakeholders etc.

Chapter 4 attemps to show the positions of stakeholders and analyse the reasons behind stakeholder responses regarding their perception of e-waste problems, applicability of extended producer responsibility (EPR), effect of Hazadous Waste (HW) rules and guidelines, responsibilities and challenges. Reasons for change in media attention will be explained.

Chapter 5 gives conclusion with main findings and ends with general recommendations and possible areas of further research.

2 Framework and Methodology

This section reviews the literature on the role of media in setting agendas, beliefs of stakeholders that influence their actions, and usage of extended producer responsibility principle in the domain of e-waste management. An analytical framework will be developed and presented at the end of the section. The data collection methods, sampling techniques and stakeholder participation are also explained.

2.1 Theoretical framework

2.1.1 Role of media in problem definition and agenda setting

According to Henshel (1990) the role of media is very important to understand how the problems have been formulated. In the literature, it is normally expounded that problems initially start as issues and then sensitized and amplified by the media to become problems (Parsons, 1995). For example, burning of cables to recover plastics is an issue, if this issue has been depicted as a wide spread phenomenon at many places of the country which needs urgent attention then it becomes a problem. Policies are designed to solve these problems. But in order to have a policy the problem should get the attention i.e. in the agenda of the public authority which makes policies. A problem becomes agenda for public authority when it gets wide spread awareness and shared concern of sizable portion of public. Agenda building is a process during which the issue is expanded from specifically concerned attention group to wider interested or attentive public. The wider interested groups are affected parties of that problem, i.e. the concept of stakeholders. In the case of e-waste management they are producers, industry associations, recyclers, users, and informal sector. The attentive public is those who has interest in public affairs and has opinion leaders such as NGOs and bi-lateral agencies. Finally, the issue reaches attention of general public.

Ader (1995) finds that pubic perception over the salience of environmental issues depends largely on its media coverage. The dynamics of expansion of an issue to general public depends on how the issue is defined. Accroding to Cobb and Elder (1972), in order to get the attention of the general public the media approaches one of the following ways to define the issue:

1. *The more ambiguously an issue is defined, the greater the likelihood that it will reach an expanded public (degree of specificity).*

2. *The more socially significant an issue is defined to be, the greater the likelihood that it will be expanded to a larger public (scope of social significance).*

3. *The more an issue is defined as having long-term relevance, the greater the chance it will be exposed to a larger audience (temporal relevance).*

4. *The more non-technical an issue is defined to be, the greater the likelihood that it will be expanded to a larger public (degree of complexity).*

Once the issue becomes an agenda, then the policy makers try to address it with policy responses. How these policy responses are influenced by the interested parties are explained in the next section.

2.1.2 Belief system

According to Sabatier (1988), policy making process is conceptualized in terms of "policy subsystems". Policy subsystem is nothing but the set of actors that are involved in a policy problem to generate, disseminate and evaluate policy ideas. These actors comprise of interest groups, civil servents at various levels of government, elected politicians, academic researchers, experts, and journalists. Thus the policy process is viewed as an elite opinion domain. In line with this, this research is also limited to these actors.

According to the Advocacy Coalition Framework (ACF), policy subsystem consists of advocacy coalitions, which are groups of actors that share the same beliefs and resources and co-ordinate their activities to influence the governmental institutions to fulfill their policy objectives (Sabatier, Jenkins-Smith, 1988). Hence it is important to look at the formation of advocacy coalitions because they shape the outcome of the policy making process. But it is to be noted that we need to have data from decade or more years, as suggested by the Sabatier (1988), to look at the formulation of advocacy coalitions. This research will not look at the formulation of advocacy coalitions due to the lack of such longitudinal data. Instead, it focuses on a core component of ACF, namely, "belief system".

Since belief system is central to the formation of advocacy coalitions, we can conceptualize public policies in terms of belief system. Belief system is divided into 3 components, see Figure 2.1. They are deep core, policy core and secondary aspects. Deep core is characterized as normative beliefs or personal philosophy, for example human part of nature or dominion over nature, priority of values like freedom, love, knowledge etc. Policy core is defined as basic strategies and policy positions to achieve the deep core. And secondary aspects are those instrumental decisions and information searches which are necessary to achieve the implementation of policy core (Sabatier, 1988). Table 2-1 explains all the components of belief system.

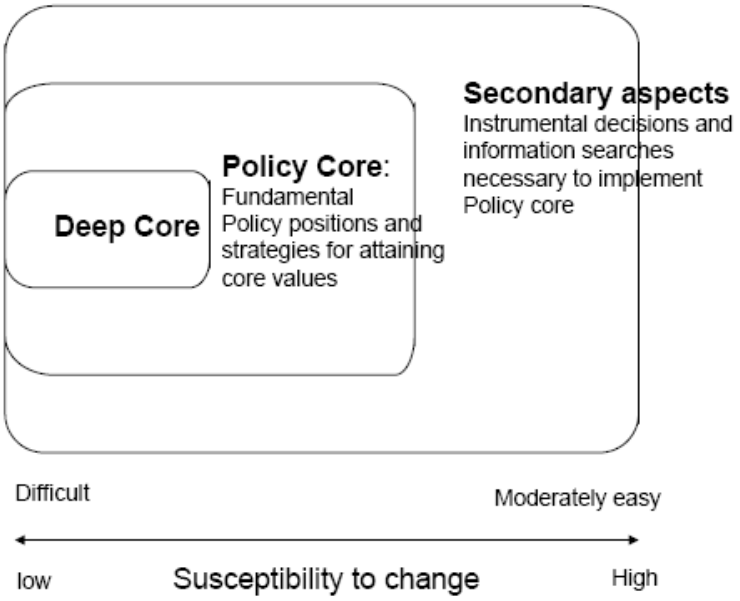

Figure 2-1 Belief system

Source: *Parsons (1995)*

Table 2-1 Structure of belief systems of policy elites

	Deep core	Policy core	Secondary aspects
Defining characteristics	Fundamental normative and ontological axioms	Fundamental policy positions concerning the basic strategies for achieving normative axioms of deep core.	Instrumental decisions and information searches necessary to implement policy core.
Scope	Part of basic personal philosophy. Applies to all policy areas.	Applies to policy area of interest (and perhaps a few more)	Specific to policy/subsystem of interest.
Susceptibility to change	Very difficult; akin to a religious conversion	Difficult but can occur if experiences reveal serious anomalies.	Moderately easy; this is the topic of most administrative and even legislative policy-making.
Illustrative components	1. The nature man i. Inherently evil vs. socially redeemable. ii. part of nature vs. dominion over nature iii. Narrow egoists vs. contractarians. 2. Relative priority of various ultimate values: freedom, security, power, knowledge, health, love, beauty etc. 3. Basic criteria of distributive justice: Whose welfare counts? Relative weights of self, primary groups, all people, future generations, non-humanbeings etc.	1. Proper scope of governmental vs. market activity. 2. Proper distribution of authority among various units (e.g. levels) of government. 3. Identification of social groups whose welfare is most critical. 4. Orientation on substantive policy conflicts, e.g. environmental protection vs. economic development. 5. Magnitude of perceived threat to those values. 6. Basic choices concerning policy instruments, e.g. coercion vs. inducements vs. persuasion. 7. Desirability of participation by various segments of society: i) Public vs. elite participation. ii) Experts vs. elected officials. 8. Ability of society to solve problems in this policy area: i) Zero-sum competition vs. potential for mutual accommodation. ii) Technological optimism vs. pessimism.	1. Most decisions concerning administrative rules, budgetary allocations, disposition of cases, statutory interpretation, and even statutory revision. 2. Information concerning program performance, the seriousness of the problems, etc.

Source: Sabatier (1988).

Deep core is related to values a person holds, thus the susceptibility of actors to change their deep core is much more difficult and the chances are very low. Since deep core are normative beliefs of a person it is not in the interest of this research to study further. Secondary aspects are instrumental decisions to achieve the policy core, the actors learning process while interacting with other actors makes it easier for them to change their secondary aspects as per the practical need of the situation. However, the e-waste debate in India is not in the advanced stage to explore the stakeholders' perception on secondary aspects such as targets, type of financial or administrative instruments suitable to India since the discussion is still on the components of policy core such as need of separate policy, policy principle and allocation of responsibilities etc. Hence, the secondary aspects were not considered for this research.

From the Table 2-1 we can see that policy core is strategies and positions of a stakeholder in order to attain his/her deep core. The policy decisions are influenced by the actor who has greater power and political resources (Sabatier, 1988). In order to understand the policy decision process and know the influence of any actor on it, we need to understand the actor's policy core belief to see its position in the debate. By knowing the policy core of an actor we can understand his/her position on the policy area of interest. For instance in the area of e-waste policy, a stakeholder says threat of e-waste on health and environment is very high thus it needs a separate policy to solve the problem. The other stakeholder might have a different opinion. Then we can distinguish these two actors as opposing parties based on this belief. Then we can understand actor's influence on the policy decision process by mapping their beliefs with the outcomes of the process.

Table 2-1 provides generic features of policy core but, in order to use it for a specific issue, these features need to be operationalised in accordance with the domain knowledge. This research is related to e-waste management in India. Hence, the policy area of interest is e-waste management domain. Extended producer responsibility (EPR) is a policy principle supported by Organization for Economic Co-operation and Development (OECD) in the waste management domain. In the next section EPR principle will be discussed. The policy core specific to Indian context with EPR as policy principle is explained in the section 2.1.4.

2.1.3 Extended Producer Responsibility

EPR is a preventive environmental policy principle. This principle has been used as a basis to manage electrical and electronic waste in some OECD countries. European commission has conceived a legislation in 1994 and, Directive 2002/96/EC of the European parliament and of the council of 27 January 2003 on Waste electrical and electronic equipment (WEEE) (hence forth the WEEE directive), was finally approved in 2003 and came in to force in August 2005. According to the WEEE directive, producers are responsible for end of life treatment such as collection, treatment and recycling of their products through financing appropriate collection, treatment, and recycling and meeting the specific targets for recycling and recovery (Council Directive 2002/96/EC). The applicability of EPR as a policy principle and views of various stakeholders on this principle in Indian context are very important for the research. In this connection it is necessary to understand the concept of EPR. In the following paragraphs we will look in to the details of EPR principle, responsibilities of the manufacturers and possible policy instruments.

According to Lindhqvist (2000), EPR has been defined as

> *Extended Producer Responsibility (EPR) is a policy principle to promote total life cycle environmental improvements of product systems by extending the responsibilities of the manufacturer of the product to various parts of the entire life cycle of the product, and especially to the take-back, recycling and final disposal of the product. The Extended Producer Responsibility is implemented through administrative, economic and informative instruments. The composition of these instruments determines the precise form of the Extended Producer Responsibility.*

EPR supports the polluter pays principle and shifts the burden from consumer and local authority to producers who have much more knowledge about the environmental impacts of their products at the end of life (Eol) phase and capacity to prevent these problems at the design stage itself. Basically EPR serves to achieve two objectives: (1) design improvements of products and their systems, and (2) high utilisation of product and material quality through effective collection, treatment, and re-use or recycling (Van Rossem, Lindhqvist, 2005). EPR intends to close the material cycle by the involvement of producers at the Eol phase. This also serves to give a feed back to the producer so that they can incorporate design changes for better environmental performance such as easy disassembly and recyclability etc during product design phase. EPR can stimulate the innovation in product design such that product functions will be provided to the consumer with less environmental impact and this will lead to the development of product service system in the future (Lindhqvist, 2000).

Type of responsibility undertaken by producer varies between different EPR programs. Figure 2-2 shows the generic responsibilities as defined by Lindhqvist in 1992.

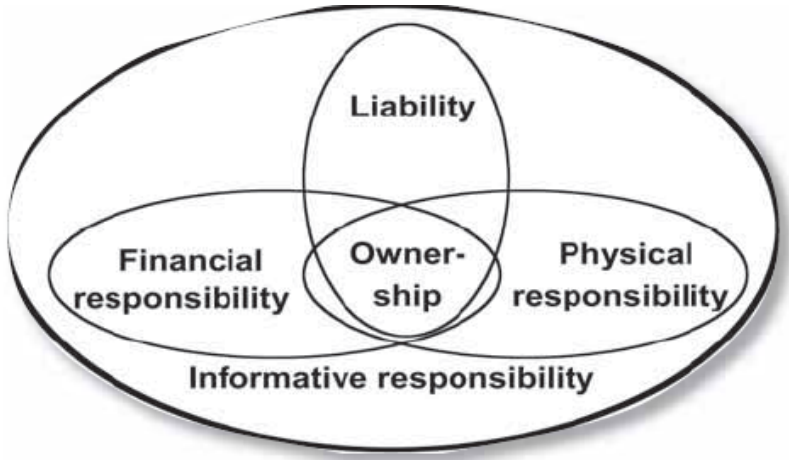

Figure 2-2. Model for extended producer responsibility

Source: *Lindhqvist (1992)*

Definitions of these four types of responsibility are given below: (Lindhqvist 2000, 38-9):

> "***Liability*** *refers to a responsibility for proven environmental damages caused by the product in question. The extent of the liability is determined by legislation and may embrace different parts of the life-cycle of the product, including usage and final disposal.*

> ***Economic (Financial) responsibility*** *means that the producer will cover all or part of the costs for e.g. the collection, recycling or final disposal of the products he is manufacturing. These costs could be paid for directly by the producer or by a special fee.*
>
> ***Physical responsibility*** *is used to characterise the systems where the manufacturer is involved in the actual physical management of the products or of the effects of the products. …*
>
> ***Informative responsibility*** *signifies several different possibilities to extend responsibility for the products by requiring the producers to supply information on the environmental properties of the products he is manufacturing (e.g. to recyclers).*"

Ownership is the ultimate form of responsibility where the producers own the product throughout the life cycle of the product and only services are delivered to the consumer which is called product service system (PSS).

The responsibility of the producer can be allocated based on the market condition, socio-economic status, culture of the country etc. In order to achieve the objectives of EPR principle, a program can be designed based on the different set of policy instuments. They are admininstrative instrumensts, economic instruments and informative instruments as shown in Figure 2-3. The responsibility of producer can be fulfilled with the help of these instruments based on the type of responsibility the producer is mandated. For example, if the producer is given the information responsibility then he/she can fulfil his/her responsibility by the use of informative instruments. EPR principle gives flexibility to policy makers to choose the appropriate instruments based on the context and market conditions of the country.

Table 2-2 Policy instruments for EPR

Administrative instruments	Collection and/or take-back of discarded products, substance and landfill restrictions,* achievement of collection, reuse (refill) and recycling targets, fulfilment of environmentally sound treatment standards, fulfilment of minimum recycled material content standards, product standard, utilisation mandates**
Economic instruments	Material/product taxes, subsidies, advance disposal fee systems, deposit-refund systems, upstream combined tax/subsidies, tradable recycling credits
Informative instruments	Reporting to authorities, marking/labelling of products and components, consultation with local governments about the collection network, information provision to consumers about producer responsibility/source separation, information provision to recyclers about the structure and substances used in products

* Some exclude substance and landfill bans from EPR-based policy instruments.
** Utilisation mandates refer to the situation where producers should achieve certain reuse and /or recycling targets, but do not have to use them within their own activities.
Source: adopted from Lifset (1992), OECD (2001), Stevens (2004), Walls (2004).

Source: *Tojo (2004)*

2.1.4 Analytical framework

2.1.4.1 Framework for media analysis

From the theory on agenda setting it is understood that any social problem passes through three stages before an effective action is taken by the policy maker. The stages are issues, problems and policy decisions. During the issue stage it gets attention from specifically interested parties and then the media sensitizes and amplifies the issue to become a problem which gets attention from widely interested and interested public. Media uses various strategies to get the attention of general public and then the problem enters to the agenda of policy makers. Then policy makers will take policy decisions on the problem. The media attention is studied between 2003 and 2007 based on aforementioned theory. In the analysis, we will see how the media initially reported the e-waste issues and translated the e-waste issues to problems of greater concern in the due course of time and how it attracted the attention of government to be in the agenda of policy decisions. We will study the role played by different events on media attention. The strategies media has used to expand the discussion from specifically intertesed to widely interested parties and then to public. The different topics of e-waste brought to the public discussion will also be discussed.

2.1.4.2 Framework for stakeholder analysis

From the theory on belief system, section 2.1.2, it is understood that policy formulation process can be understood with the help of policy core. Based on the policy core we can distinguish various actors and their influence on policy formulation process. Because actors' perceptions are framed by the policy core belief they embrace. In line with this, the policy core belief of e-waste management with EPR principle is presented in Table 2-3. The policy core consists of perceptions of stakeholders on problems of e-waste, need of seperate policy, the applicability of EPR principle to define the responsibility of producers and design policy, distribution of authority at the level of state and central governments and affected parties due to policy etc. In the present context, India is in the policy formulation stage to address the problems of e-waste. Considering this stage, the research has been conducted to know the views of various actors i.e the policy subsystem on the basis of the policy core of the belief system. Policy core beliefs have been used as guiding tool to frame the interviews and questionnaires and with a small additional component that tests the knowledge or awareness of European legislations such as ROHS and WEEE.

Stakeholders' perceptions are collected on the components of policy core shown in Table 2-3. Perception of each stakeholder has been analysed according to each component of the policy core belief. This analysis helps to see the similarities and differences between actors' beliefs and there by their influence on policy formulation process in the last two years.

Table 2-3. Structural belief system adjusted from the list given by Sabatier (1988) with the characteristics of the e-waste and EPR principle.

	Policy core	Secondary aspects
Illustrative component	1. Magnitude of perceived threat of e-waste on Health and environment. 2. Does e-waste need separate policy and what should be the basis producer or shared responsibility? 3. Desirability of participation and responsibility of various actors such as industries, consumers, and government etc. 4. Distribution of authority and responsibility of governments at state and central level. 5. Stakeholder groups most affected by policy, environmental protection vs. economic development (trade). 6. Scope of governmental intervention vs. market activity in e-waste. 7. Choice of policy instruments, e.g., Administrative vs. economic vs. Informative. 8. Ability of society to solve this problem. i. Zero-sum competition vs. Win-win solutions. ii. Technological optimism vs. pessimism.	Collection targets Recycling targets vs. standards and objectives. Visible fee, financial guarantees vs. participation in a compliance scheme. Registering and reporting procedure Marking requirements

2.2 Research methodology

2.2.1 Sampling

Snow ball sampling, which involves identifying additional informants from the existing, was utilized to choose the informants for semi-structured interviews.

Stratified sampling method was used to find the informants of ICT sector, manufacturers of computer and related office equipment, television and mobile and land phone. These producers have been selected based on the scale of operation, i.e. small, medium and large, according to their turnover to capture the views of producers of all capacities. The information was obtained from the corresponding industry associations. The industry associations that helped to find the list of producers and to classify according to their turnover as small, medium and large are Manufacturers Association of Information Technology (MAIT), Consumer Electronics and Appliances Manufacturers Association (CEAMA), Electronic Industries Association of India (ELCINA), and Telecom Equipment Manufacturers Association of India (TEMA).

There are more than 2000 NGOs operating in India. Since this number is very large and many of them do not work on e-waste the following sampling method was adopted. Ten states in India generate 70% of the total e-waste of the whole country. Maharashtra ranks first followed by Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab in the list of e-waste generating states in

India (MOEF guidelines 2008). From this list of states, top 7 e-waste generating states were selected for the study. NGOs that work on pollution, toxics and waste management as the focus areas have been selected for further study from these states. A questionnaire was prepared to send to all these NGOs to know their views on E-waste.

In order to make sure that the views from the respondents represent the views of the corresponding organization they work for, persons at the senior management level have been contacted both for interviews and questionnaires. Some experts in the field have also been interviewed.

2.2.2 Participation of stakeholders

In the research many stakeholders have been contacted in the category of producers i.e. equipment manufacturers as well in the category of NGOs. Table 2-4 shows the response rate of these two groups. Many producers have responded to neither interview nor questionnaire. In many cases it was very difficult to identify the designated person for environmental matters. It was understood from discussions with other stakeholders, in Indian organizations environmental functions are handled by people from different divisions in some organizations Environment, health and safety division (EHS), manufacturing, corporate social responsibility, and facilities etc. In many companies the vice president, or director, or managing director i.e. senior level management is looking after the environmental policy related issues. When contacted a few producers said they are very busy and cannot give time for this matter. Even some producers responded that it is not their matter to discuss. In a workshop conducted by MAIT and Greenpeace, 14 producers have attended. This turn-out was due to the pressure created by the NGO. It was also understood that there is a knowledge gap within the organizations between different geographical locations since the same companies elsewhere in the world shows interest on environmental issues. Hence, we can see that the interest shown on e-waste was very minimal by the producers in India.

Table 2-4. Participation of actors in the research

Stakeholder	Type	Contacted	Responded	Response rate
Industry	CE	56	7	12.5%
	IT	47	7	15%
	Telecom	4	0	0
NGOs	National/regional	22	11	50%

In the case of NGOs, the response rate is 50%. The reason for this response rate maybe many NGOs do not work at the policy level but at the grassroots level. Some NGOs mentioned that they were not aware of the opportunity of working with e-waste though they work on pollution at regional level. NGOs that are located in bigger cities are actually active on this issue rather than smaller cities because the scale of problem is much higher in bigger cities than any other cities. Access to policy development in seminars, stakeholder meetings and the like are also more feasible in bigger cities. It is also observed that e-waste is not a priority issue for many NGOs because they are lacking expertise in this area and they are planning to work in the future. There are only a few NGOs that work on e-waste problems at national or regional level. It is evident from

the research that many NGOs are lacking the knowledge about e-waste problems so the interest shown by them on the issues of e-waste management is also less.

With this low response rate of producers it is very difficult to generalize the results but the companies that have participated in the research have significant market share in each sector. Table 2-5 shows the market share of each organization that participated in this research. The organizations which have participated in the focus-group-like study actually makes the industry representation much significant but we cannot account them fully because their responses in the worskhsop were not enough for this research since the agenda of this focus-group-like workshop is different from this research focus.

Table 2-5 Market share of producers in Indian market

Sector	Company	Market share
IT	HP	21% in 2006
CE	LG	20.1% in 2003
	Philips	4.6% in 2003
	Panasonic	1.1% in 2003
Mobile and Land phone	LG	11.8% in 2005

Source: adopted from Greenpeace, 2008

The industry associations that have participated are the main associations for the IT and CE products. Telecom industry association could not give response. There are four authorized recyclers who are presently having operation in India. Some more are in the process of starting the operation. In this context the representation of 3 recyclers' views in the study is very considerable. Coming to institutional users, it was very difficult to contact them because the designated person for e-waste issues or environmentally issues were not easily identified in these organization, even the industry associations does not have list of contacts of these persons though the association is actively working on e-waste problem.

2.2.3 Data collection

Many stakeholders have been approached and semi structured interviews were conducted to know their views. It was not possible to physically meet many informants, so questionnaires have been prepared to each category of stakeholders. For some informants both questionnaires and later a telephonic discussion or e-mail communication have been used to get a broader understanding about their views. Before meeting the informants' archives have been searched for knowing the involvement of stakeholders in the e-waste management.

The print media was studied from 2003-2007. Articles that have addressed or raised concerns about e-waste were collected from both national and local news papers. Thanks to Toxics Link which kindly gave access to their library to collect the information on media and parliament question e-waste.

In the case of institutional users data has been collected from the recent reports and archives. Civil servents dealing with environmental policy have been chosen at the 4

above mentioned cities for Interviews. Questions raised in the Parliament by elected representatives on e-waste are also considered for the research.

Apart from the semi-structured interviews and questionnaires, a focus group like study has also been conducted during the data collection phase. A workshop conducted by MAIT and Greenpeace with information technology manufacturers and producers of some consumer electronics was attended. A bi-lateral developmental agency and 2 NGOs are the other participants, apart from a researcher from IIIEE at Lund University, of this workshop.

2.2.4 Analysis and Interpretation

All the information from various stakeholders was gathereted in to a document to see the similarities and differences in their policy core beliefs. The data was organized according to the stakeholder groups with in the category of questions as mentioned in the table 2-3. Conclusions were drawn after observing the policy core beliefs and views the stakeholders hold on various issues of interest with in the analytical framework of the study. It was not possible to club different producers of same category such as TV manufactures, phone manufactures etc, because some producers fall into all 3 categories of equipment in the study.

Media was analysed with the help of statistical tools such as Statistical Package for the Social Sciences (SPSS) and Microsoft Excel to see the prominence of media attention at different periods, the relation between events conducted and the media attention. The attention of media based on the type of issue such as awareness, dumping and government statements etc is studied. Attention of media in national and regional dailies also discussed to see the issues of prominence at the regional level.

3 Stakeholder views

In this chapter we will look at the views of various stakeholders. The views of stakeholders have been presented in their original form i.e. without interpretation to better the understanding of relative position of each stakeholder. Media articles reported in the duration 2003-2007 also discussed to show the type of topics media chose to report.

Scheme of presentation: The perceptions of stakeholders have been presented in the following order. The significance of each of the component is explained below.

1. Problem perception: Stakeholders have differing views on the environmental and health problems caused by e-waste. Realization of the magnitude of the problem guides the actors to take effective actions to solve the impending problems of e-waste. The threat scale ranges from not considerable, low to very high.

2. Need of separate legislation: Based on the experience with Indian legislations and their implementation, stakeholders have formed their opinion on the need of having a separate legislation or considering e-waste in already existing legislations such as Hazardous waste rules.

3. Basis of the legislation: Legislation can be made based on shared responsibility where every stakeholder takes the responsibility at different phases of product or making the producers primarily responsible for the products they manufacture such as EPR, where the specialized knowledge of producer about his product is utilized to address the problems of e-waste.

4. The awareness levels of EU legislations and EPR principle: The knowledge of the solutions provided by EU countries to solve e-waste problems and understanding and know-how of the EPR policy principle used in those countries gives stakeholders a chance to take informed decisions whether a certain policy principle such as EPR can be applied in Indian context or not.

5. The responsibilities of various stakeholders and government's responsibility at state and central level: Stakeholders have varying opinions when it comes to taking responsibility to solve the problems of e-waste. So this component attempts to give an overview of what each stakeholder group is expecting from other stakeholders to deliver in the spectrum of e-waste management activities.

6. The affected parties due to legislation: By having legislation on e-waste there will be some restructuring in the society. This component tries to give us the views of different groups who is most likely going to be affected by the legislation and the reasons for that possible affect.

7. Market and government intervention: Based on the market development and activity and the experience of government intervention in India, stakeholders express the domain of e-waste and how it is to be dealt with.

8. Choice of instruments: There are different categories of instruments such as administrative, economic and informative. Based on the social norms and motivations of stakeholders, the suitability of instruments can be suggested by various stakeholders to solve the e-waste problems.

9. Technological optimism: Certain stakeholders might feel that technology is evolving and it can solve the problems of e-waste with or without the intervention of public policy in that domain. This componet tries to present the beliefs of stakeholders on technology and its ways to solve the problems.

The views have been collected from the personal and telephonic interviews conducted, and e-mail communication. For the type of questions asked in the interviews and questionnaires refer to Appendix D and E.

3.1 Non Governmental Organizations (NGOs)

3.1.1 Introduction of NGOs

In this section views of 11 NGOs were reported. The NGOs are Toxics Link, Greenpeace, The Energy and Resources Institute (TERI), Development Alternatives, World Wide Fund for nature (WWF), Saahas, Electronic Waste Agency (EWA), Disha, Paryavaran Mitra, National Solid Waste Association of India (NSWAI) and AMM Murugappa Chettiar Research Centre. These NGOs represent from different parts of India. E-waste discussion has been brought into fore in India with a report in 2003 by Toxics Link. NGOs NSWAI, Paryavaran Mitra and AMM Murugappa Chettiar foundation have not worked in the area of e-waste so far and they work in waste management at regional level. Toxics link, Greenpeace, TERI, Development Alternatives, and Saahas have worked on different issues related to e-waste ranging from publishing reports on e-waste management and disposal practices to conducting training to informal sector. EWA is a key NGO in Bangalore which brought many different stakeholders from industry, government, users, formal and informal recycling sectors and started working with them from 2005. Disha has recently started working on e-waste and collobated with Toxics Link in Kolkota. WWF has not done any specific work so far but it is involved in the stakeholder meetings, workshops etc.

3.1.2 Views of NGOs

NGOs perceive that the threat posed by e-waste on health and environment is high to very high. Barring a few, almost all NGOs would like to see a separate legislation to tackle the problems of e-waste in India. The reasons for separate legislation are explained as various sources of e-waste generation such as households, business houses, government offices, software industries etc. These are point sources and cannot be covered under the current framework of Hazardous Waste (Management & Handling) Rules, called as HW rules from now onwards, for collection activities unlike hazardous waste generated from various processing and manufacturing industries that are registered with state pollution control boards. The HW rules do not deal with storage and transport of e-waste. Some NGOs feel that HW rules are much more complex to deal with e-waste due to the consideration of e-waste as hazardous throughout its end of life stage i.e collection, storage, transport, sorting, recycling and recovery. Some NGOs believe that HW framework can be used for the recycling and recovery stage of e-waste since this is

the only hazardous stage in the EOL chain. Interestingly, some NGOs argue that since the implementation of legislations is poor in India, it is better to have guidelines now and legislation can be framed based on the workability of the guidelines after a period of 3-4 years. Some NGOs argue that informal sector will be affected if we have legislation suddenly, so they would like to see the guidelines as a transition phase meanwhile informal sector can upgrade its operations and capacity. Except for these arguments, other NGOs believe that a separate legislation is imminent to tackle the growing quantities of e-waste in India.

Majority of the NGOs feel that EPR should form the basis for e-waste legislation. They feel that many Multi National Corporations (MNCs) have already implemented policies that are based on EPR framework in EU so these corporations can implement the collection and recycling activities in the same way in India. But many of the NGOs also suggest that we should frame policy based on EPR but not on the European model since the collection and recycling costs are different in India. They suggest implementing e-waste legislation in phased manner considering the geographical size starting with metropolitans, later small cities and then extending the application of the legislation throughout India. Some NGOs are not sure about how the legislation should be framed and they also said that they are not aware of the EPR principle and EU legislation such as ROHS and WEEE. Other NGOs have said that they are aware of EPR principle and know the framework of WEEE and ROHS legislations.

Many NGOs have the view that the producer should support the EPR principle and should take the responsibility for safe recycling of e-waste. Producers should start implementing take-back schemes and set up collection infrastructure that will pay off in the long run because it is believed that producers can find business opportunities in the recycling. In order to avoid the repetition of problems such as leakage[2] happened with the battery retailers, some NGOs suggest that incentives should be created to the retailers so that they will channelize the e-waste to the right actor. NGOs also express that Industry should take a proactive role to find new ideas that suits the Indian conditions and they should take part in the consultative process of the policy.

Many NGOs state that government should support EPR so that investments will be made to build recycling infrastructure. Government should learn from the past mistakes such as weak implementation of take-back schemes under battery rules and improve the implementation of legislation. Central government should develop the framework and give state pollution control board (PCB) to implement the legislation. Pollution control boards should increase their monitoring activity to check the compliance of various actors that promotes better implementation of legislations. Government should build partnership with industry to have better infrastructure. Central Pollution Control Board (CPCB) and State PCB should recognize informal sector and help them to upgrade their activities. Government should raise awareness of the general public and various actors involved in the e-waste chain. Some NGOs have the view that participation from government so far on e-waste is not that good and government is concerned about how industry will respond to any measure taken by it such as policy on e-waste. A few feel e-waste is not a priority for the government so far and this trend is changing at present.

[2] According to some NGOs, battery retailers used to sell the waste batteries, which have been collected back from consumers, to informal recyclers for better prices.

Some others feel government is coming up with new initiatives such as guidelines and they believe it will deliver legislation in the future.

All NGOs believe that institutional users can contribute to the solution of e-waste problems by channelizing their e-waste to authorized facilities by avoiding much practiced method of auctioning to informal sector. Authorized recyclers should upgrade and expand their infrastructure and follow the environmentally sound management practices (ESM). Retailers should channelize the obsolete products to authorized facilities.

Many NGOs would like to take the responsibility of raising awareness, act as a watch dog to drive industry towards better practices and to keep environment on top of its agenda. They also want to facilitate the smooth flow of e-waste throughout the supply chain by working with actors involved in the whole supply chain.

NGOs have differing opinion on the possibility of affects felt by various stakeholders due to a separate legislation on e-waste. But there is a higher degree of agreement that the most affected stakeholder will be informal recyclers, followed by producers and users. Informal recyclers will be affected because they need to upgrade otherwise there are less chances of getting input for their recycling activities. Hence their livelihoods are at stake. Producers are likely affected due to life cycle changes they might consider. Users might need to bare the cost of recycling so they might also be affected. Government will be affected due to the burden of implementing the new legislation with the existing resources.

NGOs have an opinion that a combination of instruments is required in the Indian context. Some of them believe that economic instruments might have more affect and informative instruments such as energy labels should be encouraged.

3.2 Bi-lateral agencies

3.2.1 Introduction to Bi-lateral agencies

There are two agencies that have been actively working in the area of e-waste management in India. They are GTZ and EMPA. GTZ, German Development Cooperation, cooperates with the central government and various state agencies in India. GTZ have provided technical expertise to a formal recycler in Bangalore, India. GTZ has been providing advisory services for environmental management (ASEM) to Indian government through its ASEM-GTZ program. The Swiss State Secretariat for Economic Affairs (SECO) has commissioned the Swiss Federal Laboratories for Materials Testing and Research (EMPA**)** to design and implement the global programme "Knowledge Partnerships in e-Waste recycling". EMPA is also leading several projects in developing and emerging economies in Asia, Africa and Latin America to build capacities for e-waste management in areas of policy & legislation, business & financing and technology & skills. They have been funding studies and conducting research with other stakeholders such as NGOs related to e-waste management in India and manufacturers' associations. These agencies have been leading the discussions by conducting workshops, seminars and publishing reports. EMPA has been co-ordinating with Bangalore-based EWA and Saahas in raising awareness of informal sector, various organizations and the general public.

3.2.2 Views of Bi-lateral agencies

Bi-lateral agencies seem to have a view that the perceived threat of e-waste on health and environment is medium to high. One agency has the view that there is a need for separate legislation to tackle the problems of e-waste and it also feels that guidelines are voluntary and not followed by many actors. Industry needs guidance and pressure and legislation can do both and it also helps to build the infrastructure before the problem gets severe. Whereas the other agency feels that whether we need to have a separate legislation or not should be based on a stakeholder debate which never occurred so far on this issue. Until now the discussions are related to recycling technology and not on allocation of responsibility, secure financing, monitoring etc. Hence it feels that this is the right time for that kind of debate. The agencies also caution that regulations should be framed at the central level to avoid state disparities that might make some states more attractive than others and ultimately cause loopholes in the future. It also expressed a doubt that it is not clear how the new guidelines will be implemented.

Both of the agencies feel that EPR can form the basis for having e-waste legislation in India. Making producers responsible for end of life stage of the goods can solve some problems of e-waste in India. But one agency also cautions that this legislation should be implemented in a phased manner. It has the view that many Indian players have already implemented ROHS legislation; hence it can also go together with e-waste legislation in India.

Both of the agencies state that Producers have the responsibility of offering a workable solution to consumers to dispose of their waste and they need to make sure that the solution is state of the art with secured financing. One agency believes that producers have different standards in various countries. For example the environmental policies they have in Europe are not the same in similar matters such as product take-back in India. Some industries say that they produce somewhere and sell here so they cannot claim the producer responsibility in India. Hence it feels there is a communication gap that leads to different standards within the same industry across various locations.

The responsibility of the government is viewed as defining stakeholder responsibilities clearly and keeping the present environmental laws such as air, water and solid waste rules respected. One agency thinks that the participation from the government so far is going well and it recognizes that the government came up with guidelines in a good amount of time. Whereas the other feels that the participation from the government is not that good and it is not using the available expertise of bi-lateral agencies on e-waste.

Both of the agencies want to see the NGOs raising awareness levels of various actors and bringing them together for discussion on e-waste by keeping the pressure on the government and industry high. Users should send their e-waste to authorized channels. One agency expresses that the role of recycler is limited to recycling chain such as collection, storage, transport and dismantling and to update their recycling technologies. They should not participate much with policy making process.

Both of the agencies strongly feel that the most affected stakeholder due to a separate legislation depends on how the responsibilities are allocated to the stakeholders. Nonetheless, one agency feels that the state administration will be affected highly due to the learning it needs to undergo for implementing the new legislation. The other feels

that the consumers might be affected due to disposal cost on them. It would like to see the inclusion of informal sector in EPR-kind of legislation to avoid it being affected.

Both the agencies feel that all kinds of instruments are needed. But one agency says that in Indian context economic instruments is a good option. The other agency feels that there should not be any targets in the initial phase.

3.3 Policy makers and government representatives

3.3.1 Introduction to Policy makers and government representatives

In this category, five civil servants have been interviewed. They are from the Ministry of Information Technology (MOIT), Central Pollution Control Board (CPCB), Karnataka State Pollution Control Board (KSPCB), Tamilnadu State Pollution Control Board (TNPCB) and Maharashtra State Pollution Control Baord (MPCB). MOIT has been involved in providing facilities for checking ROHS compliance of Indian producers. It is responsible for making policies for electronics and information technology industry. CPCB is a nodal agency that co-ordinates with all state pollution control boards (PCB) and works under Ministry of Environment and Forests (MOEF) which makes environmental legislation. State PCBs are responsible for implementing policies made by MOEF at the state level. MOEF and CPCB have conducted workshops and seminars with bi-lateral agencies and formed national working group with different stakeholders to address the problems of e-waste. It also helped the Delhi e-waste assessment study. KSPCB works with EWA. TNPCB has formed a working group in the past to look into the matter of e-waste with NGOs as one of the partners. MPCB has conducted an assessment in Mumbai-Pune region in collaboration with UNEP.

3.3.2 Views of government representatives

Many government representatives seem to have the view that the perceived threat of e-waste on health and environment is not even considerable. A few think it is low. A few do not want to comment on it. Some feel e-waste has been hyped by media and NGOs out of proportion. Many representatives state that forthcoming amended HW rules can solve e-waste problem by including it in schedule-IV of HW rules. Some representatives feels there is no need of a separate piece of legislation because e-waste is hazardous and it will only duplicate HW rules even if they plan to have a separate piece of legislation. One representative mentions that government feels that e-waste collection from households is not possible at this stage, so only institutional users such as IT industry, Business Process Outsourcing (BPOs) organizations, and other major industries will be covered first. A few representatives mentioned that HW rules can not handle e-waste effectively so there will be new legislation in the future. At present the guidelines will help the industry with the information of possible treatment options, methodologies for treating e-waste etc. one representative has a view that e-waste is a business activity, so market will take care of it and government should not intervene. He also believes that legislation cannot solve these problems rather what we need is better recycling technologies. Hence, technology can solve e-waste problem to the maximum extent.

One representative stated that the recently released guidelines on e-waste have introduced the EPR principle briefly. Some representatives do not want to comment on EPR and the European legislation WEEE and ROHS.

Some representatives have the view that presently there is no role to be played by the producers but others feel that producers should facilitate collection through take-back and should facilitate the set up of recycling facilities. A few even argue that producers should start themselves without any government intervention just the way they have implemented in some EU countries before WEEE Directive came into force.

Government representatives opine that the responsibility of government is to make rules and the market will take care of the rest. A few representatives have mentioned that government wants to encourage recycling activity by giving subsidies and providing cheap land. Recyclers are responsible to follow ESM practices. Institutional users are responsible to channelize their e-waste to authorized recyclers.

According to the government representatives, the institutional users and the informal recyclers will be the most affected stakeholders by including e-waste in HW rules in the future. They feel that the informal sector should be used for collection, transport and dismantling stages to avoid the affect on their livelihood.

3.4 Producers

3.4.1 Introduction to producers

Producers that have been contacted are HP, Intel, LG electronics, WIPRO, Panasonic, Elcoteq, Pgi TV manufacturer, Convergent India, T-series, Philips, TVS Electronics and Asha Electronics. These producers are from Information Technology (IT), Consumer Electronics (CE) and Telecom industry. HP, WIPRO and LG have started takeback schemes in India. HP and Philips are members of EWA in Bangalore.

3.4.2 Views of producers

Most producers perceive the threat of e-waste on health and environment is high to very high. A few producers feel it is low to medium. Majority of the producers feel that there is a need for separate legislation to manage e-waste. Reasons are mentioned in the following.

- E-waste cannot be hazardous during collection, storage and transport unlike the industrial hazardous waste which is regulated through HW rules. So separate legislation is needed that recognizes these differences and regulates according to that. For example, a generator cannot store hazardous waste more than 90 days; this rule limits the e-waste generators to store their e-waste more than 90 days if e-waste is considered hazardous in each phase.

- Nature and disposal methods of e-waste and hazardous waste are different. A single legislation for both wastes complicates the implementation of legislation.

- The administrative process for transport and collection is complex if e-waste is considered hazardous during these phases.

- A separate law is needed to give necessary impetus to solve the impending problems of e-waste otherwise it will not be given much care and things will not move further in the right direction.

A few producers feel that we cannot have legislation unless we solve the problem of informal recycling sector. They contend that unless we formalize informal sector for collection, transport and dismantling they will compete with take-back schemes by offering better prices to the consumer. They even argue that the implementation of the existing HW rules is not proper and so there will not be any guarantee for better implementation of a new piece of legislation. They believe that government should formalize informal sector and implement the existing rules properly before enacting a new e-waste law. Some producers feel that a HW rules are going to be amended as Hazardous Waste and Recyclable Waste Materials (Management, Handling and Transboundary Movement) Rules, 2008 where it contains a separate chapter on e-waste. They believe that though this legislation applies to all generators equally, it is expected that while implementing there will be a differentiation between individual households and large corporate bodies. Hence, e-waste from households will not be going through the administrative processes like a corporate user.

Barring a few producers many of them says that India is not ready for EPR-based legislation such as WEEE Directive. According to them, if EPR is made mandatory then genuine producers would have to implement where as the grey market will not. This might increase product price of the genuine players and the consumers will turn more towards grey market products since the difference of price margin will be very high between genuine players and grey market. Meanwhile, some producers feel that big producers can even implement buy back and India is ready for EPR-kind of legislation. Other producers say that India might not be ready as a whole but we need to build the capacity and work out collective models.

There is a divided opinion on who should take the responsibility for safe recycling of their products. Some producers expressed that they should share the combined responsibility with recyclers. Some producers say government and producers are responsible whereas some others say that producer, government, recyclers, users, NGOs, and media all responsible for it. Some producers express that they should implement take-back programs and educate the consumers about the e-waste.

Producers are expecting multitude of roles to be played by the government. Government has to make rules that are practical to be implemented and should make sure that all parties comply with the rules. Some producers state that policy should be developed at the central level and states will be given implementation responsibility along with freedom to make some rules to accommodate the development status of the state. Its laws should promote the development of infrastructure. For instance, government should mandate institutional users to send their e-waste to a authorized recycler that guarantees the input to the recycler, hence the recycling industry will grow. Government should have a good interaction with industry and should convene all stakeholders to solve the problem of e-waste. Some producers feel that government should take responsibility of informal sector and support it with the necessary capacity and infrastructure so that it can be formalized. According to them, in order to have more

investment in the recycling sector, government should first control the informal sector so that authorized recycler will be guaranteed the input. Some producers suggest that quasi government initiative such as build and transfer mode can be taken to improve the recycling infrastructure. Some producers have expressed that state PCBs should take leading role in finding a workable solution to solve informal sector problems because they are much more aware of local conditions. PCBs have to enforce the rules, audit and monitor the implementation of legislation by each industry.

The responsibilities of other stakeholders are expounded as follows. NGOs should raise awareness of the general public and help to develop domestic e-waste collection channels to send them to authorized recyclers. Institutional users play a very important role, they should channelize their e-waste to authorized recyclers and should not auction for lure of better prices from informal sector. Recycling industry is not only responsible for safe recycling but they also should try to find a suitable role for informal sector and train them for better practices. Recycling industry should also implement ISO 14001, 18001 and employee welfare programs.

Producers have a mixed opinion about who will be affected from new legislation on e-waste. A few producers mention that it will be a positive change and they do not see affect on any of the parties in the long run. Some producers think that informal sector will be the most affected whereas others think not only informal sector but also producers themselves and users. The reasons explained are informal sector might need to closely tie up with the statutory framework. Producers have to put some administrative processes and may need to allocate resources so that will be an extra burden on them. Users might have to pay the recycling costs for some products. A few producers think government will be burdened with implementation and will feel a medium affect. All producers have the opinion that they are going to be affected if there is a new legislation on e-waste.

A workshop was conducted by MAIT and Greenpeace in April 2008. Participants to this event are HP, Panasonic, Lenovo, Samsung, LG, WeP, HCL, Nokia, Sony-Ericsson, Motorola, PCS, Sharp, Philips, TVS electronics, and WIPRO. These producers are also from IT, CE and Telecom industry. These producers have been asked to express their views on three issues in the worshop. They are opinion on e-waste problems, what they want to do collectively and the need of separate legislation. Many producers have expressed that the problem needs attention now. They want to take pro-active actions before the legislation comes in to existence. Except a few, Most of them are in favor of having a new separate legislation on e-waste. Some of them expressed that they already have takeback schemes but schemes are not working well due to competition from informal sector players.

3.5 Industry associations of producers

3.5.1 Introduction to producer industry associations

Industry associations that have been contacted are Manufacturers' Association for Information Technology (MAIT), Electronic Industries Association of India (ELCINA), and Consumer Electronics and Appliance Manufacturers Association (CEAMA). MAIT has been actively involved in the e-waste discussion at the national level for the last 4 years. It has been co-ordinating with government, NGOs, bi-lateral agencies and other

industry associations to conduct studies, workshops, seminars etc. ELCINA has been actively participating in the public discussions at national level. ELCINA has conducted training programs for ROHS compliance to their members extensively and tried to bring awareness by publishing about e-waste in Industry news letters and magazines. CEAMA is also a participant of many forums of e-waste discussions.

3.5.2 Views of producer industry associations

Industry associations perceive the threat of e-waste on health and environment is high. Except for one association, other two feel that there is a need for separate legislation to manage e-waste. They feel that owing to different characteristics of e-waste from other solid wastes, it cannot be handled effectively with the current frameworks under Environmental Protection Act. But one association feels that guidelines will better serve than legislation. It argues on two lines: in India legislation is enacted but poorly implemented and secondly, legislation increases intervention of the government bodies that will lead to more corruption. But guidelines give a chance for self-regulation of industry so it feels responsibility.

Industry associations have mixed opinion on the type of legislation they want to see to manage e-waste. One association says they cannot comment because their members have different opinions on EPR, whereas the other say industry complies only if it is made mandatory by the government. One association opines that we do not need to have EPR-type of legislation because recycling in India is viable by itself. One association expresses that many MNCs have already implemented WEEE elsewhere so it can be done here too. One association recommends implementing WEEE type of legislation in a phased manner just like eco-labels[3] in India. First we need to make our industry feel comfortable with voluntary standards and then we can make it mandatory. Big industries should take the lead and others will follow automatically.

All industry associations state that industries should follow legislation properly and aim to be ROHS compliant. Industry should implement take-back schemes and make sure their e-waste is treated safely. Owing to industry's knowledge about its products, they feel it should be made part of any government initiatives. An association states that industry loses control once the product goes to consumer so it feels industry should educate its consumers and should work for better recycling facilities as their corporate social responsibility.

All associations opine that government has the biggest responsibility for devising a practical and enforceable legislation, not an idealistic one. It should be developed at the central level as CPCB is the nodal agency for it. The State PCBs should take the lead in implementing the legislation. One association feels that if government provides proper incentives like financial subsidies and frames laws that are friendly to recycling business, industry can set up recycling facilities. Take-back is very difficult in Indian case so government can set up facilities for collection at different locations through a PRO (Producer Responsibility Organization) and distribution at cost or by tender to recyclers. The association which favors guidelines mentions that government should talk to all stakeholders and review the guidelines periodically, and amend them based on the experience of stakeholders.

[3] Energy-lables were voluntary for first 2 years and then made mandatory for 4 categories (Refrigerators (normal and frost-free), air conditioners, incandescent lamps) of products.

Regarding other stakeholders, NGOs should raise awareness of the general public, institutional users should assure that their waste is going to authorized recycler and treated safely, and recyclers should improve their collection infrastructure. Retailers have been considered as one of the important actors who can help the consumers to choose an authorized recycler.

Associations have identified the informal sector to be the most affected stakeholder by legislation. The second hand IT product dealers also are affected highly because they might not be able to buy from institutional users, segregate and sell the usable components. Users have also been mentioned as one of the most affected group and they need to be informed about the value of the product at the Eol stage in the manual.

3.6 Authorized recyclers

3.6.1 Introduction to authorized recyclers

The authorized recyclers that have been contacted are E-parisaraa, Ash recyclers and Infotrek syscom ltd. E-parisaraa started its operation in 2005 and provides recycling services to more than 50 industries. It has been participating in national workshops and it also worked on first draft proposal on e-waste. It is actively involved in training the informal sector to upgrade their practices. It closely works with NGOs and bi-lateral agencies. Ash recycler is specialized in component recovery and reuse along with recycling. Participation of Ash recycler in public forums is not that prominent as other recyclers. Infotrek syscom has services ranging from equipment refurbishing and re-sale to recovery of materials from the electronic equipment. It has represented in the discussions at the national and regional level.

3.6.2 Views of authorized recyclers

Recyclers perceive the threat of e-waste on health and environment is high to very high. Recyclers have different opinions regarding the need of a separate legislation on e-waste. One recycler argues that e-waste is not hazardous during collection, storage and transport but during processing and recycling it is hazardous. If we consider e-waste is hazardous during collection, storage and transport then every generator has to go through certain administrative procedures irrespective of the quantity and it will complicate the whole process and encourage unauthorized disposal. All the collection and storage sites should get permission under hazardous waste rules and transport personnel also be trained according to the Hazardous Waste (HW) rules. So he does not think e-waste should be considered as hazardous waste for collection, storage and transport. Keeping these stages in mind they feel that separate legislation should be designed for e-waste. The other recyclers do not see any problem of looking at e-waste as hazardous waste. So they do not think there is a need for separate legislation. But they do feel that presently there is a problem with collection. So the government should decide the responsible actor for collection and include it in hazardous waste rules. In fact one recycler feels that the administrative process should be made much stricter.

The recyclers have expressed that EPR can be applicable in India. Some recyclers think maybe EPR can provide a solution to the collection problem and it should be explored with other possible models. Producers know about their product characteristics better

than any one else in the whole chain. But the caveat is the presence of large grey market so this should be taken into account when designing the legislation.

Recyclers opine the responsibility of producers as implementing take-back, and providing information of their products material constituents to users. One recycler mentions that good practice should start from their door steps. He explains that the rejection of Printed Wiring Boards (PWBs) from Original Equipment Manufacturers (OEMs) is a significant quantity, so OEMs should not auction that processing waste rather they should send it to authorized facilities for treatment and disposal. Industry should put honest efforts in implementing the guidelines on ESM of e-waste.

The responsibility of the government has been viewed as defining the responsibility of each stakeholder clearly, draft the policy and implement it properly. It should make mandatory for industry to have disposal policy and conduct awareness campaigns. The state PCBs should own the responsibility of informal sector and should conduct training programs to the enforcing authority about e-waste. One recycler mentions that battery recycling is only 10-15% so he suggests government to improve the capacity of existing legislations before embarking on new ones. He also feels that state PCBs should have open mind and assist recycler and generator in the transition phase.

The responsibility of NGOs is to help the back yard recyclers to upgrade their operations, and creating awareness of the hazardous nature of e-waste at processing and recycling stages to limit their activity till dismantling. The institutional users should have a disposal policy, and should send their waste to an authorized recycler and be ready to pay the cost of recycling. Recyclers look upon their role is to comply with legislation and help train back yard recyclers.

The informal sector has been viewed as the most affected stakeholder by having legislation on e-waste. But they feel it can be averted if they are considered properly during the policy formulation.

One recycler has a belief that tradable carbon credits might encourage to improve the recycling infrastructure in India. The other recycler feels that economic instruments for collection and administrative instruments for processing point are the best option to encourage and control the recycling industry.

3.7 Institutional users

3.7.1 Introduction to institutional users

Information for this group was gathered from a recent report by GTZ-MAIT and interactions with a large IT company and ELCIA, Electronic City Industries Association, which represents all the institutional users in the electronic city Bangalore. The IT Company is one of the large IT industries in India and it has contributed to the e-waste debate by continuously participating in the seminars, workshops etc. ELCIA has recently got permission to organize collection facilities for their member industries' e-waste so that it can be channelized to the authorized recycler.

3.7.2 Views of institutional users

GTZ-MAIT (2007) study was conducted on 203 organizations to find out their disposal practices and their views on e-waste. The businesses covered were 55 manufacturing and 148 service oriented organizations. According to this study, 94% of the businesses do not have a disposal policy. It was also found out that the awareness and knowledge about e-waste problems in these businesses was quite dismal. The most important factors these businesses look at when they want to dispose their e-waste are convenience, best price and best exchange offer, and 6% of the businesses look for environmentally sound disposal manner. It was also found out in this study that 80% of the replaced PCs every year by these businesses enter the e-waste stream through scrap dealers, dealers of exchange offers or second hand market. This shows that the perception on e-waste problems is low or not considerable by these businesses. In a direct interaction with large business and industry association of institutional users the author came to know that the former perceive e-waste problems as high but the later as low. Both of them think that there is a need for separate legislation. The reasons mentioned are there is no clear definition of which electronic products are hazardous such as computers as opposed to non-PVC cables etc, and e-waste as such should not be considered as hazardous waste may be some components not in bulk. So they think that generic HW rules should not be applicable.

They express that take-back and exchange programs should be conducted by the producers. They believe that e-waste legislation should be designed on the basis of EPR principle such as the WEEE Directive. According to them once the government legislate this kind of policy industry will comply though with some initial resistance due to the financial implications. They believe that government is responsible for framing a policy to make producers responsible, update information on their websites and allow online applications for collection facilities. They believe that informal sector and producers will be affected by the legislation more than the users.

3.8 Others

3.8.1 Introduction to experts

In this category a consultant and an expert of hazardous waste management have been contacted. The consultant belongs to IRG Systems South Asia (IRGSSA) private limited and the expert belongs to ASEM-GTZ on hazardous waste management. From here onwards they both are called as experts to maintain the anonymity. IRGSSA has been involved with assessment of e-waste and recycling practices in Delhi with EMPA and Toxics Link, E-waste manual with MOEF, Mumbai-Pune study with MPCB, and the recent guidelines on environmentally sound management of e-waste with MOEF. The expert from hazardous waste wing of ASEM-GTZ has been involved in conducting e-waste seminars, workshops and GTZ campaigns, brought industry on to table to discuss e-waste issues, and also worked with informal sector.

3.8.2 Views of experts

Experts have differing opinions on perceptions of threat posed by e-waste on health and the environment. One expert mentioned that we need a scientific study to find the threat of e-waste on health and environment. The other expert feels that if the informal sector

has been viewed as a polluter due to their crude operations, in contrast the actual threat is to their health and not to the environment. This is because the quantities of acids or fumes generated from their crude methods are not that huge and they can be dealt by the absorbing capacity of the environment at present quantities of e-waste handled. The expert also feels that e-waste does not need legislation per se because the existing legislation on solid waste, water and air can take care of it. But expert also argues that if we want to have consistent focus and more awareness on e-waste then only we might need a separate framework or policy to deal with it. The other expert feels that market decides when to have separate legislation. According to this expert, at present Indian government is not having capacity for developing and implementing new legislation. However expert feels that development of proper recycling market is a prerequisite for having a separate piece of legislation.

One expert feels that India is not ready for WEEE type of legislations because EPR based legislation needs a developed market. Whereas the other expert feels that we should not forget about culture and social customs of the Indian people before introducing any new legislation. The expert is of the view that Indians do not have the tradition of throwing goods in the bin or returning them to the retailer because they want to recover residual value of their obsolete goods. So she feels informal sector should be encouraged for collection, transport and dismantling and keeping this point in mind we should devise policies.

The role of the producer has been viewed as promoting responsible recycling by one expert. The other feels that industry should give information about the presence of hazardous elements in their products to the recyclers. This information should be in an comprehensible form for the informal recyclers also. The industry should suggest easy ways of dismantling like demanufacturing.

The experts feel the role of government is to devise strategies that promote responsible recycling and management plans that include the informal sector. The important thing is keeping the present social systems intact by not introducing new parallel systems. Identify the tiny problems in the informal sector and solve those problems. India do not need to take the model from Europe.

The experts state that everyone will be affected by legislation: IT companies, IT producers users and informal sector, whose livelihoods will be at stake. But the opportunities created in transport and collection can accommodate the informal sector. The first level dismantling and segregation is done manually in many countries, hence the informal sector can find employment in it.

3.9 Media attention on e-waste issues

Media archives of national and reginal dailies were collected and arranged according to the chronology from 2003 to 2007. Since 2003 media's attention on e-waste has increased. Table 3-1 summarizes the number of articles that have been published in national and regional news papers.

Table 3-1 the number of articles on e-waste in regional and national news papers in India from 2003 to 2007.

Year	National daily	Regional daily	Total articles
2003	26	25	51
2004	76	57	133
2005	80	60	140
2006	69	29	98
2007	51	18	69

In 2003, many national dailies focused on the importation of e-waste coming to India from various countries in the world. Media often reported that India was turning to become the e-waste dump yard for the world. Many articles have focused on the pollution caused by e-waste to soil and water. Some articles focused on green computers and some others on extraction of metals possible from e-waste. Regional dailies focused mostly on health and environmental hazards from e-waste and on imports from developed countries as a threat to Indian environment.

In 2004, many national dailies focused on imminent dangers from e-waste to the environment. Some discussions on the need to bring new laws, management policies to tackle e-waste problems were reported. A particular attention was brought on cities such as Delhi, Bangalore and Chennai in many articles demanding the corresponding state governments to deal with the e-waste problem. New recycling initiative that was planned in Bangalore was also given attention in the media. During this year some estimation of future PC and mobile waste were also reported. A few articles reported the demands of bi-lateral agencies and NGOs on government to frame laws to avoid illegal imports to India and asked producers to take the responsibility of their waste. Some articles reported on imports from UK and depicting India as the dump yard of UK's e-waste. In regional dailies, majority of the articles reported on health dangers from e-waste and the existence of pollutants in personal computers (PC) and mobile phones etc. Some articles reported on dumping from developed countries and regional government initiatives.

In 2005, many National dailies reported that state governments requested the central government and specialized institutions such as National Environmental Engineering and Research Institute (NEERI) to guide them with a policy that addresses e-waste problem. Some articles were on central government initiatives such as estimation studies and policy planning. Some articles were on studies and estimations conducted by some agencies, while others summarized the health hazards posed by toxic e-waste. Few articles concentrated on pollution added by e-waste to metros. Many articles reported on show cause notice sent to WIPRO, a software company and producer, for its alleged e-waste pollution. The Karnataka State Pollution Control Board (KSPCB) did threaten to issue closure orders to Wipro Technologies if the software major did not furnish details within three days, on allegations of generation and transportation of e-waste violating a

Supreme Court order in this regard (The Hindu, 2005). Some IT companies expressed their concerns about e-waste problems, environmental NGOs asking ban on e-waste imports to India were some of the themes of the articles. Regional dailies covered issues on health hazards due to pollution from e-waste, dumping of e-waste into India from developed countries, health effects to backyard recyclers, growing quantities of e-waste in India, urgent need of policy etc.

In 2006, many articles reported on plans to have draft legislation on e-waste by the central government, workshops conducted on e-waste, IT companies announcing plans to tackle their e-waste, e-waste imports to India, growing quantities of e-waste, health risks posed by e-waste, recycling of e-waste as a profitable business etc. In regional dailies most articles were on e-waste imports to India, the need of law, government plans to draft a policy on e-waste, growing quantities of e-waste, health hazards from e-waste recycling in back yards, and IT industry initiative to tackle e-waste problems.

In 2007, the majority of the articles are on government plans to introduce a new piece of legislation to tackle the e-waste problems. E-waste is depicted as a raising monster in Indian cities, health hazards posed by e-waste. Many articles summarized the findings of report released by MAIT-GTZ. In regional dailies initiatives planned by state pollution boards to address e-waste problems, issue of e-waste guidelines by government, growing e-waste quantities from IT industry, dumping from rich countries, findings of report published by MAIT-GTZ, and increasing environmental problems due to e-waste were the most common topics discussed.

4 Analysis and Discussion

In this chapter we will attempt to look into the reasons behind the attention of media during 2003-2007 and the stakeholder perceptions. The stakeholder perceptions are analyzed with the help of analytical framework on belief system to see the agreement and disagreement between actors and their positions. Discussion will bring the lacunae in the HW rules to accommodate e-waste, the effect of guidelines on e-waste management and misconception of stakeholders on EPR principle.

4.1 Analysis of media

Figure 4.1 shows the attention of media in terms of number of articles published on e-waste between 2003 and 2007. It can be seen that the media attention is fluctuating throughout this duration. The symbol in the figure 4.1 represents the action i.e events that have happened on e-waste such as workshops and seminars conducted, reports released by different actors, government action on some actors etc. The size of the symbol denotes the number of events in a certain period. It can be observed that the greater the number of events organized the more the attention from media on e-waste. The list of events is in the Appendix C. The influence of events on media is lasting for a while which we can observe from the initial period of graph where the report from Toxics Link in February 2003 yielded attention from media for a couple of months. It later faded but in March 2004 when 3 events took place the attention went up again. It is also interesting to see the nature of these events because there are some instances where the number of events are less but they commanded greater attention in media. For instance, in May 2005 when Wipro was issued show cause notice about its e-waste disposal practices. This event actually attracted much attention from media because of WIPRO's, being India's major IT company, corporate image was at stake. In fact attention of media when four events took place during May 2006 was less than the May 2005. But it is evident that from middle of 2006 to end of 2007, except for December 2007 when MAIT-GTZ study was unveiled, the attention of media on e-waste was less despite of many events happening in that duration. But we can observe that successively media attention has decreased in the last two years. The reasons can be explained from the figure on attention of media according to the category of article with the help of theory on agenda setting explained in chapter 2.

The media articles can be classified into categories such as awareness, dumping, need of government action, government statements, initiatives, action, criticism on government and EPR.

The content of articles in each category was discussed below.

Awareness: It involves reporting on harms of crude e-waste recycling on health and environment, raising quantities of e-waste generation, technologies to avoid e-waste problems such as green computers etc.

Dumping: These articles mainly discuss the e-waste being imported from abroad to Indian cities, Basel Convention etc.

Need of government action: This reporting involves demanding or requesting the central government to have E-waste management plan by state governments, NGOs, bi-lateral agencies etc.

Government statements: These articles are statements from government representatives such as minister of MOEF and civil servants, their plans on legislation or next steps to tackle problems of e-waste.

Initiatives: They are initiative by corporates, local governmental bodies, initiation of special agencies on e-waste management, setting up of new recycling facilities and so on.

Action: These articles report about workshops and seminars, conducted reports and studies released by various stakeholders, notices issued by government authorities, campaign by NGOs, bi-lateral agencies, training programs conducted to informal sector etc.

Criticism on government: This involves reporting various actors' criticism on government action.

EPR: These are articles that write about the manufacturers' responsibility or adopting extended producer responsibility principle to solve e-waste problem.

Agenda setting process described in the theoretical framework can explain the reasons behind the media attention throughout the whole period. According to the framework, issues become social problems when taken up by attentive public and then with wide spread awareness of general public enters into the agenda of policy makers for policy decisions. Figure 4-1 explains that the e-waste issue has been brought into debate by specifically interested actor, in this case report from Toxics Link in 2003. During 2003 and 2004 the topics that are mostly reported are awareness and dumping, see Figure 4-2. Both these topics are non-technical to attract the attention of general public so that issue will be viewed as a social problem. Then the issue has been taken over by attentive public such as other NGOs, industry associations and bi-lateral agencies. Their involvement is seen by the number of events, category action in Figure 4-2, conducted between 2004 and 2007. The number of articles on government statements and initiative has also increased between 2004 and 2006. The number of articles on awareness and dumping has decreased in the same period. This explains the fact that when the government representatives responded to media by giving statements on e-waste management and their policy decisions in terms of plans and legislation, then the role of media in setting agenda has been fulfilled. In response to this the number of articles on awareness and dumping has decreased between 2004 and 2007 that caused the decrease in total number of articles i.e. media attention over the last two years. But there might be some other reasons such as Indo-US nuclear deal which took front seat in media for the last two years etc. This might have resulted less media attention on e-waste in 2006-07. What is more important is that there might be some other external intervention, which is beyond this research scope that might have decreased media attention in 2006-07 on e-waste.

Looking at the queries asked in parliament for the last four years, it is evident that the attention of parliament on e-waste increased in 2007 with 12 queries on e-waste management and government actions from members of parliament (MP) to MOEF as opposed to 5, 4 and 2 queries in 2006, 2005 and 2004 correspondingly (Toxics Link,

2008). This information also supports that e-waste problem was taken up by politicians so the policy makers are forced to consider in their agenda between 2006 and 2007.

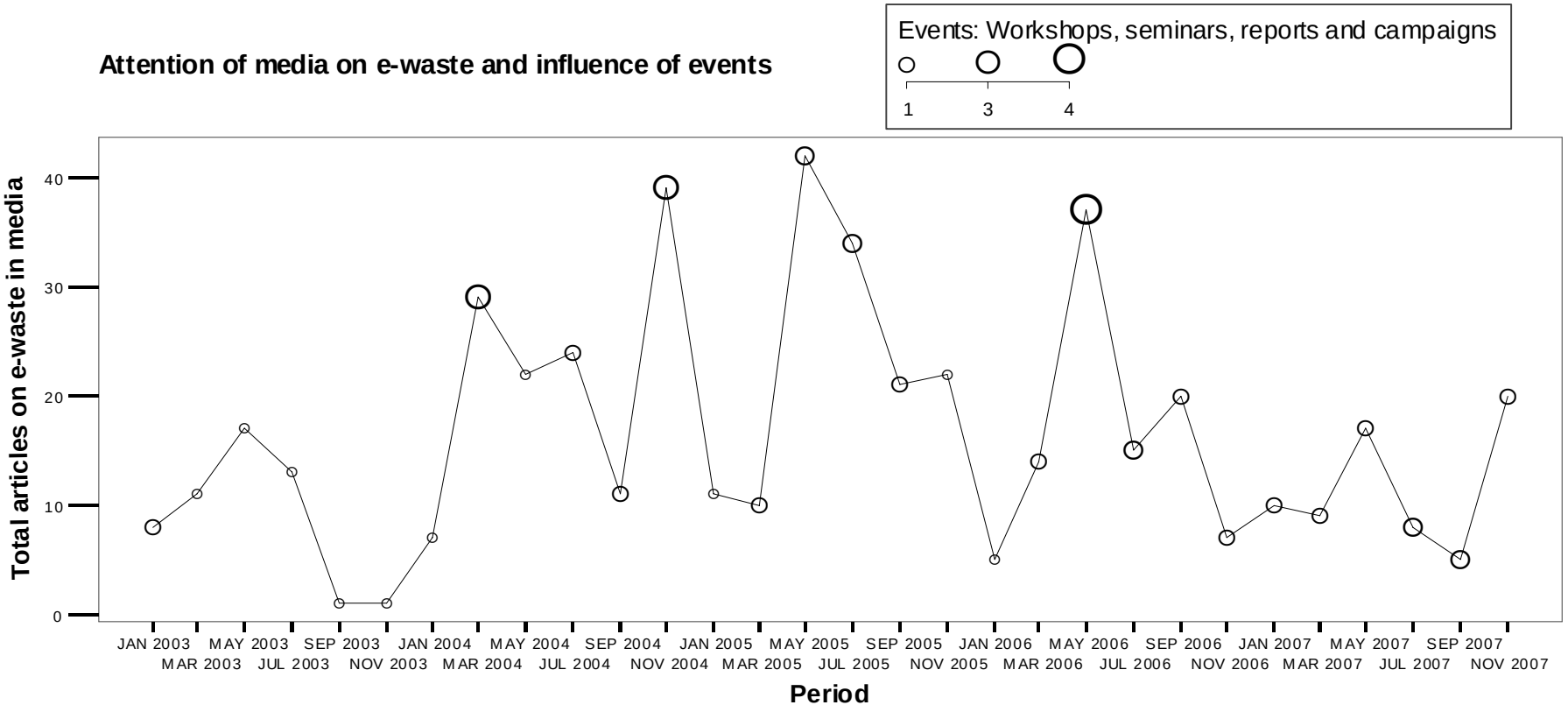

Figure 4-1 Media attention in between 2003 and 2005 and influence of events

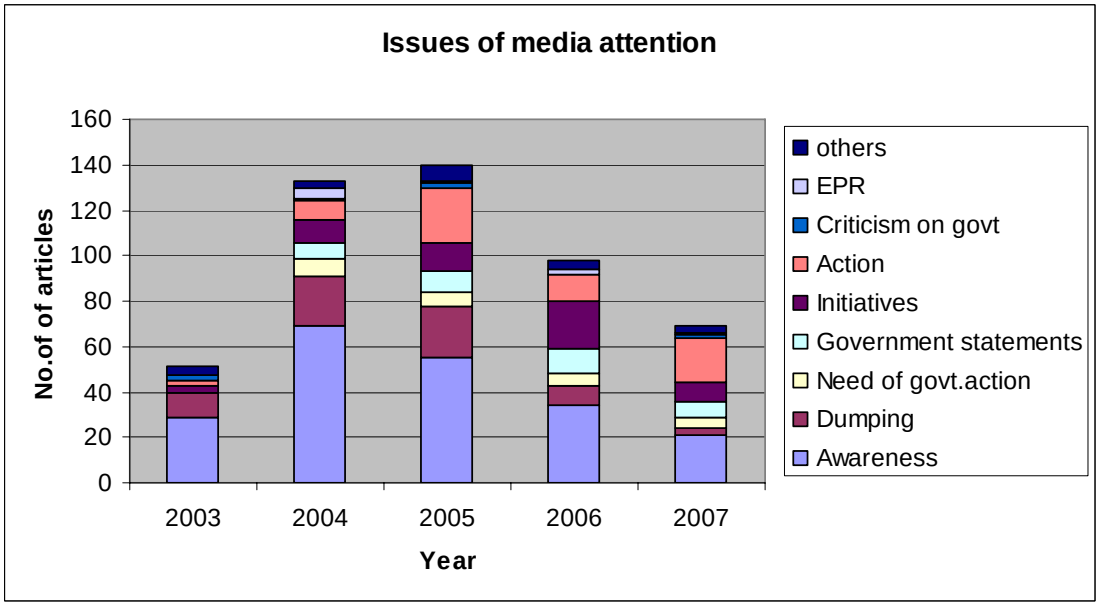

Figure 4-2 media attention based on the topic of discussion

In Figure 4-3, we can see the issues of importance in national and regional dailies during the period 2003-2007. The most discussed issues in both national and regional dailies are awareness and dumping aspects of e-waste. Particularly in regional dailies the dumping, which is less technical and can generate feelings of loss to nationhood hence more the attention of general public, issues have been reported as important or more than other topics during 2003-2007.

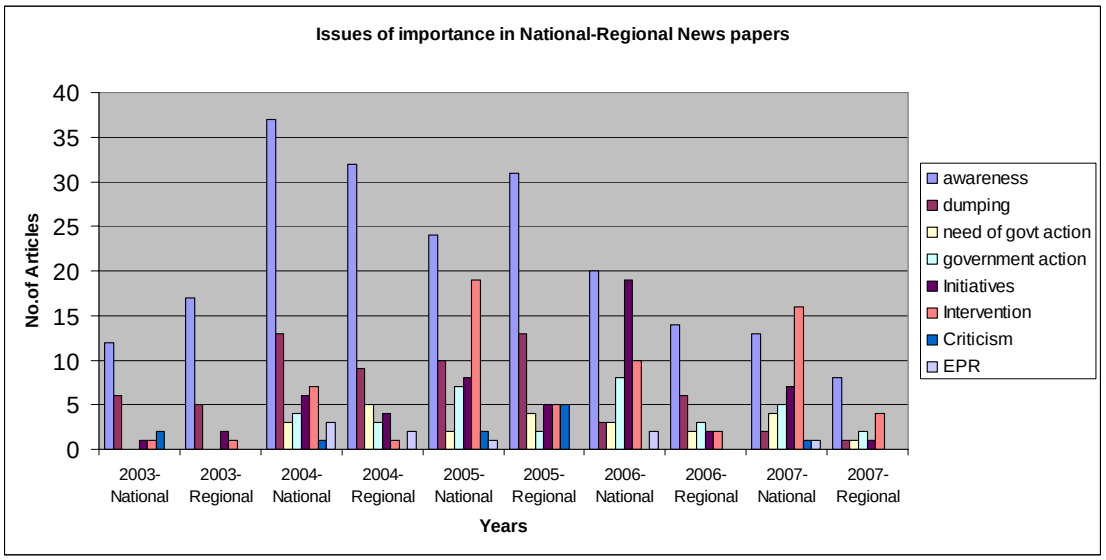

Figure 4-3 media attention in regional and national dailies

4.2 Stakeholder analysis

4.2.1 Perception of stakeholders on threat to health and environment

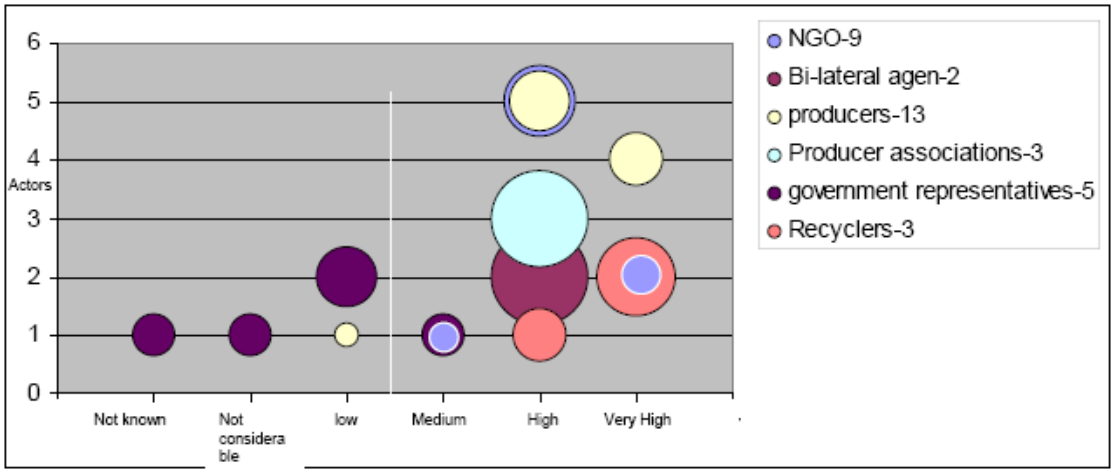

Figure 4-4 Perception levels of stakeholders (size of the bubble shows the relative percentage of actors in the same category of stakeholder, example: all 3 producer associations perceive the threat as high so the bubble is 100% and big)

The Figure 4.4 explains how different stakeholders perceive the threat posed by e-waste on health and environment, which is a component of policy core belief, as a whole. The x-axis shows the threat scale, ranging from low, medium to very high. The y-axis shows the number of actors having the same scale of threat. The bubble size denotes the relative share of the corresponding stakeholder. For example: there are three recyclers, 2: 67% says very high and the rest 1: 33% says high. This way we can see how many actors in the same stakeholder group have the same or differing opinion. There is a greater degree of agreement among NGOs, bi-lateral agencies, producer associations, recyclers, and majority of producers. Hence, these actors are having a similar core belief on threat perception. The only stakeholders which are different from the opinion of other stakeholders are government agencies and a producer. There is no agreement even among different government representatives themselves. This shows difference in the belief on threat perception, which is a component of policy core belief, in between government representatives themselves. The threat perception of government representatives and other stakeholder is also at loggerheads. The numbers might not match with the total number of producers and NGOs responded for the research because some actors do not want to comment on that issue.

It is very interesting why a certain group of stakeholders is saying something is important where as others not. In the case of government agencies they have been involved with many other pollution problems in India such as water quality, air pollution, solid waste management etc. For example, the total solid waste generated in Delhi amounts to 5900 (FICCI, 2007) tons per day while e-waste from Delhi is about 9729 (Chatterjee, 2007) tons a year. So the government agencies tend to look at the quantity of solid waste and say that e-waste is nowhere near the problem of solid waste. But what we need to be careful is the toxicity of e-waste which all the government representatives are aware of. Some government representatives mentioned that the national environmental policy (NEP) decides the priority of issues to be dealt. It is true that even NEP (MOEF, 2006) has mentioned about e-waste.

Develop and enforce regulations and guidelines for management of e-waste, as part of the hazardous waste regime (MOEF, 2006, p 39).

4.2.2 Need and model of policy

In this section we will see the agreement between different stakeholders on the need of separate policy and policy principle which are components of policy core beliefs. Figure 4-5 shows us the whole picture of what different stakeholders think about e-waste policy. The horizontal axis is divided into two parts; the left side are those who believe HW rules are enough to handle e-waste and the right side are the actors who believe e-waste needs a separate policy. Likewise, the vertical axis top side shows actors who believe EPR should be the basis for policy and the bottom side who does not think EPR can be used in India. On any axis moving towards the extremes shows the strength of belief of those actors in the corresponding quadrant.

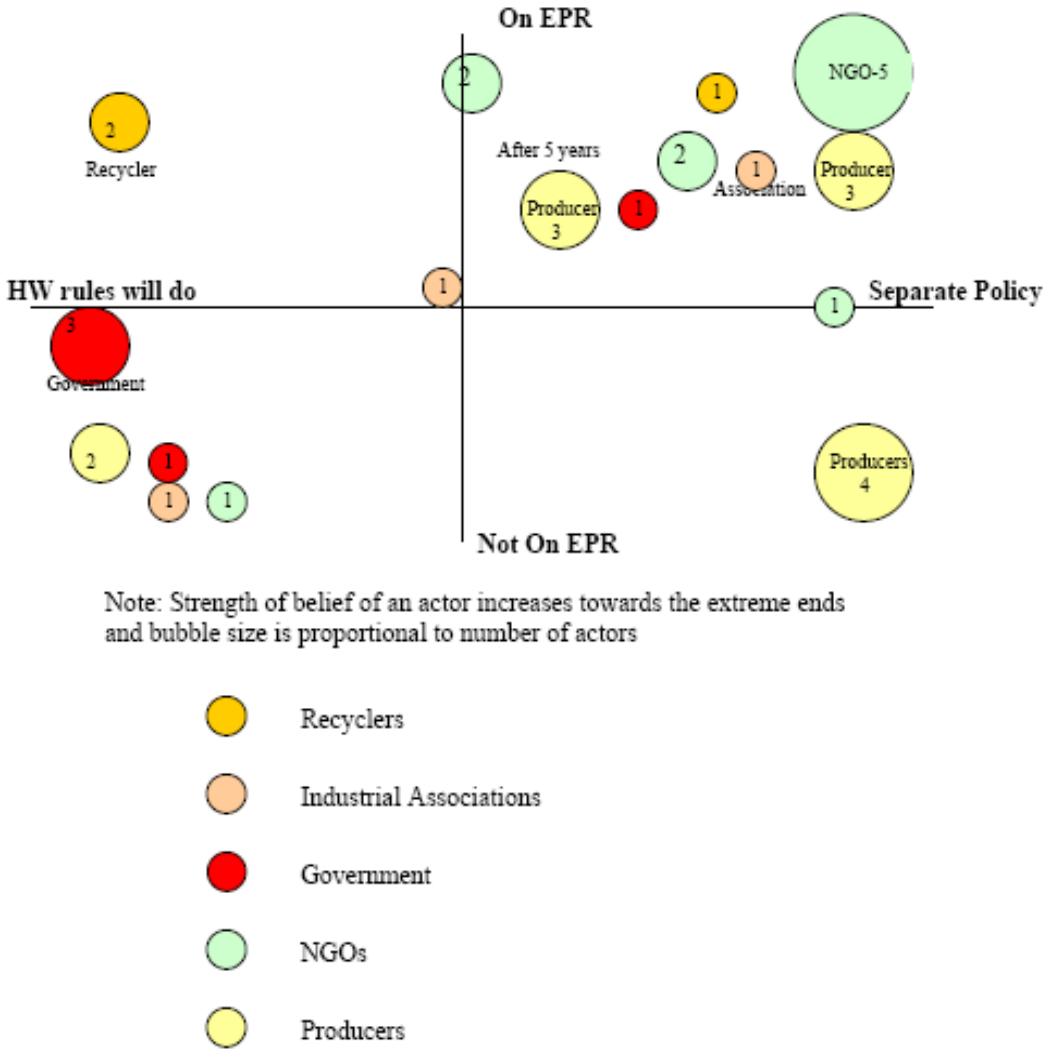

Figure 4-5 Perception of stakeholders on need of policy and EPR

It can be seen from the figure that many NGOs strongly believe that e-waste should be dealt with a separate policy and EPR framework should be the basis. These NGOs have

also said that they are well aware of European legislation such as WEEE and ROHS. There are two NGOs, on the vertical axis top side, which are doubtful whether separate legislation brings any good but they believe that EPR can bring good results. These NGOs also said they are well aware of EU legislation.

But there are two NGOs (middle of the top right quadrant) which said policy based on EPR should be tried in the future after 2-3 years. They feel that guidelines should be tried out now. They believe that guidelines can help to solve the informal sector.

Another NGO said there is a need of separate policy for e-waste but not sure whether it should be based on EPR or not, and in the same way the other NGO said it does not think the need of separate policy and EPR. But neither of these NGOs have knowledge about European legislations based on EPR. So it is evident that those NGOs with knowledge on EPR legislations want Indian e-waste legislation should be based on EPR irrespective of the time. Most NGOs agree for separate legislation based on EPR, we can see the agreement between these NGOs on these policy core beliefs.

Producers have a divided opinion. No producer believes that all the Indian industry is ready for EPR legislation right now. But they believe we should start getting ready now to develop the capacity for the future. They believe industry will implement EPR if there is legislation.

There are three producers who prefer to have EPR based separate e-waste legislation at this juncture. These producers have shown a good knowledge about both of the EU legislation, WEEE and ROHS. But there are three producers who believe we should wait for five more years. Since they do not believe that India is ready for separate legislation based on EPR right now their belief's strength is low. Hence their position is shown slightly near the origin in the Figure 4-5 because the strength of beliefs is high at the extreme ends of the axes. These producers acknowledged that their knowledge about WEEE legislation is limited but they know ROHS very well. Except for one producer, those producers who believe there should be a separate piece of legislation but not based on EPR (bottom right quadrant) have limited knowledge on WEEE. These producers expressed that the grey market is the obstacle for India to have EPR legislation. There are two producers (bottom left quadrant) who believe HW rules can handle e-waste. One producer neither knows about EPR principle, WEEE nor ROHS Directives. The other believe that consumers should take the financial responsibility not producers. In producer category, their decisions are based on the affect their organizations are going to be felt. Interestingly, all producers have acknowledged that any kind of legislation on e-waste is going to affect them. These affects can be resource relocation, administrative burden compliance and the like. This might be one of the reasons for prolonging the time of introduction of legislation. Majority of producers have agreement on separate policy which is one of the policy core belief but not the other i.e. EPR here.

Regarding industrial associations, one association (top right quadrant) feels e-waste needs separate policy. It believes EPR can be implemented if the legislation forces the companies to do. This means industry has the capacity but not willing to do without government intervention. The other association (near origin) is clear neither on policy nor on EPR. It thinks its members have divided opinion on it. So it cannot really comment on the applicability of EPR in India. It tends to say that take-back schemes under battery legislation are not successful, so the same will happen for e-waste too. Another association (bottom left) believes guidelines can do better job since

implementation is not that strong in India. One question that struck to anybody is how can we assure the implementation of voluntary guidelines if not even the mandatory legislation works. This argument does not seem rational. Fear of corruption and government intervention are reasons for preferring guidelines over legislation of this industry association. Industry associations do not hold the same policy core beliefs in terms of need of separate policy and EPR principle. They disagree on these two issues between themselves.

Recyclers believe EPR is very good for India. It can help them in terms of better collection so that their input will be guaranteed. But two of them (top left) do not see a need for separate legislation because it is believed that they can buy e-waste from anybody without much procedural requirements under the present HW rules. But the other recycler (top right) believes it is not possible to buy e-waste from anybody unless it is a registered generator under the present HW rules. Recyclers show higher degree of agreement on EPR but not the other policy core belief i.e. need of separate policy.

Government representatives are straight to the point and said the HW rules are going to be amended in the future; hence this will take care of e-waste. One representative believes that a new legislation will come in the near future. Except this one representative (top right) none of the other (bottom left) acknowledged that HW rules are not going to solve the e-waste problem effectively. Because HW rules put more procedural requirements for collection, storage and transport, and since e-waste is treated as hazardous during these phases, this will impede the formalization of the informal sector and upgrade their processes. The three representatives (bottom left) were near the horizontal line though they do not think the need of EPR legislation but believe that producers should set up collection and take-back facilities. Based on this response though they are not explicitly supporting EPR their position was set near the horizontal axis because take-back can be one of the instruments of EPR. Many representatives were not willing to talk about the European legislation. Some of them mentioned that they do not have the update of those legislation. Majority of government representatives show agreement on both policy core beliefs need of separate policy and EPR.

From the above discussion it is understood that stakeholders are having different positions on the policy core beliefs need of a separate policy and EPR. Barring a few actors, majority of NGOs and producers see the need of separate policy but the government representatives are against that. It is to be noted that policy core beliefs threat perception and need of separate policy goes hand in hand for government, NGOs and Producers.

4.2.3 Key responsibilities

Types of responsibilities mentioned under EPR principle such as physical, financial and informative responsibility explained in Chapter 2 can be used to better understand the perception of stakeholders on key responsibilities of producers.

Almost all respondents have agreed that producers should take the responsibility in recycling of their products and as per some respondents government and recyclers as well are responsible for safe recycling. This means liability of the effects of recycling has been seen as a responsibility of producers, government and recyclers. Even the civil servants who do not want to comment on need of legislation argue that producers have

the responsibility of setting up collection facilities and implementing take-back schemes. NGOs and some producers also agreed producers need to conduct take-back schemes. They did not explicitly say but it can mean physical and/or financial responsibility. One expert mentioned that producers should provide information of their products' hazardous content, marking to denote hazardous content in any part of the equipment, and easy ways to disassemble the equipment so the labour cost and time decreases. Many stakeholders also mentioned that producers are also responsible for consumer awareness. These all come under informative responsibility of producers. Many stakeholders agree on the policy core belief, take-back and safe recycling responsibility of producer.

Most of the stakeholders have agreed that the legislation should be framed at the central level and the states have the responsibility of implementing it. Many stakeholders agree on this policy core belief. Whereas some stakeholders think that states should be given flexibility to add some more requirements. This provision was already given even in the guidelines document. According to this provision the PCBs can prescribe stringent measures to any of the stakeholder whether it is licensing or operation requirements or reporting etc. In this respect, India should look at the experience of the WEEE Directive where the flexibility given to states have raised differences in definitions, marking and reporting requirements that increased the complexity of producers to implement them (Tojo, Sander *et al.,* 2007).

4.2.4 Perceived Challenges

The existence of the informal sector in India is argued as a challenge for producers to enforce EPR legislations in India. The informal sector is giving competition to the existing take-back programs and formal recyclers. It is to be understood that consumers should be given some kind of incentives to attract their participation in the take-back schemes. Here also EPR can help the situation as information instruments can be used to raise awareness of users.

Informal sector has been viewed as the most affected stakeholder if there is any new legislation on e-waste. Almost all stakeholders have agreed on the policy core belief i.e most affected party will be informal sector. There are some concerted efforts from bi-lateral agencies and NGOs about the people in this sector and their livelihoods. There was a separate seminar on the inclusion of the informal sector in e-waste management in January 2008. Some of the steps that were thought by the bi-lateral agencies and NGOs to include and strengthen informal recyclers are to advocate for the role of formalized 'informal sector' in the government, to conduct studies to show the health hazards of informal operations and awareness raising regarding these results, to provide finance through linking EPR in terms of corporate social responsibility of producers and institutional users, to form federation of informal sector people to strenthen them, and to shift hazardous operation to formal sector with the help of awareness and training etc (GTZ 2008). First and the most important of all of them is the recognition of government and its willingness to formalize the informal actors who are willing to change and set themselves as a role model to others. This is the biggest challenge because currently one attempt for the formalization has been hold down by the government by not issuing license to operate for collection, storage and dismantling.

In India, recyclers are paying for cost of collection, transport and recycling and still having profits. Some stakeholders mentioned that recycling is viable by itself at least for some products. Unless we know the costs of logistics and revenues from recycling

activity it is not possible to say that producers are going to shell out money from their pocket by having EPR legislation. So this fact should be considered and further studies should be conducted to see the financial viability of recycling of different products. This might alleviate the fears of producers from the grey market.

Some experts feel that Indian recycling market, in terms of investment in recycling infrastructure, has not developed to accommodate EPR principle. Contrary to their opinion, there is a big interest from multinational corporations and many Indian entrepreneurs in the e-waste recycling sector. One of the NGOs in Bangalore has witnessed this demand with series of enquiries by interested parties to set up recycling facilities. Their interest faded away at one point when they realized that there is no organized infrastructure for the collection of e-waste in India thus they cannot be assured of material supply for recycling. Coming to the material markets, the metal prices has been increasing and there is an increasing demand of resources everywhere in the world. The present recyclers are also having profits from the recovery of metals though he is paying for collection, transport and recycling. One recycler told that their recycling is viable so far for many different products. From these arguments it is evident that in India the development of infrastructure should be the need of the hour. Without proper infrastructure in place we cannot attract more market activity since there is no assurance to the investor. If the government takes measures and plans for the development of infrastructure we can see surge of recycling activity in India. As mentioned by some government authorities already in some states there are a few new recycling facilities coming up and they have got licenses for operation from government recently.

Some stakeholders have expressed a concern about government's capacity to implement and monitor the e-waste legislation. There are a few efforts in some state PCBs where the authorities are getting training from the experts about e-waste. This kind of capacity building of the government is very necessary to fulfil the responsibility of successful implementation of any future legislation on e-waste.

4.2.5 Summary of stakeholders' policy core beliefs

Threat perception of e-waste on health and environment: Except government representatives and a few actors, all other stakeholders have agreed that threat of e-waste on health and environment is high to very high. Government representatives perceive threat as not considerable or low.

Need of separate policy: Barring a few actors, majority of NGOs and producers see the need of separate policy but the government representatives are against that.

EPR, policy principle: NGOs, recyclers and bi-lateral agencies would like to see the implementation of EPR in India. All other stakeholders have a mixed opinion on EPR in between themselves.

Key responsibilities: Greater agreement from all stakeholders that producers are responsible for take-back and safe recycling. Most of the stakeholders have agreed that the legislation should be framed at the central level and the states have the responsibility of implementing it.

Most affected party: Almost all stakeholders have agreed that in general, the most affected party will be informal sector. (Note: It is difficult to predict the affect on other stakeholders without exact legislation in place presently).

4.3 Discussion

4.3.1 Why not HW rules for e-waste

It is learned from the discussions with government representatives that business entities like Information Technology (IT) and Information Technology enabled services (ITes) industry, and commercial businesses will be targeted in the forthcoming amended HW rules. There will be some requirements on these business entities so their e-waste will be channelled to authorized recyclers. It is expected that this will encourage recyclers to develop their capacity in the future. But this is not the whole story. There are some other issues which were not looked at. The problems are mentioned below.

1. Every business that generates e-waste should be registered as generator of hazardous waste.

2. Generators cannot store their e-waste more for than 90 days. (Pg-11, Rule 20, the Hazardous Wastes (Management and Handling) Amendment Rules, 2003.

3. All collection and storage facilities should get approval from the state pollution control boards (PCB) as hazardous waste sites.

4. Transport should be handled by licensed transporter to carry hazardous waste in question.

5. If the producers want to set up take-back schemes they need to get approval for collection, storage and transport.

6. Any collection drives initiated by community workers cannot be possible because e-waste is considered hazardous waste as per the law.

The other problem is recyclers cannot buy from the household and scrap dealers because they cannot register themselves as a generator with state PCB. It is interesting to see the administration process that should be followed by generators, transporters, and recyclers of hazardous waste, because this administrative process should also be followed by all actors in the end of life chain of e-waste. The following table 4.4 explains briefly the whole process. In the table, occupier means generator of e-waste, facility means any location that carries out collection, storage, disposal and recycling operations. There are 6 copies of manifest (form-9 as per HW rules), transporting document prepared and signed by the occupier, to be handled in this process.

This whole process complicates the system and it is not right to call e-waste hazardous during collection, transport and storage phases because the waste is still in the product form and does not display the hazardous characteristics. The registration process for collection, storage and transport also impedes the chances of formalizing the informal sector because the requirement to get license for any hazardous facility is more stringent. There should be a distinction of transport and storage stages before and after the processing or dismantling of e-waste. This distinction is not required for the hazardous

wastes handled under the present HW rules because most of these wastes are either liquid, semi solid or particulate form at the generation stage itself so needs very good attention to avoid contamination of the natural environment.

Policy makers should consider all the above complications and make/ammend policies that distinguish different phases of end-of-life chain of e-waste for pragmatic implementation of policies and to reduce the loop holes in the system.

Table 4-4 Manifest system

Copy number with colour code	Purpose
Copy 1 (White)	To be forwarded by the occupier to the State Pollution Control Board or Committee.
Copy 2 (Yellow)	To be retained by the occupier after taking signature on it from the transporter and the rest of the four copies to be carried by the transporter.
Copy 3 (pink)	To be retained by the operator of the facility after signature.
Copy 4 (orange)	To be returned to the transporters by the operator of facility after accepting waste.
Copy 5 (green)	To be returned by the operator of the facility to State Pollution Control Board/Committee after treatment and disposal of wastes.
Copy 6 (blue)	To be returned by the operator of the facility to the occupier after treatment and disposal of hazardous materials/wastes.

Source: *HW rules, 2003*

4.3.2 What can be the effect of guidelines?

Recently a document called guidelines for environmentally sound management of e-waste was released by the Central Pollution Control Board and Ministry of Environment and Forests. The aim of the document is to give different treatment options and methodologies for treating e-waste in an environmentally sound manner. Some stakeholders feel guidelines can provide a good solution during the transition phase to embark on a separate policy. In this repect the guidelines have been analyzed. Some criticisms of the guideline are as follows.

- The collection and transport stages have not been given enough consideration to clarify the reader how to obtain licenses for operations in these stages.
- It was mentioned that storage facilities should fulfil the requirements under hazardous waste since e-waste is viewed as hazardous during storage.
- The informal sector was mentioned a couple of times but there is no guidance to the state pollution control boards as how to formalize them at any stage of operation such as for collection, transport and dismantling.

Some NGOs are expecting that these guidelines will give time for the informal sector to upgrade their activities to get licenses for collection, transport and dismantling. But due to the above points it does not seem possible. In the report mostly the emphasis is on the formal recyclers. The responsibility of generators of e-waste was also not given much

importance. An effective management system starts with a better collection facility in terms of where the waste is going to be channelized i.e. formal recycler or informal back yard recycler. In this regard, this report fails to provide guidance to the authorities and actors involved in the e-waste business.

Nonetheless, the report tried to give some suggestions to the producers on the idea of collective take-back schemes and acknowledged that components of EPR should be included in the legislation later. The guidelines also gave a chance for state PCBs to make stringent rules based on the necessity. This might create loop holes or obstacles[4] for setting up new facilities based on the perception of civil servants in different state PCBs.

All in all, the guidelines appear as a good alternative but can impede the formalization of informal sector and setting up of any new facilities in different states.

4.3.3 What is EPR, is it simply WEEE directive and take-back schemes?

Many stakeholders have a belief that EPR is nothing but takeback schemes and paying cost of recycling. Some stakeholders refer to battery legislation that used take-back schemes which was a failure as an example to avoid EPR policy in India. One expert mentioned that producers should provide information of their products' hazardous content, marking to denote hazardous content in any part of the equipment, still the expert feels EPR might not work for India, undermining the fact that these requirements come under informative responsibility of EPR. From a producer's perspective, one of the reasons for disagreement of having a separate piece of legislation based on EPR is the fear of burden of recycling cost which might decrease competitiveness of genuine producers over grey market. This fear arises because looking at the European legislation i.e WEEE directive producers and many other stakeholders think this is 'the model' of EPR legislation where they need to pay for collection, transport and recycling of their products.

But in fact EPR as a policy principle gives wider options and policy instruments to fulfil the responsibility of manufacturers not just producers need to pay recycling fee like in Europe. Producers can fulfil their responsibility of assuring safe recycling of their products by choosing appropriate responsibilities such as physical, informational and financial carefully such a way that they do not affect their competitiveness in the market. Each country has its own culture and socio-economic status and a policy should reflect taking all these factors in to consideration. The onus is on the policy makers to choose instruments that are suitable to Indian context. If we keep this fact aside, it is evident from the response of many respondents that Indian stakeholders are actually accepting the EPR principle though to various degrees. This problem is occurring due to the inability of stakeholders to look at the flexibility provided by EPR principle and its application (for clarification on EPR principle and instruments please refer to chapter 2). EPR should not be viewed as an alternative name for take-back schemes and paying the costs of recycling as in WEEE directive. EPR should be viewed as a preventive

[4] Presently an association, formed by informal sector, applied for authorization but was halted on the grounds that it might encourage more application to come in future. The fear is due to the lack of trust on the association by the corresponding State PCB. Where as the other state wants to authorize more informal players to improve their performances by bench marking and bringing them in to legal compliance.

environmental policy principle and should be understood in its true sense to find the applicability of various policy instruments that suit to the context of the country.

Summary

The media has been analyzed to understand the reasons behind the variation of its attention from 2003 to 2007. The theory on agenda setting provides the explanation for media attention. Type of events conducted has remarkable influence on media attention. In this chapter the stakeholders have been analyzed to find their views on various components of policy core. The threat perception of all actors except government is high to very high. Many producers and NGOs agree for the need of separate policy. Government is against need of separate policy this decision is inline with its threat perception of effect of e-waste on health and environment which is 'not considerable to low'. HW rules act as an impediment to set up collection and storage facilities due to consideration of e-waste being hazardous during the Eol stages. Guidelines are not offering proper guidance to state PCBs as how to formalize the informal sector. Many stakeholders have a belief that EPR means take-back schemes and WEEE Directive as 'the model' of EPR policies.

5 Conclusion

5.1 Main Findings

This research attempts to find the perceptions of stakeholders on e-waste management in India. The components of blief system considered for research are threat posed by e-waste on health and environment, need of a separate policy to manage e-waste, policy principle used for the legislation, the responsibilities of involved actors, and the affected parties by the new legislation etc. Stakeholders that were considered for the research are producers, NGOs, bi-lateral agencies, industry associations, recyclers, institutional users, civil servents and policy makers, experts and media. These stakeholders can have an influence on the policy making process. The main findings of this research can be summarized below.

1. Participation of NGOs in the e-waste debate in India is limited to a small number of NGOs due to the lack of knowledge and expertise of e-waste issues.

2. Interest shown by producers on issues of e-waste management in India is minimal. This has reflected minimal participation from the majority of producers in e-waste debate so far in India.

3. Government representatives perceive the threat posed by e-waste on health and environment is low or not even considerable. This belief has supported civil servants to see no need of a separate legislation on e-waste. Some civil servants think e-waste problem can be solved by technogy and market without its intervention. On the other hand, all other stakeholder perceives the threat as high to very high and believes that attention should be paid to e-waste management.

4. NGOs and bi-lateral agencies believe that separate legislation based on EPR is needed to manage e-waste in India. Many producers also believe there is a need for separate legislation but have mixed opinion on EPR.

5. Producers and many other stakeholders have a false impression that EPR means take-back schemes and recycling costs paid by producers. The WEEE Directive has been, unfortunately, viewed as 'the model' of EPR legislations.

6. Producers and other experts see the existence of the informal sector, grey market and development of infrastructure as the impediments for EPR policy on e-waste management in India due to the perception mentioned above in point 5.

7. E-waste has been considered as hazardous during collection, transport and storage stages by the present HW rules. This is impeding the formalization of informal sector now and will limit the producers' inititiaves like take-back schemes due to more stringency and complexity.

8. Media's attention on e-waste has decreased in the last two years. This can be due to the increase in government statements and initiatives taken by different stakeholders on e-waste management. It was observed that media's attention is proportional to the number of events conducted in a certain period. E-waste

issues such as government action on corporations have attracted more attention of media than any other event such as seminars, worshops etc.

5.2 Conclusion

The research has tried to explain the perceptions of different stakeholders and the public at large through media on the issue of e-waste in India in the policy formulation process. In such a process, the stakeholders' actions are largely based on their perceptions or beliefs on the issue. Up till now, despite the efforts of NGOs and bi-lateral agencies for a separate framework, the process has not progressed considerably because of the perceptions of the policy makers or civil servants and experts who have greater influence on the process due to their continued involvement. The attention of the media, which to an extent reflects the salience of the issue in the public eyes, in terms of number of articles published on e-waste to demand the need of government action has also decreased in the last two years. These are the main reasons for the slow down in the process of making a separate policy framework for e-waste. In contrast NGOs, bi-lateral agencies and many producers feel the need of separate framework to consider the nature of e-waste and to get the attention of involved parties in solving e-waste problems, although the latter are more cautious on how the problem should be addressed, especially regarding to EPR. It is very important to understand that some stakeholders believe e-waste guidelines is a positive development in the area of e-waste policy and thus seen as a progress in the policy making process. On the contrary some other stakeholders believe issuing guidelines is a way of procrastinating or sidelining the separate framework on e-waste policy in the immediate future.

Contribution of this research lies in explaining the stakeholders' perceptions on the need of policy to solve e-waste problems and their respective understanding and views on EPR as a policy principle. Many stakeholders are under the notion that EPR principle can be implemented only in the form of the WEEE Directive. This notion has sidelined the flexibility and context specific usage of EPR as a preventive environmental policy principle that can solve the impending problems by allocating suitable responsibilities to various influential actors, such as producers and retailers, in the product life cycle. This misinterpretation of EPR principle as nothing but WEEE directive, which made producers responsible for takeback and recycling of their e-waste, has also contributed to the sidelining of the need of separate e-waste policy in India. This is mainly due to the fear of some interested parties that they might have to implement similar e-waste policy in India like WEEE in Europe. The main message is EPR policies can be designed in considering the socio-economic and cultural context of the country by choosing appropriate policy instruments rather than taking just one model of responsibilities allocated to producers as in the EU as 'the model'. But this does not mean that a policy process in India should be idiosyncratic, it should also draw policy lessons from other countries that have implemented the principle. This will help in assessing the suitability of the principle and in avoiding the problems of similar nature, if it would be followed, in the Indian context.

5.3 Recommendations

The participation of NGOs in e-waste debate is limited to very few considering the geographical expanse and number of cities in India. In order to have greater influence in

policy process and raise awareness of different actors other NGOs should be involved, and educated and equipped, if necessary.

The involvement of producers and especially institutional users is very less on e-waste issues. Raising the awareness of institutional users and producers and their involvement in the policy debate should be improved. NGOs and bi-lateral agencies might work on this front.

The media attention is dropping on e-waste for the last two years this has influence on the pace of policy process. Efforts should be guided in this respect to command the attention of media till the problem is addressed by the concrete actions of government.

Applicability and understanding of EPR principle in its true sense is need of the hour since EPR principle can be useful to solve many other problems not only just e-waste. This is much more relevant in the industrialized countries due to the greater influence of industries on society by its products and services. India is heading towards greater industrialization in terms of production and consumption of cars and electronic equipment etc. So in order to understand the relevance and applicability of EPR policy principle in Indian context, it should be seen in its true sense or totality.

5.4 Futher research

Research can be conducted to find the responsibilities that can be allocated to the producers without affecting their competitiveness in the long run. Without knowing the exact types of responsibilities allocated to producer, it is very difficult to say the effect of grey market on competitiveness of the producer due to EPR principle. Possible scenarios should be developed to see what would be the affect of allocating a particular responsibility on producers. Studies can be conducted on policy instruments to find the instruments that are better suitable to Indian context and the challenges and opportunities in formalising the informal sector etc.

The civil servants view the problems of e-waste as low or not considerable in the present context. The exact magnitude of toxicity problems and the efforts needed to solve the problems now and in the future should be studied. This might suggest the possible course of action for the government.

In India getting responses to questionnaires through e-mails is very difficult. Some times many actors are not interested in the research itself. Thus before choosing a research method, prospective researchers should consider the challenges.

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Abbreviations

ACF	Advocacy Coalition Framework
ASEM	Advisory Services in Environmental Management
CE	Consumer Electronics
CEAMA	Consumer Electronics and Appliance Manufacturers Association
CPCB	Central Pollution Control Board
EEE	Electrical and Electronic Equipment
ELCINA	Electronic Industries Association of India
EMPA	Swiss Federal Laboratories for Materials Testing and Research
Eol	End of life phase
EPR	Extended Producer Responsibility
ESM	Environmentally Sound Management
EU	European Union
EWA	Electronic Waste Agency
GTZ	German Development Cooperation
HW	Hazardous Waste
ICT	Information and Communication technology
IT	Information Technology
KSPCB	Karnataka State Pollution Control Board
MAIT	Manufacturers' Association for Information Technology
MOEF	Ministry of Environment and Forests
MOIT	Ministry of Information Technology
MPCB	Maharashtra State Pollution Control Baord
NEERI	National Environmental Engineering and Research Institite
NGO	Non-Governmental organization
OECD	Organization for Economic Co-operation and Development
OEM	Original Equipment Manufacturers
PC	Personal Computer
PCB	Pollution Control Board
PVC	Poly Vinyl Chloride
PWB	Printed Wiring Board
ROHS	Restriction of Hazardous of Substances
SECO	The Swiss State Secretariat for Economic Affairs
TNPCB	Tamilnadu State Pollution Control Board
WEEE	Waste Electrical and Electronic Equipment

Appendix A

Categories of electrical and electronic equipment covered by the WEEE Directive

1. Large household appliances
2. Small household appliances
3. IT and telecommunications equipment
4. Consumer equipment
5. Lighting equipment
6. Electrical and electronic tools (with the exception of large-scale stationary industrial tools)
7. Toys, leisure and sports equipment
8. Medical devices (with the exception of all implanted and infected products)
9. Monitoring and control instruments
10. Automatic dispensers

Appendix B

Hazardous processes in the e-waste recycling chain surveyed in Delhi (IRG, 2004).

Process	Description	Hazardous emission	Reference
IC extraction from PWB at 60°C	PWBs are heated to melt the solder Pliers are used to remove IC's and other components from the plate	Emission of brominated flame retardants, brominated and chlorinated dioxins and furans (PBDD/Fs, PCDD/Fs)	
Copper extraction from PWBs, burning	PWBs with or without components are burned in open fire. Afterwards the copper is segregated from the ash.	Emission of brominated flame retardants, brominated and chlorinated dioxins and furans, heavy metals (e.g. Cu, Pb, Cd), lead-tin fumes, respirable suspended particulates (RSP)	(Leung, 2004), (Tonetti, 2000),
Copper extraction from PWBs without components, acid bath	PWBs without components are dipped into acid bath. By addition of iron the solved copper builds iron-copper-complexes and precipitates	Waste water contaminated with acid and heavy metals (copper, lead, zinc, etc.)	(Leung, 2004)
Copper extraction from wires, burning	Wires are burned in open fires. Afterwards the copper wire is segregated from the ash.	Burning of PVC releases PCDD/Fs and PBDD/Fs, PACs	(Leung, 2004)
Cathode ray tube (CRT) glass recycling	CRTs that can't be regunned are smashed and sold to glass smelters. Reuse in bangles and CRTs.	Heavy metal emission (lead, cadmium, etc.) during smashing	(Hanke, 2001), (Tonetti, 2000)
Rare earth core extraction from transformer	Transformers are boiled in caustic solution	Emission of PCB and, waste water	
Capacitor burning	Incineration of capacitors to extract aluminium.	PCB and PCDD/F emissions	(EN, 2000)
Plastic recycling	Plastic (of casings) is shredded and washed. Reuse in toys.	Waste water, emissions of dust containing plastics	(Taberman, 1995)
Gold extraction from PWB, burning	PWBs with or without components are incinerated. The gold is extracted by adding mercury.	Emission of brominated flame retardants, brominated and chlorinated dioxins and furans, heavy metals (e.g. Hg, Cu, Pb, Cd), lead-tin fumes, respirable suspended particulates (RSP)	

Appendix C

Duration	Intervention	Details	Other events
Jan-Feb 2003	1	Toxics Link report	
Mar-Apr 2004	3	Toxics Link Chennai report, CPCB, MOEF, GTZ and EMPA workshop and Delhi report by IRGSSA, EMPA and Toxics link	
May-June 2004			
Jul-Aug 2004	1	GTZ Campaign and workshop	National working group formed
Sept-Oct 2004	1	CPCB national workshop with Toxics Link and ASEM-GTZ	
Nov-Dec 2004	3	Workshops by MCD, MAIT, FICCI-Env.Policy.	
Mar-Apr 2005		Release of e-waste manual	
May-June 2005	2	GTZ workshop, notice on Wipro from KSPCB	EWA formed
Jul-Aug 2005	2	Toxic tech report Greenpeace, national assessment GTZ/EMPA	E-parisaraa started
Sept-Oct 2005	1	Greenpeace Campaign	Stakeholder meeting GTZ sept-20
Mar-Apr 2006	1	GTZ vignette	Training conducted to informal sector
May-June 2006	4	ASSOCHAM workshop, Public Interest Litigation filed, GTZ and MOEF workshop, TERI workshop in Bangalore and Delhi	
Jul-Aug 2006	2	Greenpeace attacks Wipro, Greenpeace report	
Sept-Oct 2006	1	ELCIA seminar	Round table on SCP by MOEF and UNEP
Nov-Dec 2006	1	Toxics Link and UNEP workshop	
Jan-Feb 2007	1	Toxics Link Mumbai-Pune study	
Mar-Apr 2007	1	MPCB study on Mumbai	
May-June 2007	1	IICh conference	
Jul-Aug 2007	2	Greenpeace guide, CPCB guidelines	Training by MOEF and TERI
Sept-Oct 2007	2	Scoping workshop Development Alternatives, BASEL, SCP; Toxics Link Kolkata study.	
Nov-Dec 2007	1	MAIT-GTZ study	

Details of events happened during 2003-2007.

Appendix D

These are the list of questions asked to different stakeholders based on the suitability of the questions to them.

1. Do we need to have a separate legislation on e-waste management (i.e not under hazardous waste rules)? Why?
2. When is the time for that kind of seperate legislation?
3. Should the legal frame work be developed at the center or state level?
4. What would be the effect of recent guidelines on environmentally sound management of e-waste?
5. Who are the most affected stakeholders if there will be a legislation e-waste?
6. What should be the role of industry and government in your view?
7. What roles should be played by other stakeholders: recyclers, NGOs, consumers (Institutional and domestic), state PCBs etc?
8. Do you know about WEEE and ROHS legislation in EU?
9. What do you think about their status in Europe?
10. Do you think Indian industry is ready for similar legislations, especially in WEEE?
11. Do you see any problem with those legislations in general and especially in India?
12. Can you explain how Indian government is dealing with e-waste issues so far?
13. What instruments are better suitable to India (economic or administrative)?
14. Do you think advanced recycling fee is needed in India?
15. What costs do you bear when you get e-waste from producers or generators of e-waste?
16. Can you buy e-waste from unauthorized scrap dealers?
17. What administrative process you follow to get e-waste from generators of e-waste?
18. What are the future plans of your organization?
19. Which producers do send e-waste to your facility? (Please answer, if the information can be disclosed)
20. What electronic products are you dealing with so far and why them only?
21. What is the magnitude of perceived threat of WEEE on health and environment?

a. Very high b. high c. medium d. low e. not considerable f. do not know

Appendix E

Questionnaires sent to Producers:

1. What is the magnitude of perceived threat of WEEE on health and environment?
a. Very high
b. High
c. Medium
d. Low
e. Very low
f. Do not know
Answer:

2. Do you think a separate legislation is needed to deal with electronic waste in India?
a. Yes
b. No, Hazardous waste guideline can deal
c. May be after 5 years
d. Do not know
Answer:

3. In general, what would be the affect on the following stakeholders if there is new e-waste legislation on a scale of 1 to 5 (1-no, 2-less, 3-medium, 4-high 5-very high)?
a. Electronics industry: 1 to 5
b. Users: 1 to 5
c. Informal recyclers and junk dealers: 1 to 5
d. Government: 1 to 5
e. Others, please specify:
Answer: a. b. c. d. e.
Please mention reasons also here.

4. Do you think your organization will be affected by electronic waste legislation?
a. Yes
b. partially
c. no
Answer:

5. Who should take responsibility for safe recycling and disposal of e-waste? (you can choose more than one answer also)
a. Electronics manufacturing industry
b. Government
c. Recycling industry
d. Consumers: IT companies and other businesses, Individual users
e. Others, please specify:
Answer:

6. Are you aware of the ROHS, WEEE Directives in Europe?

WEEE Directive	RoHS Directive
a. Yes, very well	a. Yes, very well
b. Yes, but just heard about them	b. Yes, but just heard about them
c. No	c. No

Answer for WEEE:
Answer for ROHS:

7. Have you heard about the principle of extended producer responsibility (EPR) principle?
a. Yes
b. No
Answer:

8. Do you think Indian industry is ready for RoHS-type legislation?
a. Yes
b. No
c. May be in the future after 5 years
d. Do not know
Answer:

9. Do you think Indian industry is ready for WEEE-type legislation?
a. Yes
b. No
c. May be in the future after 5 years
d. Do not know
Answer:

10. Do you supply ROHS compliant products to Indian market now?
a. Yes
b. No
Answer:

11. What is the percentage share of exports to Europe from your organizations overall turnover?
Answer: