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Drivers of and barriers to E-waste management in the Philippines

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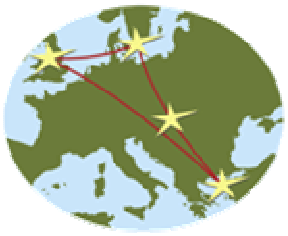

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Abstract

This study looks into the existing policy gap in the management of E-waste in the Philippines, by identifying the different barriers to – and drivers for – the adoption of E-waste management measures, through the perceptions of the different stakeholders involved in E-waste issues. Existing waste management policies in the country lack a specific framework for dealing with E-waste. This research examines socio-economic, political and cultural dimensions in identifying the drivers and barriers that hinder the adoption of E-waste management measures.

Based on the perceptions of the different stakeholders, the following drivers are seen to promote the adoption of E-waste management measures: importing countries' regulations, internal and external pressures in the electronics industry, local E-waste initiatives and market conditions, geographical conditions, urban mining and prices of metals, abundant cheap labor supply and the demand for the electronics industry to improve competitiveness. On the other hand, the different barriers that hinder the adoption of E-waste management measures are: the absence of E-waste laws, non-adoption of the Basel Ban amendment, existing multilateral and bilateral agreements adopted by key trading countries, low environmental consciousness, perceived lack of enforcement of environmental laws, inadequate supply of domestic E-waste, and the competition between the formal and informal sector in the electronics market. The fundamental characteristic of the Philippine electronics industry, as being dominated by the semiconductor sector, is seen both as a driver and as a barrier to the adoption of E-waste management policies.

The suggested policy direction is to develop the policy framework for E-waste management and weaken the different barriers identified. EPR has serious potential to be adopted in the country, especially in the context of a take-back scheme. The study suggests that existing socio-economic conditions – especially the existing structural set-up – be taken into account in designing an EPR scheme.

Executive Summary

During the last few decades, the electrical and electronics industry has experienced an enormous growth. The increase in consumption of electronic equipment – personal computers and mobile phones in particular – has been unprecedented. Coupled with increasing consumption is the increasing accumulation and generation of Waste Electrical and Electrical Equipment, commonly known as E-waste. In the Philippines, there is growing concern associated with the increasing accumulation of E-waste over time, which is primarily due to lack of adequate infrastructure to deal with the waste. In addition, there is no existing policy framework for dealing with E-waste.

The intention of this research is to understand the factors explaining why the Philippines has not adopted E-waste management policy measures, particularly considering that the electronics industry is the main driver of the economy, and that there are public health issues associated with improper disposal of E- waste. This research has tried to understand the existing policy gap, by identifying the different barriers to and drivers for the adoption of E-waste management measures, through the perceptions of the different stakeholders involved in E-waste issues. This study is guided by the model developed by Sabatier (1988) on "policy subsystem"- perceptions of stakeholders involved in a policy problem (e.g. E-waste).

An examination of the existing situation shows that there is currently no separate law on E-waste management, but that a number of private initiatives have been implemented to address the policy gap; these have achieved minimal success. The lack of a policy framework for dealing with E-waste is further compounded by the import and transboundary movement of E-waste. In the Philippines, the generation of E-waste is no longer solely confined to the domestic sphere, but has regional and international dimensions as well. The key stakeholders in E-waste and the electronics supply chain include manufacturers, finished electronics importers, second hand shops/refurbishers, hazardous waste treaters and recyclers, E-waste importers, and informal and backyard recyclers. In the Philippines, the informal sector has played a major role in recycling and E-waste management in the country.

By examining the social, economic, political and cultural dimensions of the country in relation to waste management, the different barriers to and drivers for the adoption of E-waste management measure are identified. Based on the perceptions of the different stakeholders, the following drivers are seen to promote the adoption of E-waste management measures (a) importing countries' regulations, (b) internal and external pressure in the electronics industry, (c) local E-waste initiatives and market condition, (d) geographical factors, (e) urban mining and prices of metals, (f) abundant cheap labor supply and (g) the demand for the electronics industry to improve competitiveness. The different barriers, on the other hand, are (a) the absence of E-waste laws and non-adoption of the Basel Ban amendment, (b) existing multilateral and bilateral agreement adopted by key trading countries, (c) low environmental consciousness, (d) perceived lack of enforcement of environmental laws, (e) low supply of domestic E-waste and (f) competition between the formal and informal sectors in the electronics market.

The potential adoption of EPR as a management option for E-waste is investigated by looking at stakeholders' opinions and perceptions. Stakeholders perceive that for EPR to work effectively in the Philippines it should be simple and easy to implement. In terms of identifying and defining producers, all importers are to be considered 'producers', while there is no consensus on whether local electronic manufacturer are to be considered as 'producers'. With regards to allocating responsibility, historical, orphan and no-name and generic products are perceived as the government's responsibility by default, while importers should be held responsible for all imported finished electronic items, second hand electronics and imported

E- waste. In terms of policy instruments, a deposit-refund system is seen as the most effective economic instrument to be adopted for an EPR scheme in the country.

The different drivers identified may be regarded as driving forces that can facilitate the development of an E-waste management infrastructure in the country. The barriers identified should be considered as areas of concern which need intervention from policy-makers, government and stakeholders. The suggested policy direction is to develop the policy framework for E-waste management and weaken the different barriers identified. Moreover, investment is needed for E-waste data improvement, especially in terms of identifying E-waste generation and accumulation, and, finally, a favorable climate which encourages recycling and materials recovery of E-waste should be promoted. EPR has big potential to be adopted in the country, particularly in the context of a take-back scheme. The study suggests further that existing conditions, especially the existing structural set-up, be taken into account in designing an EPR scheme.

Table of Contents

List of Figures

List of Tables

List of Boxes

1 Introduction

This chapter introduces the background of the issues of E-waste in a developing country, the Philippines. It also highlights the problems to be addressed in the research, the objectives of this study, the corresponding research questions, and the scope and limitation of the study. This chapter also emphasizes the relevance of this research in the area of waste management.

1.1 Background and problem definition

The documentary *Exporting Harm*[1] on electronic waste dumping in Guiyu, China has become an eye opener to the world on how the end-of-life of electronic products is being dealt with in a developing world. Aside from the fact that it brings out the issue of exporting of electronic wastes `by developed countries to poor developing countries, it also presents the main culprit of all: the continued generation of electronic waste and the seeming absence of responsibility for the disposed electronic products. New and improved electronics and advanced models (e.g. cellular phone and personal computers) are coming out in the market everyday making the older models technically and technologically obsolete and less satisfying to consumers thereby contributing to potential electronic waste stream.

In the Philippines, consumption of electrical and electronic products has been increasing at an unprecedented rate and the accumulation of obsolete electronics is growing over time. In the case of cellular mobile phone and personal computers for instance, the International Telecommunications Union estimates that cellular mobile phones ownership increased from 34,000 units in 1991 to almost 52 million units in 2007. With a population of about 80 million, approximately 2 out of 3 persons in the country possess a cellular phone. The same is true for personal computers wherein a phenomenal increase in ownership is observed over the last 15 years. In 1991, personal computer ownership was estimated to be around 6,300 units and it went up to 6.3 million units in 2006 (see Figure 1-1).

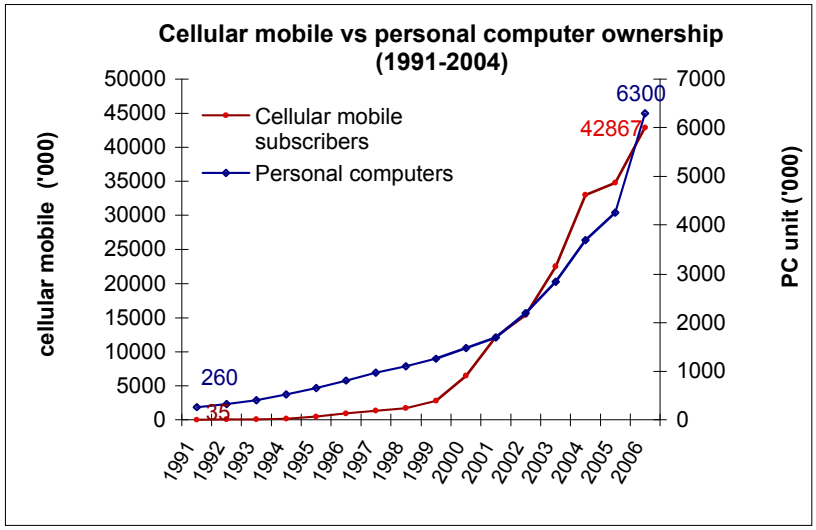

Figure 1-1. Cellular Mobile Phone and Personal Computer Estimates in the Philippines

Source: International Telecommunications Union Database

[1] Exporting Harm is a documentary and published report by the Basel Action Network on electronic waste dumping in Guiyu, China (Basel Action Network. 2002. *Exporting Harm: The High-tech Trashing of Asia.* BAN, Seattle, USA).

Coupled with the increasing consumption of e-products is the growing amount of E-waste generated for disposal. The continued E-waste generation over time has become a serious concern for interest groups, academe and policy makers alike especially that there is no official data on the level of E-waste generation and disposition in the country. A pioneering study on domestic E-waste generation conducted by Peralta and Fontanos (2006) estimates that between 1995-2005 alone approximately 25 million units of five major electronic products, namely; televisions, air conditioners, washing machines, refrigerators and radios became obsolete and an additional 14 million units more are projected to become obsolete in the next 5 years (Peralta and Fontanos, 2004). In a follow-up study of Peralta et al (2008) on the generation of obsolete personal computers accumulated by households and business sector, it was found that between 2000 -2010 approximately 1.3 million units have become obsolete. The fate of the end-of-life of these electronic products remains largely unknown although they are possibly reused, recycled, stored or landfilled.

In the Philippines, there are four major modes of final disposal of electronics; reused, recycled, stored and landfilled. However, there is no available data, official or otherwise, that determined the volume or percentage of E-waste stream that goes to particular mode of disposal. Landfilling remains the most popular means of final disposal for most waste types, including E-waste, especially those are not captured by the informal recyclers for further processing. E-wastes along with other bulky electronic products, known as "*white goods*" in the Philippines required a significant volume of landfill space. Presently, Metropolitan Manila and its surrounding provinces are facing serious shortage of landfill space for its municipal wastes alone, and indiscriminate throwing of solid wastes is commonly practiced. Municipal solid waste mixed up with E-waste scraps may end up in creeks, ravines and water-bodies and contribute to potential contamination in soil and water bodies. Electronics contain various hazardous and toxic materials and the continued improper waste disposal may pose a serious public threat in the future.

The continued generation of E-waste is not only confined within the geographical boundary of the country. External E-waste generation through importation of secondhand electronics and electronic scraps has contributed significantly to the entire volume of E-waste generated. While the country is a major electronic exporter, it is also importing second-hand electronics which may be approaching their end-of-life or in the form of waste for further processing. Thus, the issue of domestic E-waste generation is further aggregated by the continued influx of secondhand electronics and electronic waste coming both from developed and developing countries (see also Kojima, 2005, Terazono (2008), JICA (2007). The country is a party to Basel Convention yet there seems to be contradiction in the implementation of the Basel Convention and the bilateral trade agreements between the Philippines and other developed countries (e.g. US-Philippines Free Trade Agreement and Japan-Philippines Economic Partnership Agreements) that allow continued trading of second-hand electronics and waste products. The geographical situation of the Philippines, being and archipelago and isolated from the rest of mainland Asia, presents a given condition for the country to be self-sufficient both in terms of resource utilization and waste disposal. The Philippines has the geographical advantage that could easily control the transboundary movement of E-waste and the importation of second-hand electronics. Yet, the management of E-waste and the issue of trading and importation of second-hand electronics remains a complex matter that touches the economic, social and political spectrum.

There is mounting pressure coming from environmental watchdogs (e.g. Greenpeace), interest groups and academe for local industries and electronic manufacturers to implement management mechanisms that would respond to the potential and perceived problems of E-waste. In addition, there is also pressure emanating from importing countries (e.g. US, Japan

and Europe) for the country to implement environmental measures with regards to the process and production aspects and management of discarded E-waste in line with the environmental and health requirements for electronic products of the importing countries (Parayno, 2004). Electronics and electronic products (semiconductor) remain the single most important export of the Philippines and constitute more than 60% of the total exports. The enactment of WEEE and RoHS Directives of the European Union left electronic manufacturers with no other choice but to comply with the European directives in order to export electronic products to Europe[2].

Despite the obvious need for the country to implement a measure that would address the issue of continued generation of E-waste, there is no specific policy measure that deals with this particular waste stream. The Philippines is in the forefront in terms of enacted environmental laws yet it appears there is an obvious policy gap in terms of waste management policy in the country. The country has specific laws that govern the management of municipal solid waste, toxic substances, hazardous and radioactive waste, yet a policy measure that deals specifically with E-waste is still non-existent.

The continued generation of E-waste over time, the trans-boundary movement of E-waste, the lack of institutional framework for dealing with E-waste, the lack of adequate infrastructure and the internal and external pressures for the country to respond to the issues of E-waste present an opportunity for the country to explore a suitable mechanism that would respond to the potential problems of E-waste. There is growing number of policy management options available for E-waste, yet a proven and tested policy mix that would respond to the local conditions and would fit-in the dynamics of E-waste management in a developing country such as the Philippines is yet to be seen. For any environmental policy measures to work effectively the socio-economic and socio-cultural dimensions are to be carefully considered and it needs to be assessed whether such policy intervention is attuned to the ground realities and local conditions.

Globally, the principle of Extended Producer Responsibility (EPR) has been gaining ground as a policy option for managing E-waste. Several countries have embraced the principles and mechanisms of and its effectiveness has been demonstrated in some parts of Europe (e.g. Germany, Switzerland and Sweden). In the developing world, a number of countries have adopted the EPR principles yet the operationalization aspects of EPR remain a challenge (e.g. China, Argentina and Thailand). The theoretical underpinnings for the EPR principle to work effectively are based on OECD context where the market for electronics and electrical products are highly regulated and formalized, environmental consciousness is high, access to information is highly available and environmental laws are effectively enforced.

In the light of the different issues presented above, this research undertaking hopes to address the existing policy gap in the waste management by looking at EPR as management measure for dealing with E-waste in the Philippines. In order to do so, this research explores the different drivers and barriers for adopting E-waste policy option and identifies the factors that constrain the adoption of such policy.

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[2] Personal interview representatives of the Semiconductor and Electronic Industries in the Philippines, Inc. (SEIPI), April 2009.

1.2 Objectives and research questions

The overall intention of this research is to understand the existing policy gap in terms of E-waste management by looking at the different drivers and barriers to the adoption of an E-waste management measure. This research examines the economic, social, political and cultural dimensions in the adoption of an environmental policy taking into account the concept of Extended Producer Responsibility as a policy option.

This thesis seeks to answer the following questions:

1. How is the state of E-waste management in the Philippines?

2. What are the socio-economic and socio-political drivers for the adoption of E-waste management measure?

3. What are the socio-economic, political and cultural barriers to the adoption of E-waste management measure?

4. How would the concept of EPR be adopted in the Philippines?

1.3 Scope and Limitations

In any policy-making process, the socio-economic and socio-cultural aspects are important considerations in determining the suitability of policy intervention. OECD (2001) likewise identifies socio-economic and socio-cultural considerations as an important dimension for the implementation of any environmental policies and instruments, including EPR. Thus, this study puts more emphasis on the social, economic, and cultural aspects as the focus area of analysis rather than the legal, institutional and technological dimension of adopting waste management measures.

One of the stumbling blocks in this undertaking is the limited information and availability of secondary data on the level of E-waste generation and disposition. Although E-waste pertains to a broad range of electrical and electronic equipment, E-waste as used in the discussion would mainly refer to disposed electronic products such as household electrical products, personal computers and mobile phones coming from the end-user. In terms of assessing management measure for managing E-waste, the emphasis is more on personal computers and mobile phones because of the phenomenal growth and increasing accumulation of these two products over past few years. Industrial E-waste generation and disposal is not covered in this research. Studies and literatures on the disposal behaviour of industries and households on electrical and electronic products in the Philippines are not well documented. Difficulties on generating first hand information on the actual management of E-waste (handling, processing and disposal) especially in the informal sector may pose some challenges as well. To rectify such issue, this study solicits the perception, experience, opinion and observation of key stakeholders and the 'authorities' on E-waste issues in the country and use as the basis for understanding the overall dynamics of E-waste management.

This field study and gathering of first hand information has been conducted in the geographical boundaries of Metro Manila and its surrounding industrial zones in the province of Laguna. The problem of E-waste generation is more concentrated in the capital although some other big cities are also experiencing the same E-waste concerns. It is assumed that the case of Metro Manila represents the overall condition of the country.

Figure 1-2. Map of the Philippines and study area

Source: http://www.worldatlas.com/webimage/countrys/asia/lgcolor/phcolor.htm

The social, economic, political and cultural drivers and barriers of the adoption of E-waste policy mainly represent the views of the electronics companies (organized), E-waste recycling companies, academe, NGOs and interest groups and one government agency and not all stakeholders involved in E-waste issues. Small individual e-producers and software developers are not represented in this study.

The principle of Extended Producer Responsibility (EPR) entails management of the entire lifecycle of a product - from cradle to grave. EPR, as a policy principle, promotes not only the end-of-life management of products rather from the inception of the product design by incorporating sound environmental principles at the very onset of product design. However, the emphasis of the study is more on physical responsibility, thus this study evaluates the EPR as an E-waste management measure in the context of collection and take-back of discard electronics, and how the different socio-economic and cultural drivers and barriers may affect the adoption of such policy.

1.4 Data Collection and Methodology

In evaluating the adaptability of EPR mechanism, this study is guided by the principles of EPR as laid down in the EPR Guidance Manual for Government published by OECD (2001) and the outcome of the workshop on Extended Producer Responsibility and International Material Flow conducted by ADB[3].In 2006, the Asian Development Bank in collaboration with and

[3] See Meeting Notes of Workshop on Extended Producer Responsibility and International Material Flow. Asian Development Bank, Manila, Philippines. 14 February 2006.

regional organizations, private sector, academe and representative from Asian governments discuss the issues and challenges in the adoption and implementation of EPR. This study took off from one of the recommendations of the workshop which is to consider country-specific social and economic drivers for introducing EPR

This exploratory research employed a number of techniques and approaches. Different methods were utilized to collect primary and secondary information which include key informant interview, focus group discussion, semi-structured questionnaire, e-mail communication, unstructured interview, direct observation, and recycling plants site visit. The generation of data came from a number of sources thus content analysis is utilized especially for secondary literature and triangulation of data is used primary data generation such as interview, questionnaire and email communication. A bulk of primary information for this study mainly come key information interviews, observation, site-visit and focus group discussion.

The Philippines was chosen to conduct this study due to the familiarity of the author of the different issues on waste management in the Philippines, and recently with on the on-going debate on the implications of Japan-Philippines Economic Partnership Agreement (JPEPA) on the trading on E-waste and hazardous waste.

1.4.1 Literature Review

Literature reviews of academic, government (official), intergovernmental and non-governmental organizations materials focusing EPR in general and E-waste studies in particular.

1. Legal administrative framework for managing waste in general and electronic wastes in particular (e.g. Ecological Solid Waste Management Act, Toxic Substances and Hazardous and Nuclear Wastes Control Act)
2. Studies and Workshop of EPR, Recycling and International Material Flow
3. Studies on waste management and material recycling in the Philippines with emphasis on E-waste (JICA 2007).
4. Studies on trade and movement of electronic products and waste generation (e.g. UNCTAD Environmental Review 2006).
5. Technical reports on E-waste recycling
6. Published report and case studies on the process of handling, processing and disposal of E-waste in the Philippines.

1.4.2 Interview

To complement available information on the secondary literatures, semi-structured interviews and email exchange were utilized to substantiate available information on E-waste. Key informants came from various organizations such as government agencies, academe, international organizations, non-government organizations, electrical and electronics companies, recycling companies and shopping malls involved in E-waste market. The details of the key interviewees are listed below. The interviews were conducted following a semi-structured format and involved a series of open-ended questions.

(a) Section Chief, Environment Section, Environment and Development Division UNESCAP, Bangkok.

(b) Regional Adviser of Environment and Development Division, UNESCAP (in his capacity as former head of EPR Working Group in the Republic of Korea).

(c) Representative and Toxics Campaigner from Greenpeace Philippines (in her capacity as the previous lead campaigner on E-waste issues in the Philippines)

(d) Representative from Basel Action Network in the Philippines

(e) Regional Adviser on Environmental Health Hazards, World Health Organization, Western Pacific Regional Office, Manila, Philippines (in her capacity as academician involved in E-waste issues)

(f) Chief, Hazardous Waste Management Section of Environmental Management Bureau, Department of Environment and Natural Resources, Republic of the Philippines

(h) Chief, Chemical Management Section, Environmental Management Bureau, Department of Environment and Natural Resources, Republic of the Philippines

(i) Representatives of Semiconductor and Electronics Industries in the Philippines, Inc.

(j) General Manager of a recycling company

(k) Operators of E-waste market

(l) Vendors of second-hand electronics

1.4.3 Field and site visits

Field visits were conducted to various locations such as identified dumping ground for E-waste, unloading point of second-hand electronics, E-waste markets and junk shops and informal recycling. One of the biggest unloading points of second-hand electronics is the Pier 18 of Manila Port and iterant dumping sites of E-waste can also be found within the periphery of port area.

The E-waste market[4] operations of Ayala and SM Malls were also visited but there was no operation at the time of the visit (E-waste market is only conducted once a month and conducted at different venues). Site visits and direct observations of second hand market operations were also conducted in one of the biggest second-hand electronic store in the country, HMR Philippines. Field visit of a recycling plant, IRI Philippines Inc. was also conducted to observe the actual process operations and dismantling of discarded electronic items. IRI Philippines E-waste recycling and processing operation is located in an industrial estate north of Manila.

1.5 Outline

This report is composed of five chapters structured as follows:

Chapter 2- provides the theoretical framework in the study. This section provides theoretical underpinnings of policy-making with emphasis on environmental policy-making. It highlights the importance of socio-economic, political and socio-cultural dimension as integral component of policy decision-making. It introduces the principle of sound waste management policy and the concept of EPR as one of the policy options. This section provides a general understanding to the reader how the concept of EPR be assessed against the backdrop of a

[4] Collection and buying of old and junk electronics/appliances, used-lead acid battery, empty ink toner and cartridges, junk mobile phones and phones batteryies.

developing country like the Philippines. It would also provide an overview of the application of EPR in developed and developing countries and the different issues in the adoption/implementation of EPR.

Chapter 3 – provides an overall picture of the E-waste management system in the Philippines. This section presents the current state of E-waste management including the dynamics and complexity of waste management in the country. It brings out the issues of E-waste generation, trading and movement of second-hand electronics and hazardous waste, the presence of informal sectors in the electronic industry and existing local initiatives to address the problem of E-waste.

Chapter 4 – discusses the key drivers and barriers to the adoption of E-waste management measure by examining the existing economic, political, social and cultural condition and their implication in the policy-making process. This chapter highlights country-specific issues on E-waste management and the potential issues in the adoption of EPR.

Chapter 5- provides summary of findings, conclusion, recommendations and area for future research in E-waste management.

2 Research Framework and Literature Review

This chapter describes the theoretical framework employed to analyze the barriers and drivers of an adoption of E-waste management measure by looking at the "policy subsystem"- role and perception of stakeholders in policy-making. It introduces the dynamics of wastes in relation to ecosystem and human well-being, and highlights the importance of socio-economic, political and socio-cultural dimension as integral component of policy decision-making. It introduces the concept of EPR as one of the management measures. It also provides an overview of the application of EPR in developed and developing countries and the different issues in the adoption/implementation of EPR.

2.1 Role of stakeholders in policy–making process

The importance of stakeholders, key actors and interest groups in policy-making process is fairly established. Stakeholders and interests groups are generally consulted and involved in major policies (e.g. Strategic Environmental Assessment) and decision-making (e.g. Environmental Impact Assessment) process. The roles of stakeholders in affecting policy change have been documented in a number of literatures (e.g. Nelson 1987, Sabatier 1988, Heintz and Jenkins-Smith 1988). Sabatier (1988), for instance, develop the theory of advocacy coalition framework wherein it outlines that policy change is the result of the competition of 'advocacy coalitions'- individuals from various institutional settings who share a set of basic values and perceptions about factors affecting the policy topic [e.g. E-waste]. This set of values and perceptions, known as the belief system, is central to the formation of advocacy coalitions.

Nelson (1987) as cited by Heintz and Jenkins-Smith (1988) examines the role of economists in policy making and offers three models in outlining their roles in policy-making process, namely; the progressive model, the interest group model and ideological conflict model. Each of these models has conflicting role in policy-making and characterizes a set of belief that influences policy-making process.

Policy-making process, according to Sabatier (1988), is conceptualized in terms of "policy subsystems"- a set of actors/stakeholders involved in a policy problem to generate, disseminate and evaluate policy ideas (Sabatier, 1988). These stakeholders are seen as having interest in a policy topic, for instance E-waste, and concerned for its success. These stakeholders range from policy-makers, interest groups, environmental organizations, academe, expert, civil servants, researchers, taxpayers and even concerned individuals. Following Sabatier's (1988) model, this research looks into the "policy subsystem"- the roles and perceptions of stakeholders in particular- in examining E-waste as policy topic.

Within subsystems, there are external factors that constrained by a variety of social, legal, and resource [economic] features of the society of which it is part (Sabatier, 1988). According to Sabatier (1988), in a relatively stable system the external factors affecting policy change within subsystems include:

- Basic attributes of the problem area;
- Basic distribution of natural resources [economic];
- Fundamental cultural values and social structure; and
- Basic legal structure.

In line this with this, this research also looks at these factors that might explain the drivers and barriers in adopting a sound environmental E-waste management measure.

2.2 Dynamics of Waste Management

One of the main issues in waste management is dealing with the continued generation of waste resulting from human activities discharged into the environment and its corresponding impacts on human well-being. The impacts of wastes can be manifested in various ways such as lost economic opportunity, direct impact on human health and impairment of individual productivity, and damage to ecosystem such as loss of biodiversity. Looking at the relationship of wastes to ecosystems and human well-being, may provide an understanding of how policies are crafted in responding to the issue of waste generation including that of E-waste.

The Working Group of the Millennium Ecosystem Assessment (Chopra et al, 2005), presented a dynamic relationship between waste generation and management, human well-being and ecosystem (see Figure 2-1). Chopra et al (2005) elaborates that the essential aspect of generation and management of waste is to improve human well-being, as an overall goal, which is made possible by the services provided by the ecosystem. Waste generation is an essential part of ecosystem whereby the waste of one species has become the resource of another, and a balance in the system is established (Chopra et al, 2005). Yet, this "balance" is being threatened by the dominance of human beings as species especially in terms of its "ability to modify systems and extract and transform materials, and fabricate, use, and transport the new materials" (Chopra et al, 2005). The Working Group further stresses that "there is a strong relationship between the health of the ecosystem and the health of the human system, and waste generation is moderated by drivers that can be manipulated through a wide variety of responses by policy actors and decision-makers to ensure the mitigation of negative impacts of wastes and the adoption/ adaptation measures" (Chopra et al, 2005).

Figure 2-1 shows the key drivers of change in ecosystem and services. These key drivers include demographic, economic, sociopolitical, technological, social, cultural, and religious aspects and they vary according to the levels of socio-economic development of countries. According to Chopra et al (2007 p. 317), in developing countries the specific drivers include:

- *Demographic change* [including urbanization];
- *Globalization* [implying disadvantaged trade relations with developed countries];
- *Frequent changes in government*, resulting in lack of continuity in the commitment to waste management and to environmental pollution, policy, laws, and guidelines);
- *Lack of focus* on the concept of "resource recognition" – [e.g. considering waste as unused resource];
- *Following a "hard" rather than a "soft" approach*- considering waste management as a responsibility of municipal bodies that helping community-based initiatives;
- *Lack of funds and staff* to handle the ever-increasing problem of solid waste;
- *Ineffective management policies and instruments*;
- *Poor technology* for the collection, transfer, disposal, and processing of wastes;
- *Mass illiteracy* [leading to indifference to the environment]
- *Failure to recognize, support, and integrate informal waste recyclers*
- *Continued use of old technologies* that continue to generate pollutants;
- *Pervasive poverty and mismanagement of public funds.*

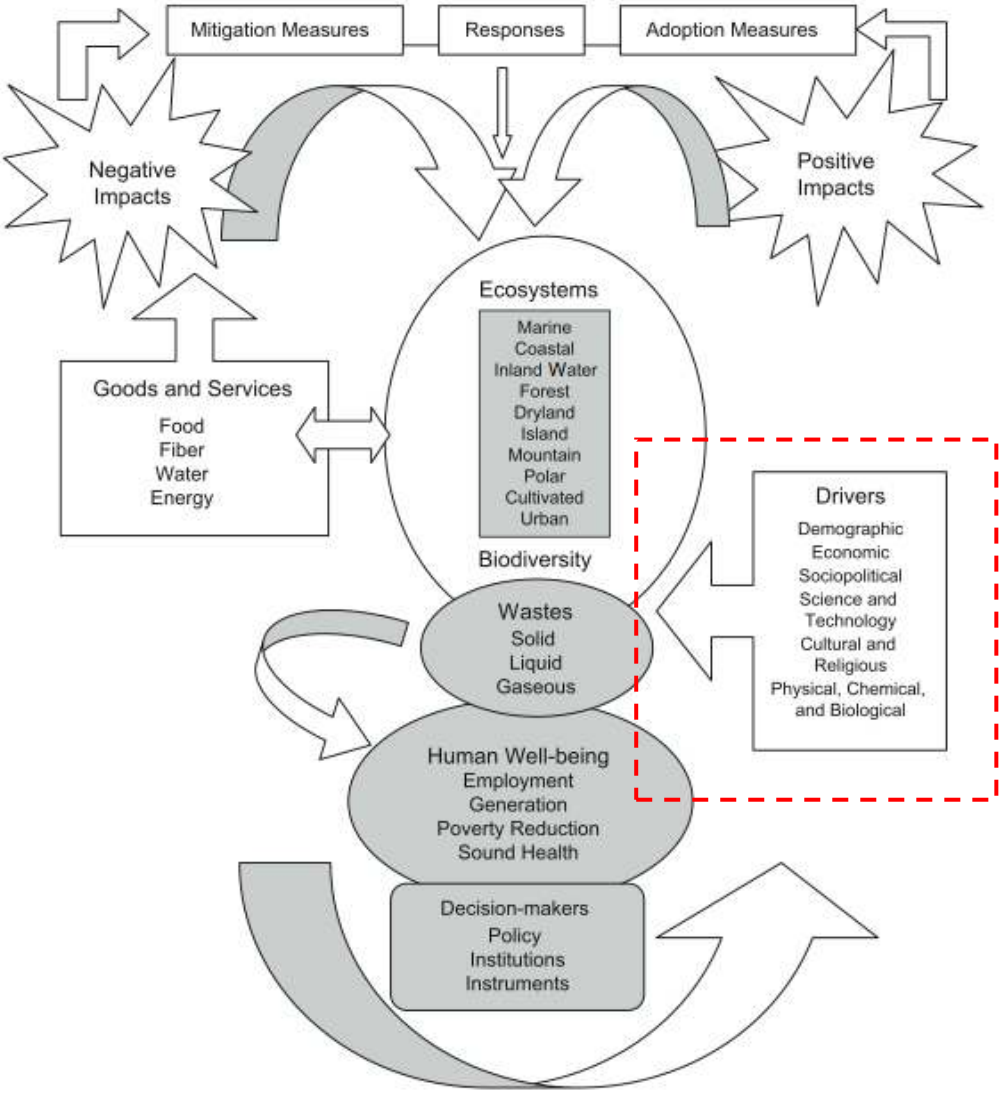

Figure 2-1. Wastes in relation to Ecosystem and Human Well-being

Source: (Adopted from Chopra et al, 2005)

In developed economies on the other hand, the specific drivers include the emphasis on wealth creation and high consumption especially and the attitude towards consumption (use and throw away society), looking at the problem of waste as an engineering problem that requires technical solutions, and the transparency and stable governments of the West (Chopra et al, 2005).

Around the world a number of policies, strategies and practices have been in place to respond to the different drivers of change in ecosystem and services that include legal responses, technological responses, financial and economic responses, institutional responses, and socio-cultural responses. These responses or a combination thereof may provide both short-term and long-term solutions to the issue of continued waste generation.

2.3 Management of E-waste

E-waste is universally understood as electronic wastes disposed off by the end users. Electronics include a wide range of products, from simple devices to more complex goods such as personal computers and mobile phones. Common household appliances and office

equipment that uses voltage and utilizes the flow of electrons can be categorically classified as electronics. There is no universally accepted definition of E-waste although the WEEE Directive of European Union serves as a model for determining and identifying E-wastes (see also UNEP, 2007a).

E-waste, also known as Waste Electrical and Electronic Equipment (WEEE) can be characterized as development-related waste. The rapid economic growth, coupled with growing urbanization and changes in lifestyle and growing demand for material goods have led to an increasing production of electronics and consequently the accumulation of E-waste over time (Babu et al, 2007). Globally, E-waste is one of the fastest growing waste streams, and according to Hotta et al (2008), "Asia has become the engine of world waste generation". The issues of E-wastes is no longer confined as a domestic issue of a country but has international dimension as electronic products and E-waste are commonly traded across national boundaries.

In contrast to other waste streams, the management of E-wastes is more complicated as electronic is a complex product composed of both hazardous and non-hazardous materials. E-waste can contain more than 1,000 different substances, many of which are toxic, such as lead, mercury, arsenic, cadmium, selenium and hexavalent chromium (Babu et al, 2007). Some components of E-waste consist of items of economic value thus warrant for possible recovery, and due to its toxic nature E-waste requires specialized segregation, collection, transportation and handling, treatment and recovery and final disposal. The management of E-waste entails the whole life cycle of electronics, from production to final disposal, as shown in Figure 2-2.

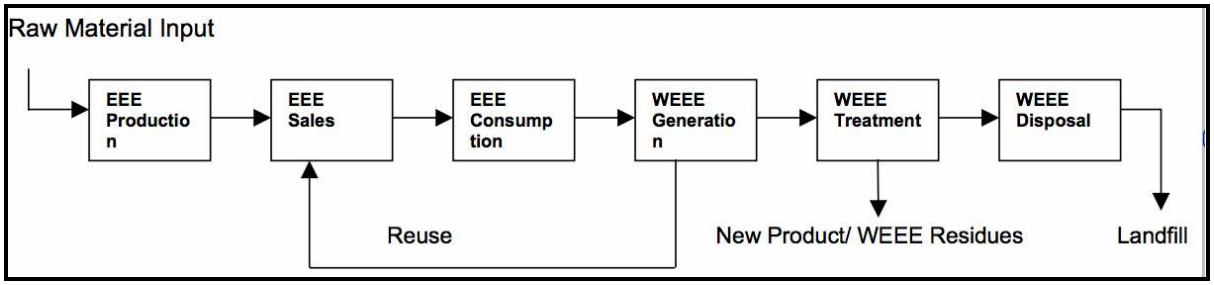

Figure 2-2. Conceptual Life Cycle of Electrical and Electronic Equipment

Source: UNEP. 2007b. E-waste: Management Manual. Volume II.

As observed by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) and the Institute for Global Environmental Studies (IGES) during a regional workshop on EPR and International Material Flow[5] conducted at the Asian Development Bank in 14 February 2007, the problem is that most of the developing countries particularly in Asia and the Pacific lack proper recycling and disposal capacity, legal frameworks, enforcement capacity, political will and financial resources to properly manage the waste (UNESCAP/IGES, 2007). In addition, the true extent of E-waste generation and material flow of E-waste in the region is largely unknown. The conventional way of dealing with E-waste is either disposal in landfills or incineration. Large quantities of E-waste are still disposed in an open dumpsite, incinerated in the open area and improperly and illegally

[5] See Workshop on EPR and International Material Flow http://www.iges.or.jp/en/ltp/activity09.html#01

disposed. Both formal and informal recycling activities are taking place in different parts of Asia but the extent of operations is not well documented.

At the regional-level, the concept of Reduce, Reuse and Recycle (3R) is being put forward as a policy measure for dealing with waste. Along with 3R, the concept of EPR as an environmental policy approach is being promoted to complement it. The former is seen as more effective in dealing at the downstream side of product life cycle (waste management and recycling) while the latter is seen as more effective at the upstream side through source reduction, efficiency improvement, and by incorporating eco-friendly product design. EPR is seen as a policy measure that would make producers internalize the cost of recycling and disposal by creating an incentive for improvement in products design, product recyclability and waste minimization through the end-user stage of product life cycle as shown in Figure 2-3.

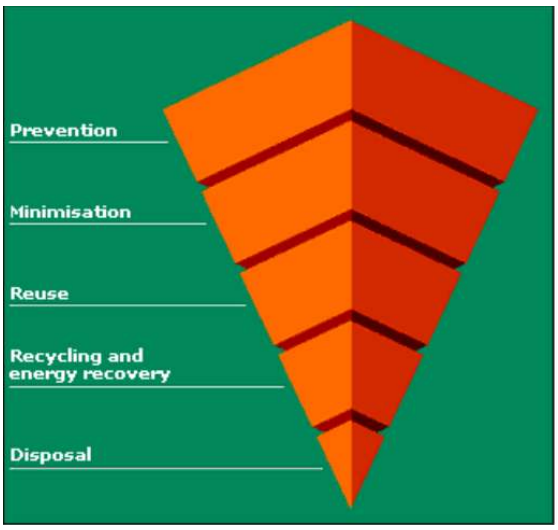

Figure 2-3. Hierarchy of Waste Management

Source: UNESCAP/IGES (2007)

It was pointed out in the workshop that for any waste management strategy to work, it should also need to consider the legal framework, the existing institutional mechanism and the dynamics of stakeholders, social and cultural considerations, economic/market potential, technological dimensions, collaboration between local and national level, international cooperation and obligation and public awareness on the issue.

2.4 Extended Producer Responsibility- a management option?

There is no doubt the concept of Extended Producer Responsibility (EPR) has been gaining ground as a policy option for managing E-waste. The concept of EPR, as first coined by Lindhqvist (2000), referred to it as environmental policy principle. As a policy principle, it serves as a guide or gives direction to make informed choices of a policy mix from a set of policy instruments to reach certain objectives (Manomaivibool et al, 2007). It could also be understood as policy strategy, policy approach or policy paradigm (Manomaivibool, 2009). EPR is also sometimes referred to as "take back", albeit misnomer, since producers are held responsible to take back and take charge of the final disposal of their products after they are discarded by the end-users. The EPR as a policy principle, however, goes beyond the "take-back", as a policy instrument, but rather provides a basis for the selection or choice of combination of policy instruments, and does not by itself constitute a policy instrument.

According to Lindhqvist (2000), EPR is defined as:

> *"policy principle that promotes total life cycle environmental improvements of product systems by extending the responsibilities of the manufacturer of the product to various parts of the product's life cycle, and especially to the take-back, recovery and final disposal of the product"*

While OECD (2001) defines EPR as:

> *"an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle. There are two related features of EPR policy: (1) the shifting of responsibility (physically and/or economically; fully or partially) upstream toward the producer and away from municipalities, and (2) to provide incentives to producers to incorporate environmental considerations in the design of their products."*

The two definitions above provide the basis of EPR principle which includes pollution prevention – especially at the upstream side of product lifecycle, the life cycle approach- which looks at the product and process from cradle to grave, and the polluters-pay-principle-internalization of externalities. It also spells out the producers' role and responsibilities in the product life cycle emphasizing take-back (physical), recycling (informational) and final disposal (financial). EPR is seen by many as a solution, or a least a partial solution, to the continued waste generation and the lack of incentive for manufacturers to reduce the wastes associated with product disposal. According to OECD (2001 p. 29), there are four principal goals of EPR, namely;

- Source reduction (natural resource conservation/materials conservation
- Waste prevention.
- Design of more environmentally compatible products.
- Closure of materials-use loops to promote sustainable development.

In order achieve the principal goals of EPR, there are responsibilities attached to the producers in implementing EPR programmes. Figure 2-4 spells out these responsibilities, which include liability, financial, physical and informative responsibilities. Additional responsibilities may be attached to producers and the degree of responsibilities also varies from programme to programme depending on the prevailing market condition, socio-economic considerations, socio-cultural condition, among other factors. These responsibilities cover the entire life cycle stages of product - from inception to the end-of-life- and ideally should include the entire product chain, including material flow. Since most products, electronics and E-waste especially, are heavily traded and the externalities go beyond the national boundary thus some policy think tanks (e.g. IGES) are proposing that EPR programme should be designed not limited to national boundaries but rather has a regional dimension by taking into account the supply chain and material flow of electronics (see also Hotta et al, 2008).

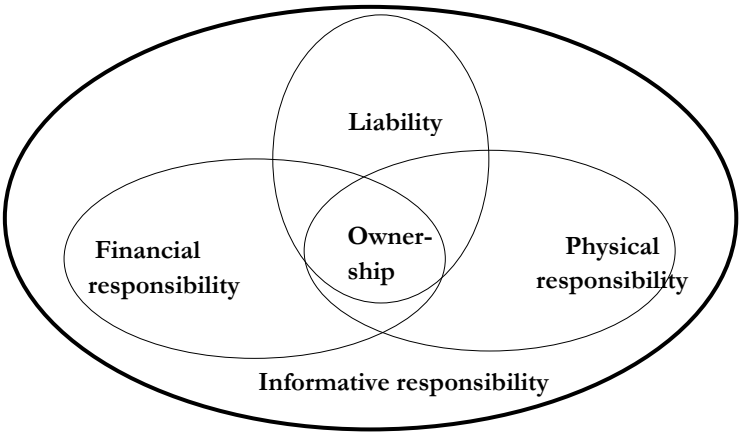

Figure 2-4. Model for Extended Producer Responsibility

Source: (Lindhqvist 2000)

Lindhqvist (2000, p.38-39) defines these responsibilities as follow:

> **"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"*

Ownership means the producer takes responsibility to the product throughout the entire life-cycle, and only renders the "service" of the product to consumers. The responsibility of the producers does not end so long as the product remains in the market until its end of life. This concept is known as product-service system (PSS).

For the EPR Programme to work, producers are to be given appropriate incentives and signals concerning the life cycle environmental impacts of the products (Davis, 1999). These incentives and signals can be in the form of policy instruments. Lindhqvist (2000) and Tojo (2004) identify these instruments as administrative, economic and informative (refer to Table 2-1). Producer's responsibility may be fulfilled by adopting a mechanism or a combination thereof of the different policy instruments through voluntary or mandatory scheme, or both. Legislative measures may also be needed for the latter, especially in terms of enforcing the policy instrument. The EPR, as a policy principle, provides flexibility to both policy makers and producers in fulfilling their responsibilities and in choosing the appropriate instruments suited to the existing market and local conditions.

Table 2-1. Examples of EPR-based policy instruments

Type of instrument	Mechanism	Responsibility[6]
Administrative instruments	• Collection and/or take-back of discarded products,	Producers Distributors Consumers Authorities
	• Substance and landfill restrictions	
	• Achievement of collection, reuse (refill) and recycling targets	
	• Environmentally sound treatment standards	
	• Minimum recycled material content standards	
	• Product standard	
Economic instruments	• Material/product taxes, subsidies	Producers Distributors
	• Advance disposal fee systems	
	• Deposit-refund systems	
	• Upstream combined tax/subsidies	
	• Tradable recycling credits	
Informative Instruments	• Reporting to authorities	Producers Distributors Consumers
	• Marking/labelling of products and components,	
	• Consultation with local governments about the collection network	
	• Information provision to consumers about EPR	
	• Source separation	
	• Information provision to recyclers about the structure and substances used in products	

Source: Modified from Tojo (2004)

2.4.1 Considerations for implementing the EPR Programme

OECD (2001) laid down some considerations in implementing the EPR Programme. As a policy option, it is pertinent to "evaluate whether and how" the EPR Programme can be implemented. According to OECD (2001 p. 23), policy makers should consider the following criteria in environmental policy-making:

- Environmental effectiveness;
- Economic efficiency;
- Equity and distributional effects;
- Administrative feasibility and costs;
- Concordance with institutional frameworks;
- Political and social acceptability;
- Adjustment costs associated with transactions
- Incentives for innovation of environmentally compatible

In any policy-making process, the socio-economic and socio-cultural dimensions are important in determining the suitability of policy intervention, especially in determining the type of EPR policy, programme and instruments. According to OECD (2001), socio-cultural factors often underpin the drivers for policy selection, and cultural acceptance is an important dimension for acceptance of environmental goals, including that of EPR. Consequently,

[6] Proposed actors to be involved in the EPR scheme. Not included in the original table of Tojo (2004).

OECD (2001 p. 24) lists these socio-economic and cultural factors as important elements for policy making that include:

- General political outlooks (e.g. market interventions; market conditions);
- Political environments in which individual countries operate (e.g. ASEAN);
- political structures (e.g. Market Economy versus Socialist State);
- Administrative cultures and societal responses to intervention;
- Priorities attached to environmental problems and public support for environmental policies;
- Basic tenets of environmental policy (e.g. quality or source oriented);
- Distribution of responsibilities for economic sectors;
- Distribution of responsibilities for economic aspects over ministries, policy levels and agencies.

UNESCAP and IGES (2007) also identify important considerations in adopting and implementing EPR Programme in NonOECD context. Policy-makers in Asia and the Pacific region need to consider "country-specific social and economic drivers behind raising needs for introducing EPR-based recycling and waste management schemes as well as a combination of solutions in implementing EPR and that governments face a number of choices in designing and implementing EPR schemes to respond to such drivers" UNESCAP/IGES (2007). Certain strategies to respond to the different barriers are shown in Box 2-1.

Box 2-1. Implementing EPR in Asia and the Pacific

- Legal and regulatory framework – includes measures against illegal dumping, mandatory take-back, disposal bans and restrictions, material bans and restrictions
- Economic and financial instruments - introducing specific laws/legislations that could send economic signals to manufacturers to reduce wastes from their products, such as deposit-refund system (EPR), removal of subsidies on virgin raw materials, waste banks, tax rebates and subsidies, and CDM credits
- Institutional mechanisms – network of institutions from national to local level, including NGOs, private sectors, research and scientific institutions, local communities, and informal sector.
- Social and cultural considerations - includes providing livelihood support, conserving water and energy, reducing human health risks, poverty reduction, and drawing on traditional knowledge
- Information instruments and public awareness – such as environmental labeling, product hazard warnings, product durability warnings, and energy efficiency labeling.
- Technological dimensions - address the needs for building national technology assessment capabilities
- Collaboration at local/national level – bring together different ministries, along with local governments, as well as promoting public-private partnerships
- International cooperation and obligation – includes R&D, carrying out pilot/demonstration projects and training programs on best practices

Source: Meeting Notes of Workshop of EPR and International Material Flow, 14 Feb 2007. Asian Development Bank. Sponsored by UNESCAP and IGES.

2.4.2 Considerations for adopting environmental measures: social and economic drivers

Incorporating social and economic dimensions in environmental policy deliberation is not longer a new area in policy-making process. In fact, social and economic dimensions are the two main pillars of sustainable development, the other being the environment. Social and economic assessments are commonly employed in projects and policy proposals to evaluate the desirability and acceptability of a policy intervention, especially in terms of establishing desired objectives and outcome.

Madlener and Bchhiesl (2007) employed socio-economic and environmental assessment in identifying the driving forces/factors that lead to a realization of the largest biomass cogeneration plant in Austria, located in the county' capital, Vienna. The authors were interested in the main driving forces and actors that led to the successful implementation of the project considering the plant is located in an urban area and operation entails supply security and environmental impact issues. The authors identify and conclude that main socio-economic drivers and success factors for the realisation of large bioenergy projects in urban settings are:

> "(1) critical mass of actors; (2) a priori political consensus; (3) the existence of a problem (and problem awareness) ...; (4) institutional innovation and changes in the mindset of the main decision makers; (5) favourable economic conditions; (6) change agents ...; (7) intra-firm supporters at different hierarchical levels ...; and (8) targeted study tours that help to reduce uncertainty, to enable leapfrogging in project planning and design, and to build up confidence in the project's feasibility and chance of success" (Madlener and Bchhiesl, 2007).

At the pan-European level, Mazzanti and Montini (2009) examine the socio-economic and policy drivers for waste generation, recycling, incineration and landfill in the EU by looking at the income-environment relationship and the differences in the policy-orientation among EU member states The authors state that socio-economic, geographical and structural factors and policy levers have either minor or major roles and further stress that the "geographical, economic, social and policy environments are crucial in understanding the complexity and links and interrelationship that characterize the waste chain, from generation to lanfilling, and the waste realm from both the economic and management perspective" (Mazzanti and Montini, 2009).

The Environmental Resource Limited (1992), at the behest of UK's Department of Trade and Industry and Department of Environment, examines the different economic instruments that could potentially stimulate recycling and reuse by looking at the different barriers that hinder the effectiveness of economic instruments. These economic instruments include raw material charges, product charges, deposit-refund schemes, waste collection schemes, waste disposal charges, transferable recycling targets, changing responsibilities (producers), and subsidies. These economic instruments were evaluated according to technical barriers, market barriers, and institutional barriers in adopting recycling and stimulating reuse of wastes. In terms of technical barriers, the study points out that reclaimed materials are rarely clean, contamination among different waste types is high, and collection and segregation difficulties among different waste streams is a challenge. In terms of institutional challenge, the main issues are in terms of cost allocation- whereby there is no direct relationship between costs and the amount of waste collected and disposed of. A more significant finding of the study is in terms of identifying the market barriers for recycling and the market for reclaimed materials that include:

- The size of the markets for products that can be made from recycled materials
- Capacity constraints for products which need further processing before use
- The ability of reclaimed materials to compete on price and quality with virgin raw materials.
- The size and security of the potential supply of recovered materials from household sources in relation to the available markets.

The different socio-economic and socio-cultural factors in the adoption of the decade-old Swiss EPR were examined by Khetriwal et al (2009) to identify key issues for consideration that other countries can learn based on the experience of Switzerland. These issues include; the challenges in starting the EPR, financing issues, the system for collection and take-back, the compliance of actors involved and existence of monopolistic practices for E-waste collection. The authors pointed that key issues to consider for designing an effective EPR include ensuring financial security for the system, especially in closing the gap between the difference of disposal costs recoverable value of E-waste, the exclusiveness and inclusiveness of the system, logistical role of retail distribution network and level of compliance among stakeholders and existence of monopolistic practices in the E-waste market.

2.5 Challenges in E-waste management in developing countries: drivers and barriers

The importance of establishing a management framework for WEEE has long been advocated by academics (e.g. Thomas Lindhqvist and Naoko Tojo of Lund University), environmental advocates (e.g Greenpeace) and governmental and inter-governmental institutions (e.g. EU and Japan). Recently, EPR has been put forward as the main framework in managing E-waste in the EU and is seen as model for adoption in other countries (e.g. Korea, China and Argentina).

In developing countries, the potential application of EPR is being explored theoretically especially in making it operational by taking into account the unique dynamics of electronics sector (e.g. Liu et al, 2006, Manomaivibool, 2009). In China, for instance, the concept of EPR has been introduced but the operationalization is not well defined (Liu et al, 2006). According to Liu et al (2006), the deficiencies in the regulation, slow implementation and construction of recycling facilities, and defective collection system all contributed to ineffective management of the end-of-life of electronic products. In addition, the material and financial flow of E-waste, the role of informal recycling, and the reluctance of citizens to pay recycling fee made the management more complicated and difficult. In India, although an EPR Programme is yet to be implemented, Manomaivibool (2009) found two main obstacles that can undermine EPR mechanism which are large grey market for some electronic products and the illegal importation of WEEE. In a more developed country like South Korea, the implementation of EPR in 2003 has lead to increased recycling and product take-back as electronic manufacturers are mandated to collect and recycle an assigned quantity based on the percentage of electronics sold (Yoon and Jang, 2006). The EPR implementation also suffered a number of setbacks such as lack of harmonization system codes for electronic and electronic wastes export; harmonization system codes mostly cover the products and packaging is not included, presence of involuntary free-riders, non-harmonized recyclable labels (especially between Japan, US and Korea), no official records in the transboundary movement E-waste and illegal trading of E-waste (Won, 2007).

The dynamics, supply chain and material flow of electronics in developing countries, particularly in Asia and the Pacific region, is a bit unique and making producers accountable for the end-of-life of their products through EPR posed significant challenges. Kojima (2005)

identifies the different issues faced by developing countries in implementing EPR such as difficulty in identifying producer (e.g. contract versus in-house manufacturers, local companies versus foreign subsidiaries), cloned products which parts are made of different manufacturers, the presence of smuggler, the black market and the importation of secondhand E-waste, delineating responsibility for re-used and modified products, presence of informal sectors in collection and recycling of E-waste and identifying responsibility for imported secondhand electronics where parts are replaced.

Osibanjo and Nnorom (2007) also share these observations and outline a number of management issues in managing E-waste in developing countries such as the majority secondhand electronics exported to developing countries are unusable junks, crude recycling and backyard recycling activities are prevalent, discarded E-waste are disposed the same way as traditional wastes, and there is no separate handling and treatment for E-waste. The authors also point out the absence of infrastructure for appropriate waste management, an absence of legislation dealing specifically with E-waste, an absence of any framework for end-of-life (EoL) product take-back or implementation of EPR as the main challenges for managing E-wastes.

2.6 Analytical Framework

A suitable framework for analyzing a policy option is necessary to gauge whether such policy is responsive to a given condition and likely to achieve the stated objectives. Stakeholders' responses and assessment are important element in assessing the likelihood of success and acceptability of the policy goals.

A simple analytical model based on Sabatier (1988), using the concept of "policy subsystem", is used in the analysis by looking at the three major "stable factors" that influence policy subsystem. These are basic distribution of natural resources [economic aspect], fundamental cultural values and social structure [socio-cultural aspect] and basic legal structure [policy aspect].

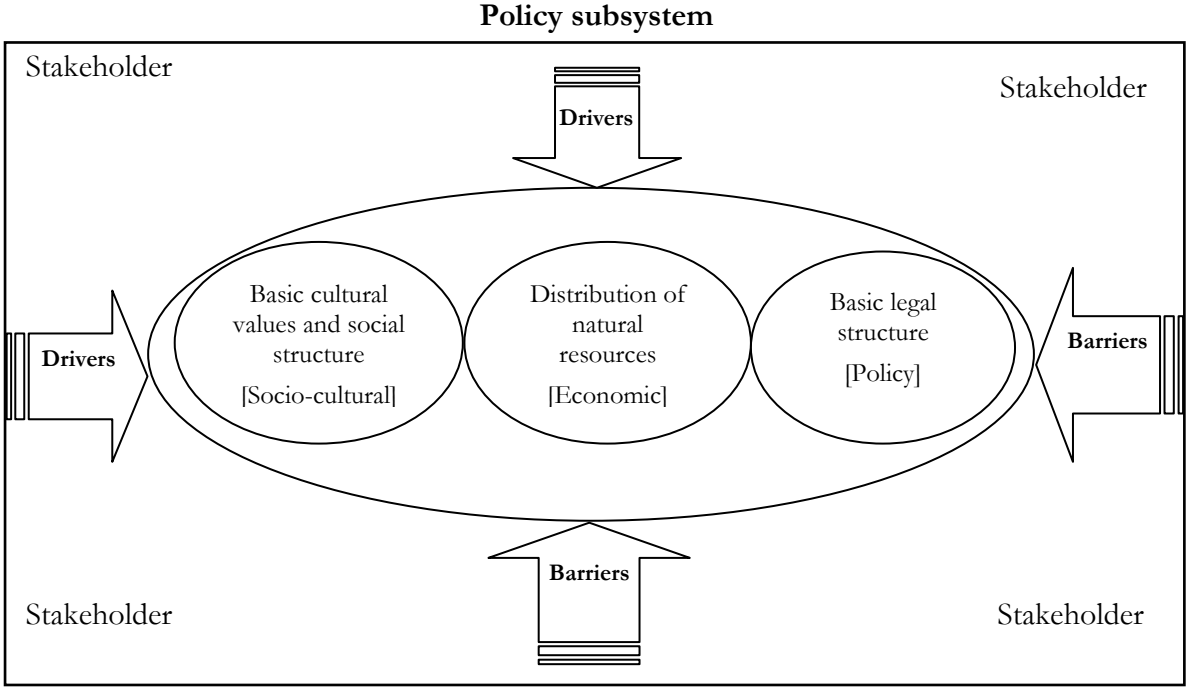

Figure 2-5. Analytical Framework

3 E-waste management in the Philippines

This chapter describes the overall situation of the E-waste management in the Philippines. It provides an overview of the generation of both external and domestic E-waste, the policy framework for the management of general wastes, and the dynamics of E-waste management at the ground level. This chapter also discusses the E-waste material flow and they key stakeholders involved along the supply chain.

3.1 E-waste definition

The Philippines has no official definition of what constitute WEEE, also known as E-waste. The overall framework for managing waste, the Ecological Solid Waste Management Act of 2000 (RA 9003), covers all forms solid waste. Since E-waste contain hazardous and toxic substances, the closest definition would fall under "hazardous wastes" as defined in the Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (RA 6969) and its implementing rules and regulation DAO 1992-29. Hazardous waste is defined as

> "substances that are without any safe commercial, industrial, agricultural or economic usage and are shipped, transported or brought from the country of origin for dumping or disposal into or in transit through any part of the territory of Philippines. Hazardous wastes shall also refer to by-products, side-products, process residues, spent reaction media, contaminated plant or equipment or other substances from manufacturing operations and as consumer discards of manufactured products which present unreasonable risk and /or injury to health and safety and to the environment" (DAO 92-29 p.2).

According to the Greenpeace (2005 p.6), "E-waste encompasses a broad and growing range of electronic devices ranging from personal computers and televisions to handheld PDAs, VCRs and cellular phones". The Basel Action Network (2002 p. 5) defines it as "encompasses a broad range of growing range of electronic products … which have been discarded by their users". The EU WEEE Directive 2002/96/EC defines E-waste based on its characteristics and certain attributes as set out in Annex 1A of the said directive. In the Philippines, Peralta and Fontanos (2006 p. 34) define E-waste as "electronic products that no longer satisfy the needs of the initial purchaser". Although a national definition of E-waste does not exist, there is a general understanding that E-waste are composed of growing range of electronic products from household appliances to office and industrial equipment that are disposed of, and they contain hazardous materials that can cause serious environmental and health hazard upon disposal, and they are generated at an alarming rate due to obsolescence and/or rapid changing technology.

3.2 Generation of E-waste

The true extent and generation of E-waste in the Philippines is largely unknown and determining the quantities of E-waste is complicated as there is no official inventory of the actual waste generated from electrical and electronic equipment. Several studies provide estimation of the current and future quantities of E-waste generated based on certain assumptions and local conditions (e.g. economic and population growth). In terms of estimating and projecting the level of E-waste generation, very limited studies have been done on this area.

3.2.1 Domestic E-waste generation

Peralta and Fontanos (2006) made the pioneering attempt to estimate the level of E-waste generation based on domestic sales data of five major electrical and electronic products namely televisions, air conditioners, washing machines, refrigerators and radios. A follow-up

study was also done in estimating the level of obsolete personal computers (PC) in the country (see Peralta et al, 2008).

Table 3-1 shows the quantities of obsolete electronic items by type. The end-of-life of electronics was determined using domestic sales data and the methodology developed by Mathews (1997) of Carnegie Mellon University. It was assumed that television and radios have average life span of 8 years while air conditioners, washing machine and refrigerators have life span of 10 years, thus all five electronic products sold a decade ago has become obsolete. For personal computers, it was assumed that initial life span of PC is 3 years, with 5 more years of reuse and storage. According to BAN (2002), quoting National Safety Council Report, the lifespan of some electronic products such as personal computers has reduced significantly from four or five years to two years in developed countries.

Table 3-1. Generation estimates of obsolete electronic products (in units)[7]

Year	Television	Washing machines	Air conditioners	Refri-gerators	Radios	Personal computers[8]	All
1995	627,179	311,931	104,690	341,960	389,861	-	1,775,621
2000	800,457	398,112	133,614	436,437	497,572	-	2,226,192
2005	911,339	508,103	170,529	557,017	617,170	142,025	2,906,183
2010	943,000	576,700	320,500	445,300	495,300	216,897	2,997,697
1995-2010							39,686,191

Source: modified from Peralta and Fontanos, 2006 and Peralta et al, 2008

In determining the level of potential E-waste and obsolete electronic items four possible scenarios for the end-of-life of electronic items were considered; electronics could be reused, stored, recycled and landfilled. The study of Peralta and Fontanos (2006) and Peralta et al (2008) employed several assumptions how electronics advances through different lifecycle options such as 50% (45% for PC) of obsolete items will be reused, 5% will be recycled, 30% (45% for PC) will be stored and the remaining 15% (5% for PC) will be landfilled. Electronics that undergo reused and storage will have an additional lifespan of 3 years and these items will be recycled further or ultimately landfilled.

Table 3-2. Generation estimates of obsolete electronic products (in units)

Year	Obsolete	Reused	Recycled	Landfilled	Stored
1995	1,775,621	887,810	88,781	266,343	532,686
2000	2,226,192	1,133,096	474,960	1,297,123	1,169,263
2005	2,906,183	1,445,990	674,311	1,897,929	1,466,300
2010	2,997,697	1,488,004	832,150	2,237,117	1,602,296
1995- 2010	39,686,191	20,275,967	8,4862,311	24,340,264	20,177,453

Source: modified from Peralta and Fontanos, 2006 and Peralta et al, 2008

[7] Obsolete electronics were determined using the sales data of 5 major electronics (except PC) from 1985 to 2003.

[8] For personal computers, the base year for calculation is the obsolete PC stock estimate of households and business (only) for 2000 (59,255 units).

As shown in Table 3-2, the quantity of obsolete items is increasing at every end-of-life year of electronic products based on 5-year data interval. By the end of 2010, approximately 3 million units will become obsolete, almost 1.6 million units remained in storage and around 2.2 million units required landfilling. Between 1995 to 2005, approximately 26 million units became obsolete, and another 14 million units are projected to become obsolete between 2005-2010, with more than a million units each would end up in storage and landfill every year (Peralta and Fontanos, 2006). The study only shows the potential E-waste of 6 major electronic products. Mobile phones, one of the fastest selling electronic products in the country, are not included in the study and there is no available study conducted on mobile phones.

3.2.2 External E-waste generation

Electrical and electronic equipment (EEE) is one of the biggest imports of the Philippines and constitute to more than 40% of the total imports amounting to US$25 billion in 2007 (raw data from National Statistics Office). The country mainly imports electronics components as manufacturing input for re-export as products (e.g. 2.5 HDD and 3.5 HDD). The country also imports finished electronics, second hand electronic items, and recyclables E-waste for further "processing" as shown in Table 3-3 (see also Kojima, 2005, Yoshida et al, 2008 and Terazono, 2008).

Table 3-3. Types of E-waste imported to the Philippines

Example	Characteristics	Category in Trade Statistics	Market
TV, Computer, Audio Equipment, Air Conditioner, Refrigerator	Whole set of electronics	Classified with product/ steel scrap or other scrap	Repair shop/ Second hand market /Recycler
PCB, Plastics, Compressor	Parts / Material		
Clashed Electronics	Mixed Metal	Scrap	Recycler
Sludge, Loss (PCB, Leaded Glass)	Waste from manufacturing	Scrap	Recycler

Source: Adapted from Kojima, M. 2006. Powerpoint presentation entitled E-waste as Transboundary Issue presented during the 3R South Asia Expert Workshop. 30 Aug-1 Sep, 2006. Nepal.

Table 3-4 shows the volume of trade of selected second hand EEE imports that were recorded and accounted in 2008 by the Department of Environment and Natural Resources (DENR)[9]. Due to the lack of proper E-waste inventory and no differentiation between new and second hand electronics in the harmonized system code for import tariffs, second hand imports are often reported as part of new imports. The table also shows the major second hand electronics exporting countries, and they are the largest trading partners of the Philippines, or free trade agreements have been established amongst these countries. Some studies (e.g. Kojima, 2005, Terazono, 2008) and environmental watchdogs (e.g. Greenpeace and BAN) provide estimates how huge trading of second hand electronic products is yet they are only part and parcel of the entire picture. According to Greenpeace (2004), the Philippines imported 389 metric tons of electronic scrap metal and 66 tons of used printed circuit boards in 2001 alone. One of the biggest electronic importers brings in around 1,000 to 2,000 second hand used computer monthly while another electronic depot receives 8-10 metric tons of E-waste daily (Greenpeace, 2004). The study of Terazono (2008) on the other hand shows that in 2007 alone 467,700 units of second hand television sets were imported from Japan to the

[9] The DENR does not maintain database inventory for E-waste except for hazardous waste.

Philippines, approximately 30-50% of them are in "good condition", and 50-70% are malfunctioning that requires refurbishing and reconditioning to be sold at the second hand market for 1/3 the price of a brand new television (Terazono, 2008). According to the definition used in the study of Peralta and Fontanos (2006), most second hand electronic products imported in the country may be categorically considered as WEEE and obsolete items.

Table 3-4. Selected second hand EEE imported to the Philippines, 2008

MATERIALS	DESCRIPTION	QUANTITY		SOURCE
		Volume	Unit	
electrical and electronic assemblies or scraps	assorted electrical and electronic components	200	MT	Thailand
Used EEE	used computer sets	8,000	sets	Korea
Used EEE	used CPUs	3,000	units	Korea
Used EEE	used laptops	2,000	units	Korea
Used EEE	used monitors	2,500	units	Korea
Used EEE	used game machine	112	pcs	Japan
Used EEE	used LCD monitor	88	pcs	Japan
Used EEE	used PC	23	pcs	Japan
Used EEE	used televisions	784	pcs	Japan
Used EEE	used television sets	409	pcs	Korea
Used EEE	used television sets and computers	3,000	pcs	Japan

Source: raw data from Environmental Management Bureau, Department of Environment and Natural Resources, Republic of the Philippines. Data sent in electronic format through email dated April 2009.

Figure 3-1. Second hand electronics mainly from South Korea sold at the roadside of Port area in Manila

3.3 Key stakeholders in E-waste

Several actors are involved in the life-cycle-of electronics as they progresses from production, consumption, reuse, recycle, up to the end-of-life. Figure 3-5 shows basic flow of recyclable

materials in the country and the involvement of the different actors along the life-cycle of electronic products.

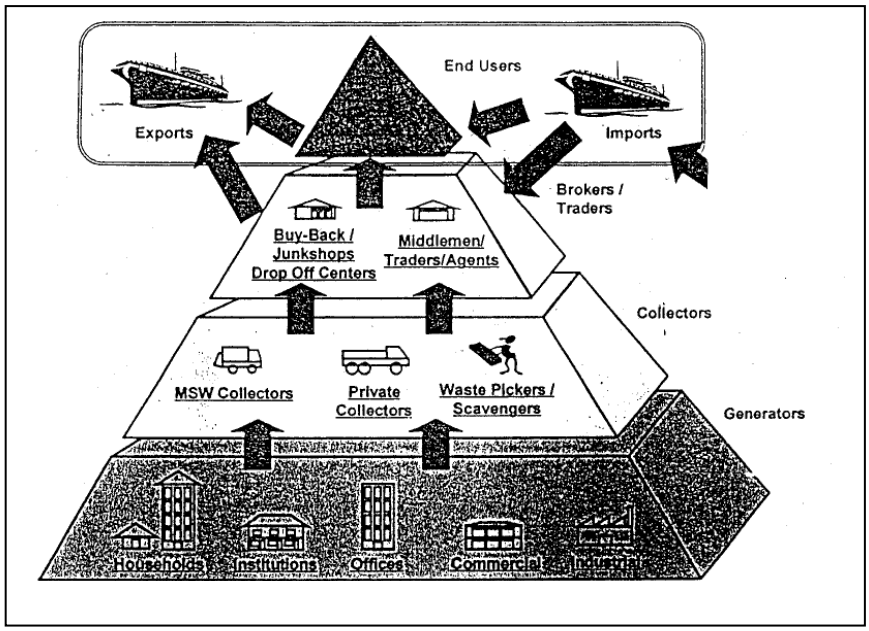

Figure 3-2. Basic Flow of Recyclable Materials in the Philippines

Source: JICA, 2007.

Manufacturers/Importers- formal and legal entities involved in the manufacturing and production of electronic products either as Contract Manufacturers or In-house Manufacturers (e.g. subsidiary of multinational corporations). There are approximately 800 electronics and related industries that comprise of Philippines electronics industry, of which 72% are foreign-owned (UNCTAD, 2006). Within the electronics industry, there are two major segments: the finished electronics products sector and the electronic components sector and this segmentation within the industry has implication on the ownership of the products especially in the context of EPR. Large-scale electronic manufacturers are usually located in export processing zones wherein waste treatment facilities are available. Some manufacturers send their E-waste to licensed waste treaters for proper treatment and disposal while wastes from small-scale electronic manufactures may end up in the hands of informal recyclers (Greenpeace, 2004).

Second hand Shops/Refurbishes - mainly involved in repairing and refurbishing old and defective electronics. In the Philippines, second hand shops/markets sell refurbished and reconditioned imported second hand items such as computers and mobile phones. Imported second hand computers (whole set electronics or scrap) are usually come from Japan, Australia, Korea and United States and different components are put together to refurbish the old ones.

Hazardous Waste Treaters and Recyclers - formal and licensed operators to handle and recycle hazardous wastes and recipient of E-waste coming from large-scale manufacturers. According to Greenpeace (2004), there are 53 registered hazardous waste treaters and 222 transporters and most them are considered small to medium scale in operations. In terms of E-waste processing, there are two companies that mainly involved in dismantling and recycling of electronics into scrap while only one company has the capacity to recover non-ferrous and precious metals from waste. Most of them are mainly transporters of metal scraps and crushed

electronic components for exports and further materials recovery in other countries. They may also involve in storage of E-waste for further processing.

E-waste importers – mainly involved in importing and bringing-in second hand electronic products in the form of secondary material for production input, E-waste for recycling and processing, and partly functioning electronic items for refurbishing that approaching their end-of-life thereby contributing to the increasing E-waste generation.

Informal and Backyard Recyclers - informal sector involved in scavenging and recovery of electronic items from municipal waste stream and open dumpsites. Informal sectors may include itinerant waste pickers, garbage collectors, dumpsite waste pickers and junkshop owners. The scavenged E-waste is often sold to junkshop owners, which may also act as middleman for factory or the informal recycler. The informal recyclers are usually a backyard industry and competing with formal recyclers for materials recovery (e.g. copper and gold), albeit their method is very rudimentary. They may also resort to open burning of E-waste to recover precious material and often exposed themselves to the hazards of electronic toxic components including their immediate environment.

E-waste exports – are accredited Hazardous waste transporters and Recyclers involved in exporting electronic scraps for further processing in other countries. The Philippines has limited waste disposal infrastructure to further process electronic and hazardous wastes to render them harmless. Processed E-waste, in the form of scrap liquid crystal display, printed wiring board, cathode ray tubes, scrap lithium-ion battery and scrap adapters among others are sent to Korea, Japan, Singapore, Taiwan, Germany, France and Finland (Greenpeace 2004 and raw EMB Export Data). Exported E-waste had undergone initial processing and importing countries process them for further materials recovery, recycling and re-use.

3.4 Policy framework

The Philippines is yet to adopt a policy that directly addresses the issue of continued E-waste generation and importation. The overall framework for managing E-waste falls under two major environmental legislations; the Ecological Solid Waste Management Act of 2000 (RA 9003) and the Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (RA 6969). RA 9003 sets targets and guidelines for managing solid waste through the 3R concept; reduce, reuse and recycling prior to collection, treatment and disposal. The enactment of this law requires waste segregation and recycling as the main strategies for dealing with waste and requires Local Government Units to divert 25% of their municipal waste into reuse, recycling, composting and recovery activities within the next 5 years from the enactment of the law and an increment increase thereof every year. Amongst the important salient features of this law include creation of National Solid Waste Management Commission (NSWMC), mandatory segregation of solid waste, promotion of eco-labeling, and establishment of Materials Recovery facility in every *barangay*[10] or cluster of *barangays*.

RA 9003 is primarily designed to respond to the garbage crisis faced by the country in the 80s and 90s without due consideration to the potential waste stream contributed by E-waste. In fact, there was already recognition of waste stream coming from consumer electronics and white goods and they may be classified as "special waste" under RA 9003. Although an implementing rules and regulations for managing solid and hazardous waste have been spelt out, no clear guidelines have been set on how to handle, manage and dispose the "special wastes stream"- the consumer electronics and white goods (see also RA9003). Special wastes

[10] A *barangay* is the smallest political unit in the Philippines.

are defined as "household hazardous wastes such as paints, thinners, household batteries, lead-acid batteries... These include wastes from residential and commercial sources that comprise bulky wastes, consumer electronics, white goods..." (RA 9003). Special wastes are supposed to be segregated from residential and commercial wastes and to be treated separately.

Since E-wastes contain hazardous components the handling, storage and disposal of hazardous materials are regulated by the Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (RA 6969). However, the law has neither explicit provision for the management of E-waste nor definition of WEEE. The law, however, widely recognizes the hazardous components of EEE. According to Garcia (2006 p.7), RA 6969 "encourages proper management of hazardous wastes in the country by promoting minimization of generation; recycling and reuse; treatment to render hazardous waste harmless; and landfill of inert residues".

As a party to the Basel Convention and with the enactment of RA 6969, the country does not allow importation of hazardous wastes as a general policy without prior consent. The same law spelt out an exception which is "importation of materials containing hazardous substances as defined under RA 6969… for recovery, recycling and reprocessing, may be allowed only upon obtaining prior written approval ..." (RA 6969). Importation of second hand EEE is without restriction and only prior notification and consent is needed to bring-in second hand electronics and hazardous wastes. The overall framework for dealing with hazardous wastes is spelt out in DAO 2004-36 (Procedural Manual for Hazardous Waste Management) and the importation of recyclable materials containing hazardous substances is covered by DAO 1997-28 (Interim Guidelines for the Importation of Recyclable Materials Containing Hazardous Substances).

Over the past years, there were initiatives introduced to incorporate sound management of E-waste. In 2004, the National Solid Waste Commission drafted an Administrative Order on EPR specifically focused on E-waste subject to further study. However, the said order was discussed in the Commission once and did not prosper[11]. In the same year, the Environmental Management Bureau drafted a proposed new Administrative Order on E-waste including its sound management however it is still subject for review and approval of the Office of the Secretary[12]. In 2007, Household Bill 2806, also known as the Philippine Hazardous and Radioactive Wastes Management Act of 2007, was introduced at the Philippines' House of Representatives that calls for instituting EPR as one of the mechanisms in dealing with hazardous and radioactive wastes (see HB 2806). However, the proposed measure is still at infancy stage and it is yet to be seen whether such measure will be approved and become a national legislation. Based on interviews with key stakeholders, they are not positive that such bill will be approved because of coming 2010 national election and changing political priorities[13].

3.5 E-waste management and practices

End-of-life of electronics in the Philippines mainly involve four phases; reuse, storage, recycle and landfilling. Finished electronic products (personal computers, cellphones, PDAs) are mainly imported and the supply chain of electronics starts from importation and end up with landfilling or exportation of processed electronic scraps for further processing (e.g. smelting). The flow of materials of EEE in the Philippines is shown in Figure 3-1.

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[11] Email exchange with one of the Commissioners of the NSWMC, April 2009.

[12] Personal on interview with the head of Hazardous Waste Management Section, DENR-EMB, April 2009.

[13] Consensus of NGOs, academe and policy-makers on the issue, personal interviews, April 2009.

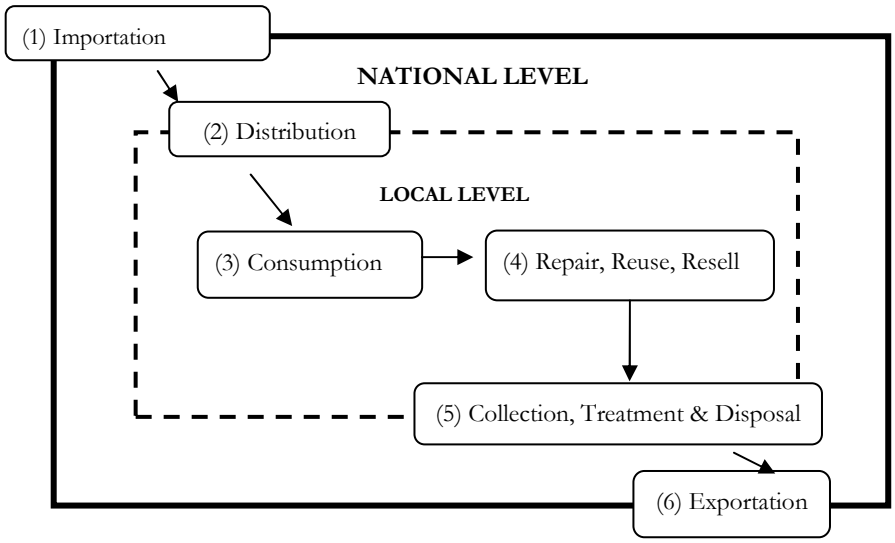

Figure 3-3. Material flow of EEE in the Philippines

Source: JICA, 2007

3.5.1 Collection and segregation of E-waste

The collection of "special waste", which E-waste may be classified under RA 9003, is under the responsibility of the municipality or city. However, there is no functional system initiated in any city/municipality in the country that targeted E-waste as special waste stream. E-waste, if disposed together with municipal waste by the household, is collected and treated as regular municipal solid waste. Some affluent neighborhoods and *barangays* in Metro Manila (e.g. Makati City) provide Materials Recovery Facility but it is not widely done in the country.

The typical E-waste generators are institutional users, commercial users, offices, industrial and household users. At the household level when someone is upgrading an electronic item (e.g. mobile phone), the old item is either passed on to another household members or sold to interested buyer or second hand shops. Non-functional electronics often end-up with scavengers (iterant waste pickers) which sell the disposed electronics to junkshops, which eventually sells to formal recycler for dismantling, recovery of precious metals and for further processing. For some offices and commercial users, a prior arrangement with formal recycler and second hand shop/refurbishers for collection for old and discarded personal computers is done (e.g. IRI Recylers and EnviroCycle). For industrial users, E-waste is sent to recyclers located within the industrial processing plant or shipped to recyclers in other areas. Whereas for institutional users (e.g Government agency), discarded personal computers and electronics have to undergo bidding process prior their discharge and the process itself is cumbersome for recyclers. Oftentimes, they have to bribe government officials to get hold of discarded items[14].

3.5.2 Repair, reuse and recycling

In the Philippines, the grey market for mobile phones is everywhere. Repair shops offer services such as computer and mobile phone software upgrade, addition and personalized accessories such as changing LCD screen, altering original lights with new colors, additional ring tones, etc. Aside from fixing broken mobile phones, repair shops also restore old, defective and non-functional mobile phones called "reconditioned" units. Old mobile phones

[14] Personal interview with IRI Philippines, April 2009.

are restored to their original physical look including the original functionality with limited lifespan. Repair shops also provide warranty for the "reconditioned" mobile phones.

Component parts of discarded electronics are reuse in the process called "cannibalization". Cannibalization is often practiced for mobile phones, laptops and personal computers. Cannibalization include the process of upgrading component parts, changing component parts using the functional parts of discarded computers (e.g. changing RAM and CPU), creating a new computer out of the different discarded components of both branded and generic computers. Cannibalization is commonly practiced for personal computers sold at second hand market. It is also referred as "refurbishing". The huge market for second hand goods has led to the entry of multinational companies such as HMR Philippines (US-based Company with branches in Australia and Viet Nam) which is involved in refurbishing old and discarded computers and sells them as second hand products. The company is also involved in buying old computers and importing used computers for demanufacturing. One interviewee volunteered that 90% of second hand computers in HMR Philippines is sourced out from United States while only 10% comes from domestic source[15]. According to HMR, they are now importing less and rely on discarded and used domestic discarded personal computers because the government is getting stricter in the importation of used and second hand electronics[16].

Figure 3-4. Refurbished and second hand computers sold in second hand shop

The Philippines has a number of hazardous waste treatment facilities and recyclers but only 2 known companies are engaged in E-waste recycling and processing; the HMR Envirocycle and Integrated Recycling Industries (IRI). These formal recycling companies sourced out their E-waste from commercial partners and offices where they have prior arrangement to take care of their discarded electronics. They also really heavily on imported second hand electronics for waste source. Other potential sources are E-waste coming from junkshops, households and waste markets organized by partner institutions (e.g. Ayala and and SM Malls). IRI sourced out most of their E-waste from industries located in the industrial zones or other parts of the country and they specialized in solid and semi-conductor wastes. Companies who are sending waste to IRI include Fujitsu, Samsung, Philips, Intel, Panasonic, Sanyo, and Toshiba.

Recycling process as practiced in the Philippines mainly involved cutting/destruction, sorting, segregation and compaction of electronic scraps. Electronics are demanufactured and dismantled into pieces. For a piece of personal computer, the whole recycling process would

[15] Personal interview and discussion with the staff of HMR Philippines, April 2009
[16] Ibid.

salvage 98% recoverable waste and leave 2% waste[17]. Processed waste are then exported to developed neighboring countries in Asia (e.g China, Korea and Japan) and Europe (Italy, Germany, Finland) for smelting or metals recovery and further processing[18].Although IRI and HRM Philippines both claimed that they have full recycling capacities, both Greenpeace and BAN downplayed it as only dismantling process. E-waste recycling in the Philippines includes buying, processing and selling of waste materials (exportation).

Backyard and informal recycling compete with formal recycling for recovery of precious metals and components parts. Most of backyard and informal recyclers are also engaged in the collection and scavenging of discarded electronics. These informal and backyard recyclers employ rudimentary process and tool to recover precious metals such as copper and gold. E-wastes are disassembled using their bare hands and integrated circuits, wires and cables are burn in the open to recover metals exposing themselves with the toxic fumes. Most of these backyard and informal recycling activities are taking place in crowded neighborhoods and slum areas in Metro Manila.

Figure 3-5. Recycling and processing of E-waste at IRI Philippines (recycling plant)

3.5.3 Processing and disposal

The final stage of the end-of-life of electronics is either landilling or exportation of processed E-waste. For E-waste that is captured by formal recycling activity, the end-of-life would be likely exported to other countries. While the E-waste that is captured by the informal and recycling activity, the end-of-life of electronic parts deemed to be without commercial value is largely unknown. According to the garbage scavengers near the Port Area, they used to see a large chunk of unusable electronic scraps in the container yard of the Port Area of Manila but now dumping is no longer allowed. Unusable electronic component parts are burnt, stored to junkshop to accumulate, sent to landfill or simply thrown away indiscriminately[19].

3.5.4 E-waste management initiative

Policy-makers, academe and interest groups alike widely acknowledge the lack of proper infrastructure in the country to deal with its domestic wastes. Several industry-led management initiatives have been put in place to respond the challenge of waste management in the country.

[17] Personal interview with IRI Philippines, April 2009.
[18] Ibid.
[19] Personal interview with waste scavengers in Port Area, Manila. April, 2009.

3.5.4.1 Industrial waste exchange program (IWEP)

The industrial waste exchange programme (IWEP) in amongst the pioneering attempt to institutionalize industrial waste exchange in the country and create a market for industrial waste. The idea of waste exchange based on the concept of industrial ecology was started in 1988 by the Philippine's Department of Environment and Natural Resources (DENR). In 1994, the operations was taken over by a non-profit organization called the Philippine Business for the Environment (PBE) with member composed mostly of business sector, community business leaders, philanthropist and environment interest groups.

PBE through the IWEP links different industries and facilitates exchange of industrial waste for re-use and recycling. The Programme involves 400 participating companies and maintains database of recyclable materials and wastes for exchange. The database provides info on waste item registered: volume of waste, frequency of generation, industrial process that generates the waste, classification of waste, physical state, and current handling of waste (packaging). The database likewise maintains information on waste generators and waste buyers/recyclers that can be potentially matched. So far, only eleven types of waste, namely; acids, alkalis, solvents, other organic/inorganic chemicals, oils and waxes, metal and metal sludge, plastics and rubbers, textile and leather, wood and paper, construction/building, and equipment parts are included in the programme (see also PBE website).

3.5.4.2 *Bantay-Baterya* programs

The *Bantay-Batery* (Battery Watch) programme was launched in 2000 under the auspices of ABS-CBN (media outfit), DENR and Philippine Recyclers Incorporated (PRI) (lead-acid battery recycler). The programme works by requesting private companies to donate their used junk lead acid batteries earmarked for disposal. PRI is responsible for collecting donated batteries and treatment processing, and the determined monetary value of junk lead-acid battery is donated to ABS-CBN foundation for its environmental and watershed projects. Motor vehicle owners can also donate their junk their lead-acid battery to the compound of ABS-CBN. The programme provides incentives for private companies to donate their junk batteries in terms of cost savings for the disposal of batteries (transport and processing). The project issues donation acknowledgment certificate to donors and the Bureau of Internal Revenue in turn issues a Certificate of Donation which can be used for business income tax deduction equivalent to the determined monetary value of donated batteries. The successes of the programme is attributed to economic incentives associated in donating batteries and with the strong involvement and endorsement of key personalities and celebrities in the programme (see also the *Bantay Baterya* Flyer)

3.5.4.3 E-waste markets

E-waste market was started in 2006 with the establishment of Recyclables Fair as an initiative that target general masses for collection of The collection event is taking place in participating Ayala Malls in Metro Manila area and conducted as regular monthly activity. The project provides a venue for households and offices to discharge their E-waste such discarded electronic, electrical equipment, appliances, used lead-acid batteries, empty ink and toner printer cartridges, mobile phones and mobile phone batteries.

The project takes advantage of the Filipino hobby of spending time in malls by providing convenient, accessible, and regular drop-off areas for discarded electronics. During the past three years, the project has achieved moderate success in E-waste collection as shown in Table 3-5. As part of their corporate social responsibility, Ayala Malls are also providing Materials Recovery Facilities. The largest mall operator in the Philippines, the SM Malls, has also initiated similar E-waste collection activities. Other organizations such as Philippines Business

for Environment and private companies also organize recyclables collection events that coincide with the Earth Day.

Table 3-5. E-waste collected through monthly Recyclables Fair, Ayala Malls

Year	Kilos	Pcs
2007	19,163	-
2008	57,119	-
2009	47,016	3,058
Total	123,300	-

Source: raw data from Ayala Foundation sent through email, dated April 2009

3.5.4.4 Other initiatives

There are other E-waste related initiatives undertaken by various companies in the Philippines as part of their Corporate Social Responsibility Programme. In 2007, mobile phones manufacturers participated in a national pilot project called Cell Phone Waste Collection and Recycling spearheaded by the Department of Trade and Industry (DTI). The pilot project aims to initiate a take-back system for mobile phone through the partnership of mobile phones manufactures, mobile phones operators, mobile phone service providers and distributors and three largest mall operators in the Philippines. There are 20 collection bins place and drop off points identified in various malls. The initiative was not a success due to the lack of aggressive campaigns and awareness about the project. Most mobile phones vendors interviewed during the field work are not aware of the existence of the project and/or they are supposed to accept junk mobile phones discarded by the consumers[20].

Another take-back initiative is being undertaken by Fuji-Xerox Philippines for discarded toner, printers and photocopying machines. Discarded electronics are collected and sent to Thailand for processing and disposal.

3.5.5 Summary

As discussed above, there are already schemes initiated by private companies, environmental organization and government agencies to steer into the direction of E-waste collection and recycling. These initiatives, however, are still at infancy, the scope is limited and the impact is minimal. Table 3-6 provides a summary of the E-waste management and practices in the Philippines.

[20] Personal interviews with mobile phone vendors, April 2009.

Table 3-6. Summary of E-waste status

Area	Status
Legal Framework	No legal framework for E-waste. General policy framework for solid waste (RA 9003) and Hazardous waste (RA 6969).
Inventory	E-waste inventory is being prepared. Harmonized System Code for imports tariff does not differentiate second hand electronics from new imports.
Separate collection	There is no separate collection for E-waste. There are no data, information and study how much E-waste goes to formal and informal recycling.
Recycling/reusing technology	Recycling process is more of dismantling and crushing of electronics into scraps. Only recyclable and reusable E-waste is recycled and process for material recovery. Scrap E-waste are exported to other country for material and precious metals recovery.
E-waste initiative	Monthly E-waste market for Ayala and SM Malls. Cell Phone Waste Collection Project, Take-back scheme of selected companies (e.g. Fuji-Xerox)

4 Drivers and barriers of E-waste management measure

This section discusses the drivers and barriers to the adoption of sound E-waste management measure in the Philippines. These drivers and barriers are identified by examining the socio-economic needs to implement such measure, and based on the perceptions of stakeholders on the issue. This section also looks at the policy, socio-economic and cultural dimensions of the country and examines how they influence decision-making processes. It also discusses how an EPR programme may be adopted taking into account the different issues at hand.

4.1 Fundamental characteristics of E-producers in the Philippines

The Philippines is one of the major electronics producers in the world. It supplies 10% of the world's semiconductor needs, 50% world production of 2.5" hard disk drive (HDD) and 10% of 3.5" HDD. The Philippines electronics industry is mainly divided into semiconductor manufacturing service (SMS) and electronics manufacturing services (EMS). In 2007, export performance of electronics amounted to US$ 31 billion, 74% of which is the share of semiconductor (raw data from National Statistical Office).

The country is also a manufacturing hub of multinational corporations (MNCs) such as Intel (until 2008), Texas Instruments, Toshiba, Fujitso and Hitachi and other major electronics players. These companies are involved in the manufacturing and production of (1) components and devices or semiconductor; (2) electronic data processing; (3) consumer electronics; (4) telecommunications; (5) office equipment; (6) communications and radar; (7) control and instrumentation; (8) medical and industrial; and (9) automotive electronic (see also Parayno, 2004, Santiago, 2005 and Avila, 2006). The electronics sector is highly dominated by Components and Devices (semiconductor) sector that produces Pentium processors, digital signal processors (microchips), integrated circuits, transistors, diodes, resistors, coils, capacitors, transformers, lead frames and printed circuit boards, among others (Santiago, 2005). The country is also a regional centre for semiconductor testing, development and design. Figure 4-1 shows some of the electronic products developed and manufactured in the Philippines.

The Philippine electronic industry is comprised of more than 800 electronics and related and allied companies employing approximately 400,000 people (Santiago, 2005). Majority of which, 70%, is dominated by foreign players and the rest are local Filipino companies (UNCTAD, 2006). There two major types of semiconductor manufacturer in the country; the *finished electronic product sector* and *electronics component sector*. The former is composed mainly of MNCs or their subsidiaries while the latter are mainly local Filipino firms that mostly supply component parts to the MNCs. The electronics component sector is further divided into *in-house* and *contract manufacturers*. The in-house manufacturers produce integrated circuits for use in their own products (e.g. Intel, Motorola, Texas Instruments) while contract manufacturers are responsible for the assembly of integrated circuits that will be used in the products of various end-user customers (e.g.Amkor/Anam, Hyundai, etc.) (Parayno, 2004).

At the national level, compliance to various environmental legislations is mandatory but often poorly enforced and monitored by government agencies partly to attract foreign investment in the industry[21]. The environmental policies, standards and regulations for most companies emanate from their parent companies especially those who have Environmental Management System (EMS) in place- e.g. *in-house manufacturers*. Changes in policies resulting from environmental legislation in parent companies automatically apply to local companies, its subsidiaries and suppliers. Local subsidiaries of parent companies relay the same requirements

[21] Personal interview with BAN, April 2009

to local suppliers. In the case of *contract manufacturers*, the demand for compliance to environmental standards and regulations emanates from companies that will use the products, both domestic and foreign (Parayno, 2004).

This unique characteristic and composition of electronics industry in the Philippines present an opportunity that could be both driver and barrier to the adoption of sound management of the end-of-life of electronics. It could be a driver in a sense that the industry can deal best the proper disposal of electronics, especially that the technology and capacity are already in place. According to the Semiconductor and Electronics Industries in the Philippines (SEIPI), an organization of more than 200 major electronics producers, the industry has the capacity to take care the end-of-life of their products but the question is how to institutionalize such system[22]. The potential stumbling block is in terms of delineating responsibility especially in instituting take-back system and processing and treatment of disposed electronics. For an EPR system to work properly, it should be able to delineate responsibility for a) locally produced electronics, b) imported finished products with local components and imported products without local components[23]. Another potential issue is in terms of defining a producer. Are *in-house* and *contract manufacturers* can be considered producers and up to what extent they are responsible for the component parts that they produced, are just some of the issues that need to be resolved in instituting an EPR system.

Stakeholders have varying opinions on how to delineate responsibility on the different issues identified above. Since most finished electronics are usually imported finished product, one prominent suggestion is to make all importers responsible for imported electronics entered the country. SEIPI on the other hand, floated the idea of having a collective responsibility since their members are amongst the biggest players in the industry and their organization already captured 70% of the electronics market.[24]

Figure 4-1. Semiconductors and electronic products manufactured in the Philippines

[22] Personal interview with SEIPI representatives, April 2009.
[23] Ibid
[24] Ibid

4.2. Socio-economic drivers of E-waste management

4.2.1 Importing countries regulations

The Philippines is highly dependent on electronics export for revenue generation. Electronics has been the major export and main driver of the Philippine economy during the past two decades. Since 2000, the electronics industry constitute to more than 50% of the total exports. In 2007, the country's electronics export was valued at US$ 31 billion (raw data from NSO). The bulk of electronics product exports come from semiconductors (74%), electronic data processing (16%) and rest from electronic manufacturing services. Figure 4-2 shows the performance of electronics export in relations to the total exports.

The United States, Japan, and the EU (Germany, Netherlands and United Kingdom) are the three biggest markets for the Philippine electronics. To gain entry to wider market (e.g. European market) and sustain competitiveness, local electronics exporting companies and suppliers have to observe the environmental and health requirements of importing countries for entry requirements and market access. This is particularly true with the enactment of European RoHS Directive wherein companies have to comply with the regulations and specification of the directive despite the absence of similar regulation in the country. The moment RoHS Directive has become in effect local manufacturers have already complied or about to comply with the new regulation otherwise they would not be able to send their products to Europe[25]. At the same time, the importing companies and the finished electronic product manufacturers are requiring local suppliers- the contract manufacturers in particular- to comply with the new requirement. According to SEIPI, "it is not a matter of choice but a matter of time when to comply".[26] SEIPI boasts that almost all of its members have already complied with RoHS Directive.

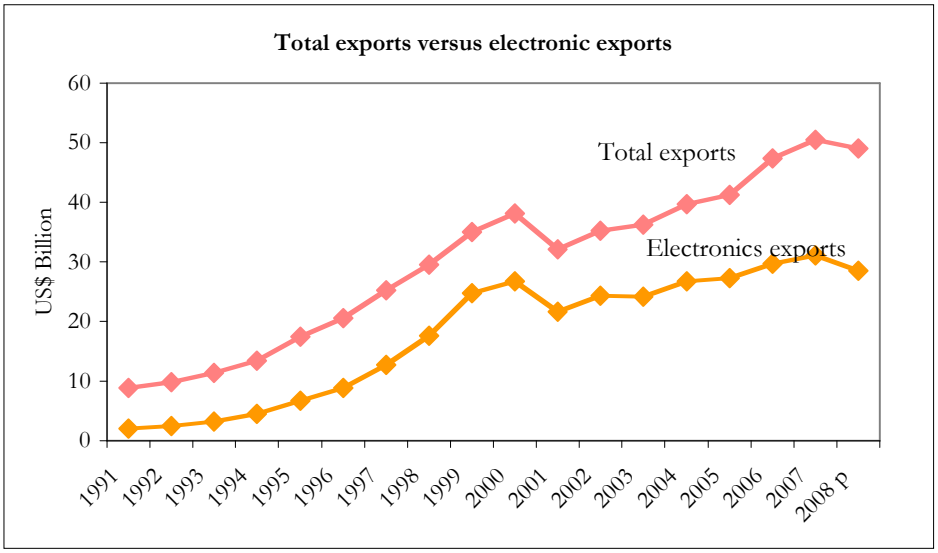

Figure 4-2. Performance of electronics export to total exports (1991-2008)[27]

The increasingly strict environmental standards and technical regulations of importing countries especially with the enactment of the Home Appliances and Recycling Law in Japan,

[25] Personal interview with SEIPI representatives, April 2009.
[26] Ibid
[27] Data for 2008 is from January to November

German Packaging Act and WEEE Directive in the EU have far-reaching effects in Philippine electronics. According the UNEP-UNCTAD (2007), the environmental regulations in developed world "…create an effect of increasing requirements for suppliers to become more aware of environmental issues, especially, product-related aspect concern with material and energy efficiency, reduced toxicity and increased recycling" (UNCTAD-UNEP p.4). These regulations have been manifested in some electronic products sold in the Philippines. For instance, mobile phones and battery products carry the WEEE symbol, a crossed-out wheeled bin, which signifies separate collection despite the absence of both policy and infrastructure for separate E-waste collection. Majority of the users are not even aware what the label signifies[28].

According to Parayno (2004), the environmental trade policies of the EU can be categorized into three: product-oriented environmental policies (e.g. CE marking), process-oriented environmental policies (e.g. EMS, Eco-label, Eco-design), and waste management policies (e.g WEEE Directive, German Packaging Act). Most electronics companies have either complied or in the process of complying EMS, OSHA and ISO 9000 and 14000 accreditation. The Eco-labeling programme in the country has also been gaining ground. Thus, the increasing global consciousness of the potential impacts of E-waste creates a driving force for local electronic companies to implement, adhere and institute stricter environmental standards (see also Parayno, 2004).

4.2.2. Internal and external pressures

Electronic products contain heavy and toxic compounds such as lead, cadmium, chromium and other heavy metals that could potentially pollute the environment especially the receiving body upon their disposal. Environment interest groups and academe call for both voluntary and mandatory measures that would institute sound management of electronic products. At the production and processing stage, a number of regulatory measures have been in place especially in regard to securing the health and safety workers and regulations on the use and the proper handling of chemicals. The issue with electronics is the improper disposal, which is commonly practiced in the country, and the potential environmental impacts of leachate from landfills.

Landfilling remains the most popular means of final waste disposal; however, Metro Manila is already facing a shortage of landfill space for solid waste alone. According to the Asian Development Bank study, Metro Manila generates 6,700 metric tons of waste daily (Philippine Senate 2005). The continued accumulation and generation of bulky E-waste will further aggravate the shortage of landfill space.

In 2004, the University of the Philippines warned of the potential dilemma posed by the continued generation of E-waste, the absence of management measure, and the lack of the proper infrastructure for treatment and disposal[29]. Basel Action Network (BAN) and Greenpeace Philippines likewise brought the E-waste issue in the forefront of their toxics campaign. Until recently, Greenpeace is actively campaigning and raising awareness on the issues of transboundary of E-waste. Their primarily campaign, however, is no longer focused on E-waste and shifted to wastewater issues.[30]

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[28] Based on discussion with Greenpeace and electronic vendors, April 2009.

[29] Personal interview with the Regional Adviser of WHO-Western Pacific Regional Office, Manila, April 2009.

[30] Personal interview with the former toxics campaigner of Greenpeace, April 2009.

According to WHO Regional Adviser on Environmental Health Hazards, "the issue on E-waste of is that we don't know how grave the problem is but you know that something is wrong when E-wastes are just disposed anywhere and the government is not taking action".[31] There are initiatives undertaken at the regional level such as the creation of regional technical working group for hazardous waste by UNEP and Basel convention partnership on the environmental sound management of electrical and electronic wastes for Asia-Pacific region to bring the issue in the policy agenda. Environmentalist groups such as BAN and Greenpeace also exerts pressure to the parent units of multinational companies for them to establish environmental friendly products and production in their local subsidiaries.

The situation describes above is not only typical in the Philippines but also in other developing countries. According to Nnorom and Osibanjo (2008), citing the case of Africa, the transboundary movement of E-waste and the lack of recycling and waste disposal facilities are typical in developing countries and are strong justifications for countries in developing world to implement EPR.

4.2.3 Local initiatives and market competition

A number of voluntary initiatives have been implemented by local electronic companies, including subsidiary of multinational corporations, in reducing the impacts of their products and operations despite the absence of a national legislated EPR-related system. These initiates include the implementation of Environmental Management Systems (e.g. ISO 14000) to reduction and recycling of material components and even EPR-related initiatives such as voluntary product take-back system. Nokia and major phone companies have implemented a pioneering voluntary take-back system for old and non-functional mobile phones and HP Philippines established take-back programme for printer and ink cartridges. Fuji-Xerox, on the other hand, has established a take-back system for discarded photocopying machines and printers sold in the Asia-Pacific region to be sent to its recycling facility in Thailand. The Oriental and Motolite Corporation, a local battery manufacturer, has also participated in the "*Balik Baterya"* program (battery take back) to collect and take-back used lead-acid batteries for reuse and production of new batteries.

Some of these initiatives, however, did not sail as smooth as planned. In 2007, Nokia Philippines along with other mobile phone manufacturers participated in pilot take-back scheme for mobile phones. After some time, Nokia stopped accepting discarded Nokia mobile phones and batteries because the bulk of their take-back comprise of fake Nokia phones, contain generic battery or do not have the original parts or a cannibalized phones[32]. According to Greenpeace, Nokia Philippines promised to carry on the take-back scheme once Nokia management resolves the issue.

These local initiatives, to some extent, have demonstrated that an E-waste management system, especially the back-scheme, is doable and already set an example for the government to follow. These initiatives create a pressure on the government to take a lead role in similar undertaking. Although the government is always seen as a partner in such kind of endeavor, it is always the private sector or non-government organizations that take the lead role.

4.2.4 Geographical condition

The geographical condition of the country necessitate for the country to be self-sufficient in terms of resource utilization and waste disposal. Being an archipelago and having

[31] Personal interview with the Regional Adviser of WHO-Western Pacific Regional Office, Manila, April 2009.
[32] Personal interview with Greenpeace Philippines, April 2009.

mountainous terrain, locating an ideal landfill in an island environment present some challenges. This unique geographical set-up is a compelling reason for the government to bring about a mechanism that would address the waste generation issue.[33] In addition, incineration as a means waste disposal is misconstrued as legally banned in the country as stipulated by the Clear Air Act of 2000. There is a strong public sentiment against the use of incineration for waste disposal.

The agglomeration of electronics companies in selected locations in the country brings both positive and negative aspect of E-waste management. Electronic manufacturers are highly concentrated in the industrial zones of the Calabarzon[34], Clark and Baguio cities due to their proximity to the infrastructure in Metro Manila. In addition, these areas are identified as PEZA zones that provide economic incentives and tax breaks for investment locating in this area. From the point of view of industrial ecology, this is good strategy since some industries are doing industrial symbiosis with the industrial zone[35]. On the other hand, this set-up brings constraint in terms of moving waste from one island to another, especially in collecting E-waste from the end users. E-waste materials need to be consolidated to make it economically feasible logistically. For instance, in order to materialize country-wide recycling activity many recycling centres are needed to be established all over the country.

4.2.5 Urban mining and metal prices

Urban mining is colloquially the termed for scavenging E-waste in the Philippines. Informal waste pickers and scavengers are particularly interested in collecting discarded mobile phones and computer cables since they command higher prices in the junkshops compared to other types of waste[36]. Bulky electronic items, however, are not a priority because it requires space and quite cumbersome especially for iterant waste pickers scavenging in open dump sites[37].

According to IRI Philippines, the company has the full capacity to recover non-ferrous metals such as nickel, tin, aluminum copper and metal alloy from E-waste and precious metals such as gold, silver and palladium. In 2008, when the prices of copper surged to 8,000 US$ dollars per ton from 4,500 US$, there was sharp rise in the delivery of electronic waste coming from primary junkshops and trade (scrap) consolidators. E-wastes that contain copper were prized items for scavengers and waste collectors to the extent that are even stealing electricity cable wires to extract the copper content[38]. According to the general manager of IRI Philippines, "it was also observed that once the prices of metals went up, especially gold, there would be a sudden rise in the delivery of E-wastes from junkshop. The prices of metals will continue to rise and it would be good opportunity to institute recycling and metals recovery system in the country"[39]. The difference in the price of virgin raw materials (precious) and the recovered precious metals would attract companies to invest into recycling and recovery provided there is steady and reliable supply of E-waste.

Urban mining and metals recovery could be an option to combat the wastes inherent in the electronics industry. According to USGS (2006), a metric ton of mobile phones contain 140 kilograms of copper, 3.14 kilograms of silver, 300 grams of gold and 130 grams of palladium

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[33] Personal interview with the Regional Adviser of WHO-Western Pacific Regional Office, Manila, April 2009.

[34] Is one of the regions in the Philippines composed five provinces, namely Cavite, Laguna, Batangas, Rizal and Quezon.

[35] According to IRI, their recycling activities are highly dependent on E-waste sent by other industries within and outside the industrial zone.

[36] Personal interview with informal water pickers and scavengers, April 2009.

[37] Ibid.

[38] Personal interview with IRI Philippines, April 2009.

[39] Ibid.

and 3 grams platinum. The challenge, however, is attract private investors to invest in such technology. In addition, price of metals fluctuates which could hinder the attractiveness of investing in metals recovery infrastructure.

4.2.6 Cheap skilled labour and strategic location

The abundant supply of skilled and cheap labour is one of the factors that electronics companies locate in the Philippines. This cheap labour supply is also seen as leverage to promote recycling and materials recovery as low quality recyclables that are not economically viable to process in other developed countries can still be processed in the Philippines.[40] This can also led to job generation and absorption of informal recycling into the formal sector[41].

The Philippines is positioned strategically should the country wish to pursue as the recycling centre in the region. Manila lies in the main shipping routes and can be easily reached and within a short range to other Asian capitals. This would also give competitive advantage for the country to go forward as key player in recycling in the region instead of sending domestic waste in developed countries for smelting and materials recovery.

4.2.7 Improving electronics industry's competitiveness

SEIPI acknowledges that the country lacks waste management facilities that meet international standards. Both the industry and the government should work together to develop world-class standards facilities if the government were to sustain the competitiveness of the industry. The availability of treatment facilities to process especially the hazardous generate by the electronics industry provides an incentive for companies to invest in the country as it brings down the waste treatment and disposal costs. Present practices within the industry are either to store hazardous waste in the storage facilities indefinitely or send it to other countries for processing and treatment. According to Parayno (2004), exporting hazardous waste to offshore disposal site cost companies US$ 2,000 per metric ton on the average. According to one e-producer interviewed, the country needs proper waste treatment facilities in order to look good in the eyes of international business community.[42]

4.2.8 Regional EPR Initiative

The transboundary nature of E-waste and the uncontrolled and illegal movement of hazardous waste prompted regional policy makers to float the idea of a regional EPR. As early as 2000, there were already discussions to incorporate trade dimensions in the management of E-waste as it is no longer confined as a domestic issue. The rationale for the creation of a regional EPR is that because of the steady economic integration resulting from increasing trade and investment flow, it is possible to separate the most efficient and effective recycling location from the location of production and consumption, as it does with separate location of consumption from the location of most efficient production (Hotta et. al, 2008). A regional EPR is essential especially that recyclables are traded both illegally and legally making it difficult to institute domestic oriented recycling schemes as the case of Japan (Hotta et al, 2008).

According to the Chief of Environment Section of UNESCAP, a regional EPR is seen as potential solution to the uncontrolled and illegal trading of E-waste in the Asia-Pacific region. Several countries in the region have the potential to become recycling centre owing to their

[40] Ibid.

[41] Personal interview with interview the Department Chair, Miriam College, April 2009

[42] Personal interview with E-producer, April 2009.

strategic location and existing capacity to process recyclables materials. A regional EPR is also seen as policy tool to promote recycling activities.

Policy-makers in the Philippines are keen to the idea of a regional EPR and the creation of regional recycling centres provided it would address the illegal movement of E-waste. Environmental groups however are criticizing this move of Japan as a way to circumvent the provisions of the Basel Convention. According to Greenpeace, trading of E-waste between developing countries may be understood because of the technological issues but not the E-waste exportation of Japan to developing countries.

The move to institute a regional EPR is seen as a driver for the country to adopt its own national EPR scheme. Recyclers in the country support this initiative in order to develop the recycling capability in the country through investment of advanced technologies. The country, however, should take into account the on-going EPR Programme in the region e.g. China, Korea, Australia and Thailand and to harmonize regional initiative and identify a particular niche for the country in this regional EPR initiative.

4.3 Barriers to the adoption of E-waste management and EPR

The barriers to the adoption of an E-waste management were identified based on the perceptions of the different stakeholders why there is no such measure in place. Stakeholders were also asked about their impression of EPR and what could be the stumbling block in the possible adoption of EPR in the country.

4.3.1 Policy Barriers

Absence of framework for E-waste – there is no legal framework or environmental regulation that directly target E-waste as special waste stream. The country has existing laws that govern resource extraction and utilization and regulations on waste disposal to receiving environment (e.g. ambient and effluent standards) but not on the waste associated to products. Although 3R (reduce, use, recycle) has been the identified strategy for waste reduction, it was never legislated nor complied companies with mandatory recycling activities. The absence of law governing E-waste is also seen as a loophole in the continued importation of second hand electronics that are no longer function and may be categorically classified as E-waste.[43]

In the absence of a national legislation governing E-waste, it would be very hard to compel and mandate companies to take action[44]. According to SEIPI, some of their members have taken voluntary measures but the organization cannot compel other members to do so in the absence of an E-waste law. An E-waste law (e.g. waste reduction targets/recycling targets) is also necessary to oblige especially small and medium electronic companies to improve their manufacturing processes.

Non-adoption of Basel Ban Amendment- one of the main factors that the policy-makers are not keen on pushing legislation on E-waste is that the government has no intention of ratifying the BAN Amendment.[45] According to EMB, the government position is that "once we ratify the BAN Amendment, we are showing to the world that we are capable in dealing with our E-waste problems"[46]. Policy-makers have the impression that once the country

[43] Personal interview with BAN, April 2009.
[44] Separate interview with BAN and WHO Regional Adviser, April 2009.
[45] Personal interview with the Environmental Management Bureau, DENR, April 2009.
[46] Ibid

ratifies the Basle Ban Amendment, it would need to implement corresponding legislation that would restrict movement of E-waste, which could be detrimental to the local industries. Most industries rely on the processed waste of other industries as their raw input for manufacturing (e.g. Industrial Waste Exchange Programme).

Multilateral and bilateral agreements- the country entered into bilateral agreements with other major trading partners (e.g. Japan and USA) in order to have preferential treatment in trade. The government policy is to promote free trade and easy movement of goods and services in the region. An enactment of a regulation that would limit movement of certain tradable goods and products, such as E-waste, might go against the free trade agreements signed with trading countries. Policy-makers do not see any big issue concerning the movement of E-waste provided there is prior notification and consent secured from the government and E-waste trading is in line with the Basel Convention protocols.

The major environmental groups, however, is heavily criticizing free-trade agreements (e.g. JPEPA) signed by the Philippines with developed countries as onerous and one-sided. The Japan-Philippines Free Trade Agreement (JPEPA), for instance, has been the focus of debate recently because of the different interpretations of the trade provisions and allegation that it would even allow exportation of fly ash and hospital waste from Japan to be processed in the Philippines.

4.3.2 Socio- Economic Barriers

Low environmental consciousness – the issue with environmental movement in the Philippines is that people have low environmental consciousness and low awareness of environmental laws[47]. This is partly because of the lack of education and access to information and lack of aggressive promotion and educational campaign to raise environmental consciousness.

The low environmental consciousness has undermined the implementation integrated solid waste management efforts in the country. Despite the mandatory waste segregation as stipulated by the Solid Waste Management Act (RA 9003), waste segregation is rarely observed and in some areas in the Metro Manila solid waste collection service coverage is even less than 40% (Hotta et al, 2008). In terms of recycling, despite the establishment of collection points and materials recovery facilities in Metro Manila, materials recovery for recycling is only about 10% of waste generated (Navarro, 2003).

The low environmental consciousness among the people is captured by Social Weather Station (SWS)[48] survey on a national poll looking at the awareness of people about environmental laws and their perceptions on the enforcement of environmental laws. SWS conducted a national survey administered through face-to-face interview and the result is shown in Box 4-1. As shown in the survey only one-fourth of the respondents (N=1200) are aware of the existence of the Clean Water and Solid Waste Management Acts and half of the respondents are not even aware of any laws pertaining to pollution prevention. The results are not surprising but rather a confirmation on the level of environmental consciousness amongst Filipinos. The survey also shows that there is significant difference in the awareness level by educational levels; the higher the educational level reached the higher the level of awareness about environmental laws. Surprisingly in terms of income status, people with the lowest income

[47] Personal interview with Greenpeace, April 2009

[48] SWS is one of the leading survey institute and policy think-tank in the Philippines

group (Group ABC) are more aware of environmental laws than the highest income group (Group E).

Awareness of Environmental Laws

The Clean Water Act and the Solid Waste Management Act are just some of the laws enacted to help prevent pollution. Are you aware of any of these laws at all?

Aware of Clean Water Act – 26%
Aware of Solid Waste Management Act – 27%
Aware of other acts to prevent pollution – 15%
Not aware of any acts to prevent pollution – 50%

Box 4-1. Awareness of environmental laws in the Philippines

Source: SWS Survey presentation (2007). Presentation sent by Greenpeace through email dated April 2009.

In terms of awareness about EPR, none of the scavengers and electronics ever heard of the word but somehow they heard about take-back scheme (especially with the *Bantay Baterya* programme primarily because it is well advertised and endorsed by celebrities). Most stakeholders interviewed, including e-producers, are not familiar with the word EPR but they are familiar about take-back scheme as well. Based on discussions with different stakeholders, only environmental interest groups, academe, recycling company and one policy-maker has full understanding and knowledge about EPR as a policy principle.

Weak enforcement of environmental laws- the Philippines is said to be very good in legislating environmental laws but very weak in enforcing them. Policy-makers, academe, environmental groups and government environmental agency have pointed out similar reason as to why environmental laws are not effective.[49]. In the same SWS survey, the perceptions of people on the enforcement of environmental laws are shown in Box 4-2. Not surprisingly, 40% of the respondents perceive that environmental laws are rarely enforced. The survey also shows that there is no significant difference in the perception of law enforcement by gender, age, location and education attainment of respondents. According to the waste scavengers and electronics vendor interviewed, nothing would change much even if there were legislation on E-waste. Waste pickers would still be collecting recyclables for living. Legislation on E-waste is not something unique that will not bring significant change in the enforcement of environmental laws. Most likely it would end-up as lip service.[50]

Enforcement of Environmental Laws

In your opinion, are these laws about the prevention of pollution enforced?

Almost always enforced	8%
Often enforced	15%
Occasionally enforced	29%
Rarely enforced	40%
DON'T KNOW/REFUSED	7%

Box 4-2. Perception on enforcement of environmental laws

Source: SWS Survey presentation (2007). Presentation sent by Greenpeace through email April, 2009

[49] Processed results on individual interviews with different stakeholders.
[50] Based on group discussion with waste pickers, and electronic vendors.

Low recycling penetration and low supply of domestic E-waste– another potential barrier that is perceived to hinder the adoption of E-waste management measure, recycling in particular, is the low supply of domestic E-waste. Presently there are two recycling companies operating in the Philippines but they cannot get enough domestic E-waste to sustain their operation. Envirocycle, one of the recycling companies, has the capacity to process to operate 200 tonnes of waste per month but only operating at 10% capacity due to competition with other hazardous waste processor and informal recyclers (Greenpeace, 2004). IRI Philippines, another recycler, sourced out its E-waste supply from domestic sources and is only operating at 2400 metric tonnes per year despite its design capacity of 7200 metric tonnes per year.[51] IRI Philippines used to source out E-waste supply both from domestic and imported suppliers but now relies heavily on traditional sources locally such as industrial E-waste scraps, officers and business partners, junk shops and E-waste market organized by partner institutions.

Envirocycle and IRI Philippines both acknowledged that the country needs external supply of E-waste in order to maximize the country's recycling potential. Although IRI has the capacity to recover metals from waste, it is more economical to export scraps for smelting rather than doing in-house metals recovery. IRI opined that the available domestic E-waste is not sufficient to invest in full recycling technology.

Competition between the informal and formal sectors – competition between informal and sectors is very evident in the especially in the personal computers and mobile phone markets. Informal sectors are usually engaged in "cloning", computer assembly and repair, counterfeit and genuine software installation and installing computer add-on and accessories. In terms of mobile phones, informal sectors are usually engaged in repair, "reconditioned" and "cannibalization" of mobile phones. They are also engaged in selling "no-name" and pirated and copycat electronics (e.g. iPod) imported from Taiwan, Thailand and China. The informal sector and second hand market for electronics thrive well in the Philippines because of the significant price difference between branded and clone, "no-name", and reconditioned electronics (e.g. personal computers).

According to Greenpeace Philippines, the huge market for second hand electronics can be attributed to huge student population[52]. Students usually go for cloned and second hand computers because of the huge difference in prices. Cloned (new) personal computer is usually half the price of branded computer, and the refurbished second hand branded computer is usually 1/3 the price of branded computer. Second hand shops also provide warranty for their products and services. In case of computer and mobile phone breakdown, informal sector services are readily available in contrast to branded products where repair and warranty can be only availed in the authorized service centers that generally located in the capital and the turn-in around time of repair takes longer time.

The proliferation of computer and mobile phones repair shops is partly because of the job creation program of the national government. The Technical Education and Skills Development Authority (TESDA), the skills development agency of the country, offer technical courses on electronic and mobile phones repairs all over the country targeting out of school youths and student population that cannot afford to pursue formal tertiary education. In a national televised speech, the President is even encouraging jobless people to take TESDA course on electronics and computer repairs. This, in effect, creates a niche and labor supply skills that cannot be absorbed in the formal sector especially the electronics industry.

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[51] Personal interview with the General Manager, IRI Philippines, April 2009

[52] WHO estimates that are 11.5 million people are between school age group of 12-23 (see www.wpro.who.int)

Informal and backyard recycling also thrive because of the lack of available jobs in the country.

According to one interview respondent, "if you intend to design an EPR scheme, do it by stages targeting formal sector and exclude first the informal sector unless you have alterative program for them"[53]. Greenpeace likewise echoed that for an EPR to work in the country the government should provide alternative programs for the informal sector especially the iterant waste pickers and backyard and informal recyclers (e.g. job creation/ alternative livelihood).

Deficient harmonized system code– another potential drawback in the capturing the volume of E-waste and second hand electronics entered the country is the lack of differentiation between the two. Under the custom's harmonized system code, E-waste may be declared as electronic scrap, E-waste for processing and second hand electronics. Often, the customs officer cannot distinguish the difference and just follow whatever is declared in the customs manifest.[54] In addition, there is no harmonization in the system codes within the region and this is being taken advantage by illegal exporters to send E-waste in other countries (e.g. E-waste from Korea to Philippines). Furthermore, there is no separate recording between the new imports and second hand imports thus second hand electronics are often reported as new imports.

Other considerations in implementing E-waste collection – As previously discussed, scattered efforts have been in-place to promote materials recovery and take-back scheme but with minimal success. For instance, the E-waste market in Ayala and SM Malls and material recovery drop off points in Ayala Malls have not attracted significant volume of waste collection despite the program has been going –on for 3 years (see also Table 3-5). Based on discussions with key stakeholders, the following reasons have been pointed out as to why there is low turn out of waste collection:

Incentive – people widely believe that the discarded/junk E-waste have monetary value partly due to the famous promotional campaign "*May Pera sa Basura*" (There's money in waste) to encourage people to do recycling. People sending E-waste to material recovery drop off points are expected to get paid for their E-waste, however most MRF do not provide monetary value for junk and discard electronics rather they provide venues to discharge E-waste properly. Recyclers participating in the monthly E-waste market buy the junk electronics at the same buying price in the junkshops, which is perceived to be cheap thus discourage some people to participate in the E-waste market. IRI Philippines usually receive calls from individuals inquiring if they are buying discarded personal computer and caller usually get disappointed to learn that IRI would take the item but they can only give freebies as compensation (e.g. T-shirt or company memento). According to IRI, they buy E-waste in bulk but not on individual basis. The company is still willing to pick-up individual items discarded by the user but they are not willing to pay the user since the cost of picking-up the item is much more expensive that the actual monetary value of junk item[55].

[53] Personal interview with the Regional Adviser of WHO-Western Pacific Regional Office, Manila, April 2009

[54] Personal interview with the Chief, Hazardous Section, EMB, DENR, April 2009.

[55] Personal interview with the General Manager, IRI Philippines, April 2009.

Inconvenience – stakeholders perceive that while conducting a regular E-waste markets in the parking lot of Ayala and SM Malls is a good idea, it can be also inconvenient for people to bring-in their electronics especially those who do not have personal transport. Bulky electronics are difficult to carry especially using public transport and thus creative a disincentive for people to bring-in junk E-waste in the identified drop off points.

Competition from printer ink/toner refill shops – Some E-wastes have an established market that command better prices. For instance, empty printer toner and ink cartridges can be sold in the second hand shops and electronics shops for US$ 2-3 a piece. Offices and individuals seldom throw away empty toner and ink cartridges but rather sell them to ink/toner shops for refilling and repackaging.

4.3.4 Political Discourses

The concept of EPR is not widely discussed in political arena. Most policy-makers, and industry player alike, have no idea about the EPR as a policy principle but they may have some knowledge or heard about take-back scheme for products. Discussion about EPR is generally confined within the academic field and environmental groups. Major newspapers in the country have not published an article about EPR but take-back scheme, recycling and eco-design initiatives. At the level of the National Solid Waste Commission, deliberation about EPR as strategy for managing end-of-life of products was discussed once.

In terms of environmental campaign, EPR is no longer in the forefront of campaign of Greenpeace. BAN Philippines also admit that their campaign is now shifted to exerting pressure to parent companies and no longer directed to local electronic companies and suppliers.

4.4.4 Cultural Aspect

In terms of cultural aspect, Filipinos have strong penchant to keep prized items such as electronics due to the sentimental value attached to the product and partly due to the Filipino concept of *"sayang"*. It is common in Filipino houses to keep old and non-functional television, radio and refrigerator as household display or just for storage. As a general observation, ordinary Filipinos who cannot easily afford to buy expensive items such as electronics may find it hard to dispose valued possession right away.

In terms of waste segregation and recycling, it needs a change in mindset for new generation to internalize waste segregation and recycling and become part of their habit. In fact, the concept of materials recovery has been part of the Filipino culture for a long time with the *"Bote-Bakal-Diardio-Garapa"* as the forefront of materials recovery. Itinerant vendor would go house-to-house on a regular basis buying disposed bottles, iron, and newspaper and glass container eliminating the need to segregate waste at source. This business practice, however, is no longer common especially in big and urban areas. This idea of house-to-house collection should be explored in an EPR programme especially in establishing MRF in the barangay

4.5 E-waste management option: implementing EPR

The potential adoption of EPR as management option for dealing with E-waste was examined by asking stakeholders hypothetical questions on how to implement a national EPR programme emphasizing on products take-back. Products take-back was selected because of stakeholders' familiarity with the scheme and it has been implemented for certain products albeit limited in scope (e.g. mobile phone- pilot project and lead-acid battery- implemented mainly in Metro Manila only).

Based on individual and group discussions with various stakeholders, there is a consensus built that for an EPR to work effectively it should be simple and easy to implement with clear allocation of responsibility. Stakeholders were also asked to identify/define producer, how to allocate responsibility amongst different products and type of policy instrument needed to administer the EPR.

Identifying and defining producers – in terms of identifying and defining producers, all importers of finished electronics, second hand products and E-waste were identified as producers. Electronics importers were singled out as producers since majority of the finished electronic products are imported (e.g. personal computers, mobile phones, MP3 players, cameras). There is no consensus on whether the local electronics producers –the *inhouse* and *contract* manufacturers be considered producers. Should local electronic manufacturers be considered as producer, SEIPI representatives floated the idea of doing collective take-back responsibility since their organization has enough funds and membership contribution to do so. Some of the hazardous treaters and E-waste recyclers are members so SEIPI it could be easily discussed within the organization[56].

Allocating responsibility- stakeholders perceive that for historical, orphan and generic and mixed products already out in the market, it would be the government's responsibility by default. It would be difficult if not impossible to identify the "producers" of these products. It is also inherent in the policy-making that once a new regulation takes effect, it can not be applied retroactively (in most cases). Once a legislation is enforced making importers responsible for imported electronics (imported electronic component parts not included), then the government is immediately responsible for all electronics already in the market and the importers responsible for new imports would soon take effect. There is no consensus, however, on the responsibility of local manufacturers that manufactures finished electronics for the local market (e.g. Lexmark printers).

Table 4-1. Allocating responsibility for different electronic product types

Product	Responsibility
Historical products	Government
Orphan products	Government
Generic and mixed products	Government
Imported finished products and second hand e-waste	Importer

Products to be prioritized in the EPR - stakeholders were asked to identify 5 major electronic products to be prioritized in a hypothetical EPR take-back programme. Electronics that topped the list include mobile phones, personal computes, batteries, television sets and printers. Major household electrical appliances did not make it to the list except televisions set since stakeholders believe that E-waste coming household electrical equipement have already "leveled" off. In case of television set, there is perceived need to include them because rapid change in television models – from CRT to flat screen to plasma to HDTV. Lead acid batteries are to be included by default because of its existing take back scheme while printers were selected because it doesn't have established second hand market compared to printer toner and ink cartridges. Table 4-2 shows the 5 main products to be considered in the EPR including their degree of priority.

[56] Personal interview with SEIPI representatives, April 2009.

Table 4-2. Major electronics to be prioritized in the EPR

Product	Degree of Priority		
	High	Medium	Low
Mobile phones	■		
Personal Computers (including laptop and mini notebook)	■		
Batteries (lead-acid batteries)		■	
Television set (crt to slim desing)			■
Printers			■

Policy instrument – in terms of identifying economic instruments for implementing take-back, all stakeholders responded that only deposit-refund system is doable in the country. Deposit-refund system has been in existence for so long that it has become part of the Filipino culture[57]. Its application has been tested on several products such as bottles of beverages and PET plastic bottles. Any other economic instrument that deals with money issues such as advance disposal fee system will be received with skepticism due to rampant corruption in the country. In terms of informative instrument, stakeholders suggested to utilize marking/labeling of product and/or endorsement of EPR programme from celebrities and key personalities. Stakeholders believe that if EPR programme were to raise awareness and reach wider audience and mass base, it should capitalized on celebrities and key personalities endorsement. Endorsements from celebrities have been proven effective in reaching wider audience in promoting environmental programs (e.g. *Bantay Kalikasan, Bantay Baterya).*

Table 4-3. Proposed policy instruments for EPR

	Policy instruments
Administrative instruments	Collection and/or take-back of discarded products
Economic instruments	Deposit-refund system
Informative instruments	Endorsement from celebrities/key personalities Labelling and marking

[57] Personal interview with BAN, April 2009.

5 Conclusion and Recommendation

5.1 Conclusion

A closer examination at the situation of the Philippines reveals that they are barriers and drivers inherent in the system that need to be carefully considered in designing a sound management measure in addressing the end-of-life of electronics. These barriers and drivers are seen as push and pull factors that could explain the present state of environmental management in the country and the existing policy gap for E-waste management. These drivers may be regarded as driving forces that facilitate the development of E-waste management measures in the country. The barriers on the other hand are the key areas of concern that need intervention from policy-makers, government and stakeholders alike should they wish to close the existing policy gap and to improve the overall waste management in the country.

The electronic industry plays a pivotal role and contributes significantly in the economic development of country, thus a proactive approach is needed in dealing with environmental issues confronting the industry, especially the (less) generation of E-waste and improvement in product design. In regard to the end-of-life of electronics, it is expected that E-waste generation will continue to increase over time, therefore, adequate information on the actual level of E-waste generated is needed, and the extent and gravity of the problem need to be understood in order to frame appropriate policy responses. As discussed above, the existing waste regulations failed to incorporate E-waste as an area of concern, thus there is a need to revisit existing waste policy measures and develop policy framework for E-waste.

For an EPR programme to work effectively in the country, it should be able to consider all actors involved in the electronics and recyclables materials supply chain. In the case of the Philippines, the informal sector is inherent if not part of the economic system of the country. It has important role and contribution in the economy, especially in terms of job creation, and they need to be carefully considered in designing an EPR programme. They should be integrated and mainstreamed into the formal economy.

As discussed in the preceding chapters, the management of E-waste is not longer confined in the end-of-life (downstream) phase of electronics but rather have further implications in manufacturing aspects, and even trade. E-waste management issues are no longer confined within national boundaries as electronic products and E-waste are commonly traded and transported across national boundaries especially in Asia-Pacific region. Given the expansive scope of the issue, management of E-waste may require regionally coordinated actions and national EPR policies alone may not be sufficient in addressing the illegal and transboundary movement of waste.

The unique situation of the electronics industry in the Philippines, being dominated mainly by the semiconductor sector, presents an opportunity to tackle the end-of-life of electronics by different approach. Instead of focusing on the End-of-life of E-waste management, the country may focus on the upstream side and capitalize instead on improving the product design by making it more eco-friendly. The country is already the regional center for semiconductor testing, development and design. An integration of the environmental friendly design (e.g. Design for the Environment) may not be necessarily costly and does not require legislation but the government can provide incentives for the industry to steer into this direction. Eco-design in the electronic products could potentially lead to waste avoidance, waste minimization and enhanced recyclability, which could be translated as less resources

required for treatment and disposal. The potential savings in materials reduction and energy consumption can also enhance the competitiveness of the industry.

Overall, the country needs to improve its waste-management infrastructure and attitude towards recycling and reuse especially with electrical and electronic products. The government should also explore the possibility of having an industry driven-EPR as several local industries were already taking initial steps heading to this direction. As the electronic sector is the main driver of the Philippine economy, it should be able to adapt to global changes and respond to the emerging requirements of international markets.

5.2 Recommendation

Several recommendations can be drawn out from this exercise based on observations in the field, author's familiarization of the issues, and from the discussion and interviews with key stakeholders. These recommendations touch upon the waste management issue in general and E-waste management issue in particular. These recommendations are addressed to policy makers, industries, academe and environmental organizations and other actors that are in the forefront of E-waste campaign.

Invest on E-waste data improvement– one area of improvement in aid of policy-making is in terms of capturing actual data on generation of E-waste and second hand electronics (both internal and external). Little is known about the actual level of domestic E-waste generation or the amount of E-waste entered the country annually. Some studies provide estimates and model scenarios on the extent of E-waste generation but they are just part and parcel of the bigger picture. Policy-makers can easily make policy intervention in this respect by improving the system of recording and harmonized code system of the Bureau of Customs. The improvement in data collection should be able to capture and take into account illegal movement and importation of E-waste. Another way to improve the E-waste data is to look at the basic flow of recyclable materials and identify deficient areas that need intervention. The availability of realistic information about the E-waste would serve as a foundation for effective decision-making.

Weaken the barriers that hinder adoption of environmental measure – As different barriers towards the adoption of sound management of E-waste have been identified, policy-makers and stakeholders should work together to weaken them. This can be done (a) improving environmental awareness among Filipino and (b) improving the enforcement of environmental laws. As shown in the survey by the Social Weather Station in 2007, 50% of the survey respondents are not aware of the existence of anti-pollution laws and 40% of the respondents perceive that environmental laws are rarely enforced. Stakeholders, especially the government and environmental organizations should take a lead role in making people aware of the existence of various environmental legislations. At the same time, through the improvement in the enforcement of environmental laws it would create positive impression and perception about the seriousness of government and stakeholders in dealing with the E-waste issue.

Work with the existing institutional set-up– every stakeholder including the end users has a role in the implementation of a successful waste management programme including EPR. In order to address the issue of E-waste, policy-makers and different stakeholder should work together and take into consideration the existing institutional set-up in introducing E-waste management intervention. Key actors along the supply chain of electronics have to be involved including the informal sector. Several initiatives in the country have demonstrated the success of program implementation with the involvement and partnership of different stakeholders (e.g. tripartite and multi-sectoral E-waste management).

Focus on selected products – Based on the discussion with different stakeholders, the management of E-waste should focus first on selected electronics, specifically personal computers and mobile phones if the government were to implement a take-back scheme. Take-back scheme may cover few electronics items and expanded later on to cover more electronics items.

Promote favourable climate that encourage recycling and materials recovery of E-waste –A number of initiatives have been implemented that encourage material recovery and recycling yet achieved minimal success due to their failure to create a favourable climate to encourage people take part in the program. Drawn from those experiences, two important considerations that would encourage people to participate in recycling efforts are to provide right incentives and convenience for end users. Giving the right incentive does not necessarily in terms monetary but also in terms of recognition to people's contribution to the recycling program (e.g. Greenpeace may issue certificate for individual participating in the program). Also, as electronics are bulky and difficult to transport, making recycling programme more convenience to people would surely encourage wider participation.

Adopt an E-waste management framework - Government and policy-makers should take lead roles in developing and adopting an E-waste management framework. E-waste is an emerging waste stream, yet the existing environmental policies failed to incorporate E-waste as an area for concern. Developing an E-waste policy framework is not only timely but also attuned to the pressing need to address the continued accumulation and generation of E-waste. Policy-makers should also look into EPR how it would be able to close the existing policy gap in waste management.

5.3 Areas for future research

E-waste and the examination of the application of EPR especially in developing countries in Asia are emerging areas that necessitate more research. In the context of this study, which is looking at the barriers and drivers of an adoption of E-waste management measure, two areas that would be interesting to study further are:

(a) Research on the financial flow of recyclables in the Philippines- the financial dimension especially financial flow of recyclables is a good area for future research. By looking at this area, one could further explain the factors why exportation of second hand electronics and existence of the informal and grey market of E-waste thrive well in the Philippines. The financial flow of recyclables could also have important implications in designing an EPR program. In addition, with this study, it would contribute to the existing body of literature on E-waste and, thus, complete the parts and pieces of the bigger picture of the dynamics of E-waste management in the country.

(b) Research on the implications of a regional EPR- the proposed regional EPR in the Asia-Pacific region is a radical diversion of the original concept of EPR. As initially conceived, EPR is seen to work on a national and domestic scope, as socio-economic, political and cultural dimension need to be considered in designing an EPR scheme. Perhaps, it would be worthy to look and examine in what form would a regional EPR take shape especially with the socio-economic, political and cultural differences across Asia, and how it assigns responsibilities to producers across countries.

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Abbreviations

3R	-	Reduce, Reuse and Recycle
BAN	-	Basel Action Network
DENR	-	Department of Environment and Natural Resources
EMB	-	Environmental Management Bureau
EPR	-	Extended Producer Responsibility
EU	-	European Union
IGES	-	Institute for Global Environmental Strategies
IWEP	-	Industrial Waste Exchange Programme
JICA	-	Japan International Cooperation Agency
JPEPA	-	Japan-Philippines Economic Partnership Agreement
NSWMC	-	National Solid Waste Management Commission
OECD	-	Organization for Economic Co-operation and Development
PBE	-	Philippine Business for the Environment
PC	-	personal computer
PDA	-	Personal digital assistant
PRI	-	Philippine Recyclers Inc.
RoHS	-	Restrictions of Hazardous Substances
SEIPI	-	Semiconductor and Electronics Industries in the Philippines
SWS	-	Social Weather Station
TESDA	-	Technical Education and Skills Development Authority
UNESCAP	-	United Nations Economic and Social Commission for Asia and the Pacific
WEEE	-	Waste Electrical and Electronic Equipment

Appendix

Dear respondent:

The undersigned is a Master of Science candidate at Lund University, Sweden presently conducting a study (thesis) on electronic waste management in the Philippines, and the relevance of Extended Producer Responsibility (EPR) as policy measure for dealing with E-waste. You are hereby requested to participate in a questionnaire survey to identify the different drivers and barriers of E-waste management and the potential adoption of EPR as policy option.

Your valuable response is deemed very important in coming up with policy recommendations on how the problem of E-waste be dealt with. Rest assured that that your answers would be treated with strictest confidentiality.

Sincerely,

Brian Carisma
Candidate
Master in Environmental Science, Policy and Management (MESPOM)

Central European University (Hungary), University of the Aegean (Greece), Lund University (Sweden), Manchester University (UK)

Background information:

The need to implement proper mechanism in managing waste electric and electronic equipment (WEEE) in the Philippines can no longer be overemphasized. The Philippines, as is the case of other developing countries in Asia, has been experiencing a growing number of discarded electronic products resulting from rapid obsolence and fast changing technology. It is a growing concern especially that the country has neither official data regarding the current quantity of WEEE generated. Waste electrical and electronic equipment, commonly known as electronic waste (E-waste), is becoming a serious social and health concern since these pieces of equipment contain hazardous and toxic materials such as lead, mercury and chromium. While electronic equipment are considered safe during use-phase, the potential threat lies in the improper storage and disposal (end-of-life phase) with potential release of toxic constituents in the environment.

Electronics and electronic products remain the single most important export of the Philippines and constitute to more than 60% of the total export. The country is a manufacturing hub of multinational companies such as Texas Instrument, Intel, Toshiba, Fujitso, Acer, Motorola and NEC. While most of these companies do implement measures to minimize environmental impacts of their products, they are mainly confined in addressing the manufacturing aspect improvement and/or resource-use improvement. Some of these companies have implemented product/process oriented environmental policies and waste management policies, yet there is no comprehensive policy that deals specifically with the end-of-life of discarded electronic products.

This thesis undertaking would entail examining the different drivers and barriers to the adoption of E-waste management measure taking the concept of Extended Producer

Responsibility as a case study. It is hoped to bring out the different issues in adopting management measure for E-waste and hopes to address the existing policy gap in the waste management in the country.

Name of Respondent: _____ (optional)

Organization: _____

Accreditation: _____(e.g. ISO 9001, ISO 1400 optional)

A. Familiarity with EPR

Q1. Have you ever heard of the concept of Extended Producer Responsibility (EPR)?

☐Yes ☐No

Q2. What is your understanding of EPR? pls. provide short explanation

Q3. Does your company have "Corporate Social Responsibility" (CSR) program related to 3R, cleaner production and product/waste minimization? ☐ Yes ☐ No. If yes, pls. elaborate the CSR program of your company?

Q4. Is your company fully compliant to WEEE, RoHS and REACH Directives (whichever is applicable)?

☐ Yes ☐ No. If no, why?

Q5. In your opinion, what are the key factors that push for the adoption of E-waste management measure in the Philippines?

Q6. In your opinion, what are the key factors that hinder the adoption of E-waste management measure in the Philippines?

Q7. How do you see the potential of EPR in addressing the E-waste issues in the Philippines?

B. Adaptability of EPR

B1. Defining producer

Q8. How do you define a producer? Are contract-manufacturers can be considered producer? What about manufacturer of component parts of a product? What about resellers?

B2. Product coverage

Q9. What are the major products to be covered by an EPR system? Pls. rank according to degree of importance (1- 10).

Table 1. Selected products and corresponding rank

Product	Rank
Mobile phones	
Computers	
Printers	
Digital Camera	
Household appliances (pls. specify)	
Batteries	
MP3 players	
Television sets	
Personal digital assistants	
Others (please identify)	

B3. System of collection:

Q10. How do you see the take-back system for obsolete and discarded electronic products be operationalized?

Q11. Should the take-back scheme of obsolete and discarded products be implemented on a voluntary or mandatory basis? Why?

C. Operationalization of EPR

Q12. EPR advocates for 3 major instruments. Please rate the following EPR-based policy instruments and their suitability to the existing local condition.

	Policy instruments	Highly suited	Somew hat suited	Suited	Less suited	Not suited
Administrative instruments	Collection and/or take-back of discarded products					
	Substance and landfill restrictions					
	Collection, reuse (refill) and recycling targets					
	Environmentally sound treatment standards					
	Minimum recycled material content standards					
	Product standards					
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 re. collection networks					
	Information to consumers re. EPR /source separation					
	Information to recyclers re. structure & substances					

Q13. Should EPR be implemented on individual (individual producers are responsible only for their products) or collective basis? Why?

Q14. Do you see any social, economic and cultural barriers to the adoption EPR especially at the level of the end-user? (e.g. Filipino penchant to keep old household appliances, etc).

D. Other issues- pls. feel free to express any thoughts on the following questions (You may write whatever thoughts you have on EPR and its potential for adoption in the Philippines)

Q15. How do you think the informal sector be accommodated in a Philippine-based EPR system?

Q16. How do generic products (without brands), orphan (producers that have gone out of business) and "mixed" products (products composed of multiple producers) be integrated in the EPR scheme? Who should be responsible for them?

Q17. How do you think trading of imported secondhand electronics in the country be addressed? How to integrate them in an EPR system?

Q18. Do you think a regional EPR system (ASEAN) is ideal for the Philippines? Why?

Note: this questionnaire was administered through face-to-face interview. Follow-up questions and other open-ended questions are not reflected in this questionnaire guide.

-end-