

# The 3Rs and Poverty Reduction in Developing Countries

## Lessons from Implementation of Ecological Solid Waste Management in the Philippines



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## Abbreviations

3R	Reduce, Reuse and Recycle
BRIC	Brazil, Russia, India, China
CDF	converted disposal facility
DepED	Department of Education
DENR-EMB	Department of Natural Resources and Environment – Environment Management Bureau
DILG	Department of Interior and Local Government
DOLE	Department of Labor and Employment
DSWD	Department of Social Welfare and Development
DTI-BOI	Department of Trade and Industry – Board of Investment
ESWM	ecological solid waste management
ESWMA	Ecological Solid Waste Management Act, 2000
GOJ	Government of Japan
ILO	International Labour Organization
IOE	International Employers Organization
IRR	implementing rules and regulations
ISWM	integrated sustainable waste management
ITUC	International Trade Union Confederation
IWB	itinerant waste buyers
IWEP	Industrial Waste Exchange Program
LGU	Local Government Units
LUPAI	Lupang Pangako (or promised land) Urban Poor Association, Inc.
MRF	material recovery facility
MSWM	Municipal Solid Waste Management
NGO	Nongovernment Organization
NHA	National Housing Authority
NSWMC	National Solid Waste Management Commission
OD	open dumpsite
PIA	Philippine Information Agency
PBE	Philippine Business for the Environment
PNOC-EC	Philippine National Oil Company Exploration Corporation
RA	Republic Act
SWMP	Solid Waste Management Program
TESDA	Technical Education and Skills Development Authority
UDHA	Urban Development and Housing Act (1992)
UNDESA	United Nations Department of Economic and Social Affairs
UNEP	United Nations Environment Programme

## **Abstract**

About 30,000 tons of waste is generated daily in the Philippines, and this amount is likely to increase by 40% in the next decade if no interventions are provided (Aguinaldo, 2009). Varying approaches to manage waste include efforts to perform cleaner production, eco-efficiency or green productivity, and even sustainable consumption and production. Simple yet challenging ways have also been proposed such as the 3R Initiative by Former Japan Prime Minister Koizumi.

On a national scale, the passage of the Ecological Solid Waste Management Act (ESWMA) assigned the responsibility of managing waste to the local government units while the national agency keeps track of implementation. Although this offers the advantage of an individualized waste management program founded on the context of a city or community, progress has been slow especially given the lack of financial and technical support from the national government. Nearly a decade after the ratification of the law, about 13% of the local units met the provisions. On the upside, external funding, and nongovernment organization, private and public entities and informal waste sector involvement prove to be important catalysts in realizing waste management initiatives particularly in terms of waste diversion and recycling.

This report investigates the potential decent employment and issues arising from undertaking closed-loop reduce-reuse-recycling activities or 3R-related activities in the Philippines in general. Four local cases on solid waste management and 3R implementation in this paper illustrate basic responses of the local governments to waste management in their area. These projects are limited to regular collection of recyclables by eco-aides in every household alongside the establishment of a material recovery facility, information campaigns on waste segregation, 3Rs, utilization of biodegradables and enhancing collection of recyclables, and promoting reusing and recycling in the industry. Financial constraints appear to be a limiting factor in the sustenance of these initiatives. Hence, economic benefits have to be equally emphasized in these undertakings in addition to apparent environmental and social gains. Some instances also demonstrate the need to strengthen local capacity to adequately plan waste management measures. Based on these cases, suggestions were drawn on how to implement the 3Rs in support of green business, employment and poverty reduction. Instrumental support systems and the role of stakeholders were also identified in the analysis based on cases and the drafted national framework on informal sector.

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## 1. Background

Waste generation has increased exponentially along with the rise of economic situation of the population and considering the materialistic nature of society. Projections for total annual waste generation in 2030 is at 900 million tonnes for OECD countries, about 1 billion tonnes in the BRIC (Brazil, Russia, India, China) countries, and around 1.1 billion tonnes in the rest of the world (EEA, 2010). The two most populous countries, China and India, have produced roughly 2.65 million metric tons of e-waste in 2007 (Schluep, Hagelueken, Kuehr, Magalini, Maurer, Meskers, Mueller & Wang, 2009). This amount represents waste generation for a single type of waste alone for two countries. Hence, the gravity of this situation presents the urgency to reverse this trend, calling for environmentally sound solutions as well as local and international legislations and agreements that can prioritize sustainable solutions.

In the past years, there were efforts to perform Cleaner Production (CP), eco-efficiency, or Green Productivity (GP); there is a need to also look at the issue from system point of view, sometimes referred to as the Industry Ecology or its sub-component – industrial metabolism. In addition, Sustainable Consumption and Production (SCP) when placed together may trigger an out-of-box thinking vis-à-vis treating them separately. Product Service System (PSS) has been discussed much, but perceived to encounter barrier factors. These developments offer opportunities to people in developing countries enabling new economic activities through the collection, sorting and recycling of waste material as well as service-oriented business activities.

At the international level, Junichiro Koizumi, former prime minister of Japan, proposed the 3R initiative at the 2004 G8 Summit. The aim of this initiative was “to build a sound material-cycle society through the effective use of resources and materials” (Chiu, 2009), preventing the total destruction of the environment and promoting sustainable production and sustainable consumption for the maintenance of biodiversity. Specifically, the 3R Initiative aims to prioritize 3R policies and improve resource productivity, establish an international sound material-cycle society, and collaborate for 3R capacity development in developing countries (UNEP, 2008). To achieve these goals, the following action programs (AP) having environmental, economic and social benefits were devised:

- a. AP1: Promotion of the 3Rs
- b. AP2: Reduction of trade barriers to the international flow of 3Rs-related goods and materials
- c. AP3: Cooperation between developed and developing countries
- d. AP4: Cooperation among stakeholders
- e. AP5: Science and technological development for the 3Rs

In the Asian Region, the goal of the 3Rs is to achieve low carbon and sound material-cycle societies through facilitating bilateral and multilateral cooperation for increasing resource and

energy efficiency through the 3Rs, and promoting environmentally sound management of wastes in the region (Mohanty, 2009). The basic principles of the Initiative call for “the realization of a society in which sustainable development is possible with less environmental impact; prioritization of handling products, wastes and recyclables; and ensuring appropriate material cycle in nature” (UNEP, 2005). Furthermore, this initiative encourages the development of markets for recovered materials from waste stream, and repair facilities in consideration of sustainable production. The volume of by-products is of multiple factors as compared to the consumption-stage level.

In line with the objectives of 3R, the Green Job Initiative was launched as a joint initiative by the United Nations Environment Programme, International Labour Organization, Institute of Education and International Trade Union Confederation that aims to assess, analyze, and promote the creation of decent jobs as a consequence of the needed environmental policies. Green jobs pertain to employment in businesses that reduces environmental impacts to levels that are sustainable. These include jobs that help reduce the consumption of energy and raw materials, decarbonize the economy, protect and restore ecosystems and biodiversity, and minimize the production of waste and pollution (ILO, 2008). This undertaking complements the concerted effort by governments, employers, and trade unions to promote environmentally sustainable jobs and development in a climate-challenged world (ILO, n.d.).

However, a reality faced by developing countries pertain the lack of resources to adequately implement a waste management program which is further burdened by the increasing rate of urbanization (Ahmed & Ali, 2004). In this respect, the informal sector has had a hand in providing services in waste collection, segregation and recycling in many cities of developing nations. In most cases, those involved in the informal recycling sector are exposed to unhealthy work environment having to work under substandard conditions and live by minimum wage (Aguinaldo, 2009). With the significant role that the informal sector play in achieving more sustainable waste management (Wilson, Velis, & Cheeseman, 2006), various studies (Agarwal, Singhmar, Kulshrestha & Mittal, 2005; Wilson, Velis, & Cheeseman, 2006; Sembiring & Nitivattananon, 2010) have explored the formalization of this sector or their inclusion in solid waste management while the International Labour Organization (ILO) examined the issue from the perspective of decent work (Amin, 2005).

In the Philippines, the Republic Act (RA) Number 9003 of 2000, the Ecological Solid Waste Management Act of 2000 (ESWMA), represents the national policy on managing solid waste. This law coupled with the Local Government Code of 1991 signaled the devolution of tasks of the national government to the local government including the waste management sector for which various responses from the national government as well as from all local government units (LGUs) that geared towards real and unreal solutions have been made. A great number of these efforts were simply lip service to the politician’s constituents and in what seem to be efforts of

compliance to the new law. The national government itself seems to be less resourceful domestically in implementing RA 9003, especially in financial terms, even after the passage of its implementing rules and regulations (IRR) given the small percentage of budget allocated for its purpose. However, the national effort to obtain external funding and assistance proved to be a stronger catalyst to actualize any hope for successfully implementing RA 9003 or any other similar policy or agreement that the government has initially entered into.

On the other hand, some provisions of the ESWMA were met. The government was able to set-up a National Solid Waste Management Commission (NSWMC) as a national coordinating body to implement the ESWMA, while the private sector was able to set-up a number of good and well-intentioned environmental NGOs with different interests in promoting sustainable development and effective solid waste management. Cooperation between private and public sector can be observed in groups like the Solid Waste Management Association of the Philippines. The law also features the inclusion of the informal waste sector in the concept of waste management which is common to waste management in developing countries.

This report investigates the potential decent employment and issues arising from undertaking close-loop reduce-reuse-recycling activities or 3R-related activities in the Philippines in general. This study presents four local cases on solid waste management and 3R implementation. Based on these cases, suggestions were drawn on how to strengthen the 3R policy implementation in support of poverty reduction, green business and employment. Instrumental support systems and the role of stakeholders were also identified in the analysis and the drafted national framework on informal sector.

Section II gives an overview of the state of waste generation and management in the Philippines, and briefly illustrates some local cases of solid waste management and 3R implementation. Section III discusses the issues and opportunities involved in organizing the informal waste sector. Section IV summarizes the findings and recommendations of this study.

## 2. Waste Management and the 3Rs in the Philippines

### 2.1 Waste Generation and Management in the Philippines

Depending on the income level, a Filipino citizen generates approximately .3 to .7 kilograms of garbage per day. For instance, 15 of the 17 LGUs (excluding Quezon and Caloocan City) of Metro Manila (MM) registered a 0.71 kg per capita waste generation rate in the second quarter of 2009 (NSWMC, 2009). Total waste generated nationwide in 2007 is 12.15 million tons with 23.54% or around 2.68 million tons of which came from MM; 2010 projections report that waste generated for the region is at 3.14 million tons (NSWMC, 2009).

Only roughly 720 tons of waste is recycled or composted per day in MM (Westfall & Allen, 2004). The remaining percentage is either hauled to dumpsites, dumped illegally on private land and water bodies, or openly burned. Table 1 compares the composition of household wastes in MM with that of the Payatas Dumpsite in the region showing close percentages. The tons of waste being discarded in MM that have the potential for recycling include used paper, scrap metals, glass bottles, plastics, defective electronics, used batteries, used oil, and flour or rice sacks (Leo, n.d.) indicating numerous opportunities in which MM can benefit from the 3Rs.

**Table 1. Characteristics of Household Waste and Dumpsite in Manila (in %)**

Waste Type	Manila Household <sup>1</sup>	Payatas Dumpsite <sup>2</sup>
Kitchen and food wastes	45	45
Paper	16	17
Plastic	15	16
Yard Waste and glass	9	10
Metal	5	5
Textile	4	4
Leather and Rubber	1	1
Ceramic and Stone	1	1
Others	4	1

<sup>1</sup> Garcia, 2006

<sup>2</sup> Liongson, 2000

As waste generation increases with respect to the growing population, the efficiency of service levels of waste collection in the metro is dropping. In addition, there are additional human health costs due to the improper handling and disposal of waste by entities like households, hospitals, and industrial factories (World Bank, 2001). As a response to the persisting problem of waste management, ESWMA was enacted. This law recognizes the importance of waste segregation at source, and the need to efficiently recover recyclable materials and dispose of non-recoverable wastes with an end goal of preventing the emergence of health and environmental problems that may result from faulty waste recovery and disposal technologies. ESWMA also calls for the institutionalization of a national program that will manage the control, transfer, transport,

processing, and disposal of solid waste in the country. Further, it aims for waste diversion rate of 25% during the first three years of the Act and shall be increased every three years thereafter (UNCRD, et al., 2009; Aguinaldo, 2009).

The ESWMA and its Implementing of Rules and Regulations (IRR) define the responsibilities of relevant stakeholders to promote recycling. The NSWMC was created as the main body supervising the implementation of waste management plans and the provisions of the law. The National Ecology Center under this commission serves as the enabling body that should advise and coordinate with LGUs in terms of policy mechanisms, management opportunities and technical needs in order to implement the law. As with other Philippine legislation, the ESWMA also promotes multi-agency cooperation. The Department of Environment and Natural Resources (DENR) tracks the implementation of the law. The Department of Trade and Industry (DTI) establishes standard for recycled product and develops a market for such items in cooperation with the Department of Finance. The Department of Agriculture (DA) promotes the use of compost and ensures its compliance with fertilizer standards. Foremost, the LGUs hold the responsibility for the implementation of the law within their jurisdiction through the creation of a solid waste management (SWM) board to create and implement programs. Multipurpose cooperatives and organizations are also encouraged to initiate projects in compliance with the law. An initial 20 million pesos is appropriated for the implementation of the law upon ratification.

## **2.2 Outcome of Implementation of ESWMA and Other Initiatives**

A NSWMC was created and chaired by the DENR Secretary. This group oversees the implementation of appropriate solid waste management plans by end-users and local governments as mandated by law. Programs of the NSWMC are geared towards the participation and capacity strengthening of LGUs in the implementation of the law, and the involvement of schools in terms of academic curriculum and student leadership in promoting ESWMA. Locally, complying with the minimum requirement of setting up a Material Recovery Facility (MRF) in each barangay was not observed. As of January 2007, only 2,361 barangays were able to establish an MRF out of the 43,500 barangays nationwide (NSWMC, 2008, as cited in Serrona & Yu, 2009).

Section I, Rule VIII of ESWMA specifically states that management of waste shall pursue the following hierarchy:

1. Source reduction and minimization of wastes generated at source,
2. Resource recovery, recycling and reuse of wastes at the barangay,
3. Efficient collection, proper transfer and transport of wastes by city/municipality, and
4. Efficient management of residuals and of final disposal sites and/or any other related technologies for the destruction/reuse of residuals.

For the purposes of this report, discussion will focus more on the first two goals in the given hierarchy.

Waste segregation at source provides the benefit of reducing waste to be dumped to the disposal facility, but often suffers from a collective action problem. In addition, many regard waste segregation as a tedious and time-consuming activity. This behavior is supported by the fact that garbage collectors will gather them anyway, regardless of whether or not these are segregated. Furthermore, some argue that certain materials are difficult to classify or that others could either be damaged making recycling difficult. On the other hand, more and more households recognize the value of recyclable materials which are often collected or bought by itinerant waste buyers, or directly sold to small junk shops by household members.

In terms of recycling, data shows a steady increase in its practice in MM, the largest urban region in the Philippines (Table 2). Only 13.11% of barangays nationwide have responded to the provisions of the law, and 41.2% of which are in MM (Aguinaldo, 2009). A *barangay* refers to the smallest local government unit in the Philippines. Municipalities and cities are composed of barangays.

**Table 2. Recycling Rates in Metro Manila**

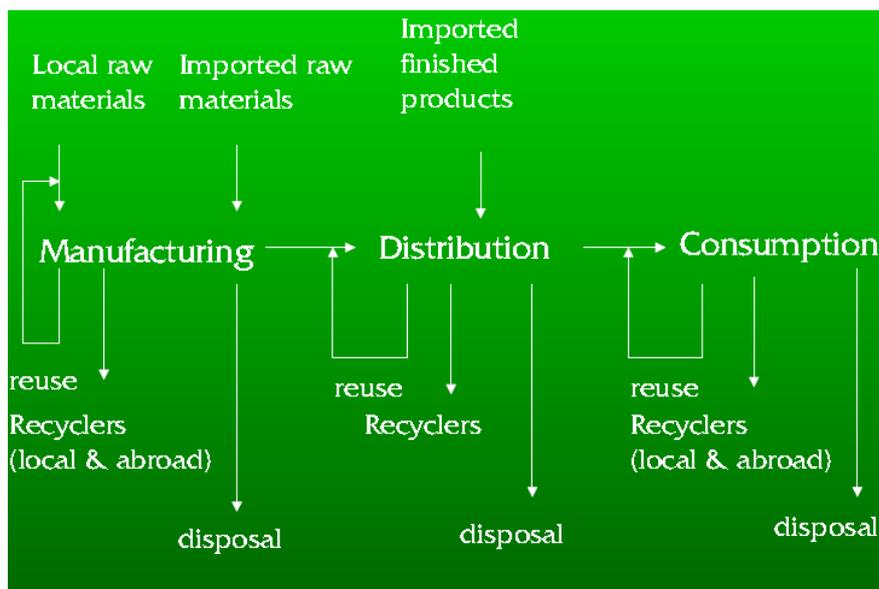
<b>Year</b>	<b>Recycling Rate (%)</b>
1997	6
2000	13
2002	25
2006	28
2009	31

The presence of the small and medium recyclers contribute to the achievement of waste diversion targets, but may also result to problems in the implementation of ESWMA since their operation is not regulated; hence, work safety, environment, and pollution control may not be prioritized (Kojima & Jain, 2008).

Although there are many recycling plants available nationwide, recycling a substantial portion of the waste generated by the country remains a challenge. The distant recyclers offer little incentive for household waste segregation. However, more and more recyclable markets are organized in the cities by NGOs and private entities in recent years.

Despite the intermittent compliance of waste segregation at household level, a bigger opportunity for waste minimization exists upstream. Enhancing manufacturing processes to use less raw materials and constantly reinventing methods to optimize use of necessary components will lead to decreased amount of waste generated as reducing and reusing can be observed in production, and recycling throughout the product life cycle (Figure 1). The need to address this undertaking allows for the growth of green jobs. Green employment is seen to be demanded by a number of

industry or sector, namely, energy, building, transportation, basic industry, food and agriculture, and forestry (UNEP, 2008). The transition to a low-carbon economy through sustainable transport system, green industry and energy efficiency can create jobs under these sectors to accomplish set targets (House of Commons, 2008). However, this shift implies that new skills are required for these jobs. Therefore, “Economies should address specific deficiencies that hinder green job development by identifying business opportunities, improving workforce capability, and implementing coherent government policies to foster green job growth” (Asian Business Council, n.d.).



**Figure 1. Flow of Waste Materials across Different Product Functions**  
**Source: Garcia, 2006**

The following subsections provide brief details on waste management projects carried out by different LGUs.

### 1. Pasig City Barangays

Pasig City is ranks fourth in terms of population size in the National Capital Region (roughly 5% of the population in the region). SWM Program started in Pasig in 2006 wherein the local government follows the Ecological Solid Waste Management (ESWM) system in handling the wastes in the city. ESWM refers to the systematic administration of activities which provide for segregation at source, segregated transportation, storage, transfer, processing treatment, and disposal of solid waste and other related activities which do not harm the environment. The programs listed in

Table 3 are currently being promoted and implemented in the whole city. Employment, additional income of about eight thousand pesos for the barangays and waste reduction of as much as 35% are among the benefits of the programs implemented (Angeles, 2010).

**Table 3. SWM Projects in Pasig City Barangays**

<b>Project</b>	<b>Description/ Activities</b>	<b>Benefits</b>
30 Urban Gardens	Annual contest on Most Outstanding Urban Garden where participants must use soil conditioners from established Composting Facilities	Waste diversion/ reduction
Green Hearts Saver's Movement	Exchange of recyclable wastes (e.g. papers, folders, newspapers, etc.) for school supplies in various schools	Increase waste recovery
Waste Segregation and Door-to-Door Collection	<ul style="list-style-type: none"> <li>• Establishment of MRF</li> <li>•</li> <li>•</li> <li>•</li> </ul> <ul style="list-style-type: none"> <li>• Figure 2) and provision of segregation bins in all public schools of the city</li> <li>• Monitoring of waste segregation in all residential areas</li> <li>• Garbage truck and personnel collect waste on main thoroughfare and secondary roads, while 46 Ecoboy collect from houses along in inner streets and alleys</li> </ul>	Waste diversion/ reduction for possible recycling, and employment
Monitoring Team	24 Green Police, 68 Bantay Ilog, and 100 Tanod Sapa maintain and monitor all water resources in Pasig	Employment
Information Dissemination and Advocacy Campaign	Hold campaigns promoting proper disposal of wastes in schools and all residential areas	Encourage waste segregation
Anti-littering Campaign	Distribution of free waste receptacles, made of recycled tin cans, to public vehicles	Waste recovery
Creative Recycling	<ul style="list-style-type: none"> <li>• Plastics are recycled into hollow blocks and doypacks to Ecobags (Figure 3)</li> <li>• Employment of 500 Ecobag makers</li> </ul>	Additional income for the barangay, and employment



**Figure 2. Material Recovery Facility**



**Figure 3. Recycled Products**

## 2. Barangay Pinagkaisahan, District IV, Quezon City (Conexor, 2008)

Barangay Pinagkaisahan is one of the barangays in District IV Quezon City and has a population of 7,215 as of 2007 (Quezon City Barangays, 2009). The Barangay Council has approved the SWM project in 2004 to address the increasing amount of garbage in the barangay. Table 4 enumerates the projects implemented by the barangay. Through community consultations and workshops, emphasis was made on the involvement of members of household in waste segregation (Figure 4).

The development of an Ecology Center in 2004 improved the collection of recyclables and provided some revenue which is used to support the eco-aides (street cleaners), and sustain the SWM projects in the barangay. However, the composting project envisioned did not last long due to the laborious nature and impracticality of the processed involved in the production of

fertilizer. This led to an agreement between the local government and a pig farm for the latter to collect the biodegradables. Four years into the implementation of this program, an improvement of about 75% reduction in waste going to the landfill was achieved.

**Table 4. SWM Project in Barangay Pinagkaisahan**

<b>Project</b>	<b>Description/ Activities</b>	<b>Benefits</b>
Eco Brigade	Collection of wastes at households following a “No segregation, no collection” policy	Waste segregation and diversion, employment
Ecology Center	Establishment of a facility resembling a MRF where collected recyclables are stored and sold	Revenue, recycling and employment



**Figure 4. Waste Segregation System in the Barangay**

### 3. Barangay Tagapo, Sta. Rosa, Laguna (Mendoza, 2010)

Barangay Tagapo, a barangay in the City of Sta. Rosa, Laguna, is dubbed as the “Investment Capital of South Luzon” because of the numerous multi-national companies and industrial technology parks situated in the city. As of 2007, the barangay consists of 32 subdivisions and a population of 24,058 (Census of Population, 2007).

Waste management in Barangay Tagapo was initiated by Barangay Officials in response to the usage of barren lots in their area as dumpsites by residents. Table 5 lists the initiatives of the Barangay. A main concern in the implementation pertains to financial and logistical support. According to the Ecological Manager of the Barangay, the allocated budget for Ecological Management Projects in 2010 is roughly 400,000 pesos which is not enough to service more than 24,000 residents, not to mention future facilities that will be established to expand the scope of the project. In terms of logistical support, the “eco-truck” is not solely intended for the project as it also serves other projects of the Barangay. In addition, the unpaved roads going to the MRF cause flat tires to the “eco bikes” and “eco truck”.

**Table 5. SWM Projects in Barangay Tagapo**

<b>Project</b>	<b>Description/ Activities</b>	<b>Benefits</b>
“Adopt a Lot, Sagip-Kalikasan, Sagip Kabuhayan”	<ul style="list-style-type: none"> <li>• A contest for the community to utilize vacant lots as vegetable/ poultry farm to generate income and contribute to sustainability</li> <li>• “Model Farm” was established by the barangay to serve as guide</li> </ul>	Waste segregation (biodegradables are used as fertilizers), revenue
MRF (Figure 5)	Collection of recyclables from households through “eco-boys” on bikes and/or truck	Revenue, recycling and employment
Information dissemination/ Schools involvement	Barangay require schools to create and disseminate flyers on the benefits of 3R and organize small seminars for the community	Awareness and community involvement



**Figure 5. MRF of Barangay Tagapo (paper and tetra pack storage area)**

#### 4. Payatas, Quezon City

Quezon City has a land area of 2,818 hectares where 20% accounts for the land area of Payatas. The Payatas Dumpsite is the main terminal for the solid waste collected in the city. It covers 22 hectares (54 acres) and receives an average of 2,000 tons of MM garbage per day. 3,500 families live at the edges of the dumpsite surviving by scavenging for plastic, cardboard, paper, wood, glass, metal, tires and other items that can be sold to recycling agents (Pforr, 2005). Since 1995, Payatas population has approximately increased by 12% annually, far from the annual growth rate of 3.6% of the city. Moreover 80% of the population of Payatas are informal settlers,

consisting primarily of wastes pickers (Figure 6) (ADB, 2000). Most of the residents of Payatas have incomes below the official 1997 poverty threshold of 11,319 pesos annually.



**Figure 6. Scavengers finding recyclable products to sell**

More than 30 years of use and misuse of the open dumpsite took its toll when a hill of garbage fell on a community of informal settlers in Payatas due to continuous heavy rains brought by a storm in July 2000. Garbage piled up to 50 feet high crashed on the houses and shanties of the residents. In addition, methane gas emanating from the huge pile of garbage caused instantaneous combustion and fire, causing burn and inhalation problems for the people. The dumpsite was closed as a result of the tragedy. However, it was reopened again and only accepts the waste of Quezon City in the absence of alternative dumpsites.

The City government launched several pioneering and innovative projects as a response to the tragedy. In addition to implementing provisions of the ESWMA, other programs have also been put forward by the government in consideration of the principles of the 3Rs. Table 6 details these projects, action programs and the benefits.

**Table 6. Summary of Projects in Payatas**

<b>Program</b>	<b>Activities/ Projects</b>	<b>Benefits</b>
Conversion of the Payatas open dumpsite into a controlled waste disposal facility in compliance with ESWMA implementation	<p>Rehabilitation works:</p> <ul style="list-style-type: none"> <li>• slope reprofiling, stabilization and greening,</li> <li>• systematic way of collection and recirculation,</li> <li>• drainage system improvement,</li> <li>• fortified roadways and access to the site,</li> <li>• gas venting and material recovery</li> <li>• Composting and materials recovery facilities</li> <li>• Dumpsite security and safety</li> </ul>	<ul style="list-style-type: none"> <li>• Promotion of environmental health and safety</li> <li>• Stability of the dumpsite</li> <li>• Safety and livelihood needs of the community</li> </ul>
Conversion program of methane gas into electricity	Collaboration of city government with Philippine National Oil Corporation (PNOC)-EC to set up a 100-kW Pilot Methane Power Plant at the dumpsite in 2004	<ul style="list-style-type: none"> <li>• Free electricity for the people in Payatas (Ironing).</li> <li>• Streetlights in nearby roads are powered by the dumpsite</li> </ul>
Biogas Emissions Reduction Project	<ul style="list-style-type: none"> <li>• An agreement between Quezon City government and PANGEA Green Energy and its local counterpart, PANGEA Phils in 2007</li> <li>• Registered under the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC) on February 1, 2008</li> </ul>	<ul style="list-style-type: none"> <li>• Average annual reduction of greenhouse gas emissions by 116,000 tones CO<sub>2</sub>e (carbon dioxide equivalent)</li> <li>• Improve local air, water and soil quality; eliminate fires and explosion hazards and trashslides</li> <li>• Generates electricity and employment</li> <li>• Reduce exposure to toxic and hazardous gases</li> </ul>
The Used Tire Retrieval project of Holcim Cement	Retrieval/ collection of used tires dumped at the disposal facility for use by Holcim cement plant as alternative fuel	<ul style="list-style-type: none"> <li>• Reduction of tires dumped at the facility</li> <li>• Additional income for the waste pickers</li> </ul>
Raising the livelihood of waste pickers project	<ul style="list-style-type: none"> <li>• Creation of a formal group of accredited waste pickers who are regularly consulted</li> <li>• Assistance to junkshop operators in legitimizing their business or operation</li> <li>• Financing, education and skills training for scavengers, recyclers and junkshop operators</li> <li>• Amortization of trucks by some</li> </ul>	<ul style="list-style-type: none"> <li>• Prevention of infighting among the scavengers and enhance their recovery efficiency</li> <li>• Enable the scavengers to earn additional income and/ or embark on alternative livelihood</li> </ul>

<b>Program</b>	<b>Activities/ Projects</b>	<b>Benefits</b>
	groups for collection of garbage in nearby communities	
“Plantsahan ng Bayan”	Establishment of a space where people can avail free electricity for ironing	Free electricity for ironing for the people in Payatas
The Japan Fund for Poverty Reduction (JRPR) Project	Bridge Financing Revolving Fund	Provide bridge financing to purchase the 3.2 ha site in Payatas
	Site Development and Housing Construction Improvement Fund	<ul style="list-style-type: none"> <li>• Support for civil works including sewerage and road systems, and a program of individual loans up to 12,000 pesos per household for housing construction and/or housing improvements with labor contributed by the beneficiaries</li> <li>• Provision of special grant assistance to a portion of the victims of the garbage slide tragedy (100 families)</li> </ul>
	Livelihood and Microfinance Program	Provision of supplemental funding and expansion of existing microfinance program being implemented by Vincentian Missionaries Social Development Foundation, Inc. (VMSDFI) in Payatas
	Community-Based Health Insurance Program	Provision of a seed fund for the community-based health insurance program for GSHAI (Golden Shower Homeowners’ Association, Inc.) beneficiaries
	Education, Training, and Exchanges	Support expansion of existing VMSDFI program for nonformal education and training

As with other environmental management programs of the country, technical assistance, financial and institutional support are among the barriers towards actualization of mapped out plans. Budget constraints of the national government did not allow for LGUs to receive enough technical and institutional support from the national government for the implementation of ESWMA (Yamamura, 2005 as cited in Mercado, 2006). In fact, the Environmental Management Bureau only receives 7 million pesos annually to oversee the implementation of the ESWMA (Serrona & Yu, 2009). Mercado (2006) concludes that the “dispersal of limited amounts for a very large undertaking clearly shows the ineffectiveness of any effort to institutionalize a sustainable SWM system in the country.”

In terms of the 3Rs, considerable improvements can be seen if these measures will be effectively incorporated in the waste management plans of every LGU. However, the degree and nature of improvements toward sustainability vary and depend on the economic status of a country. High-income countries like Japan and South Korea can afford to spend for adoption of 3R technologies (Shekdar, 2008), whereas developing countries may have to prioritize other social and development issues.

In summary, the LGU-leg SWM project features the establishment of an MRF in compliance with ESWMA, information campaign on waste management by households, and garbage collection by Eco-aides. The lack of funding from national government may have hampered the implementation of a sophisticated SWM program, but creativity in generating projects in relation to the LGU's context certainly has room in such situations.

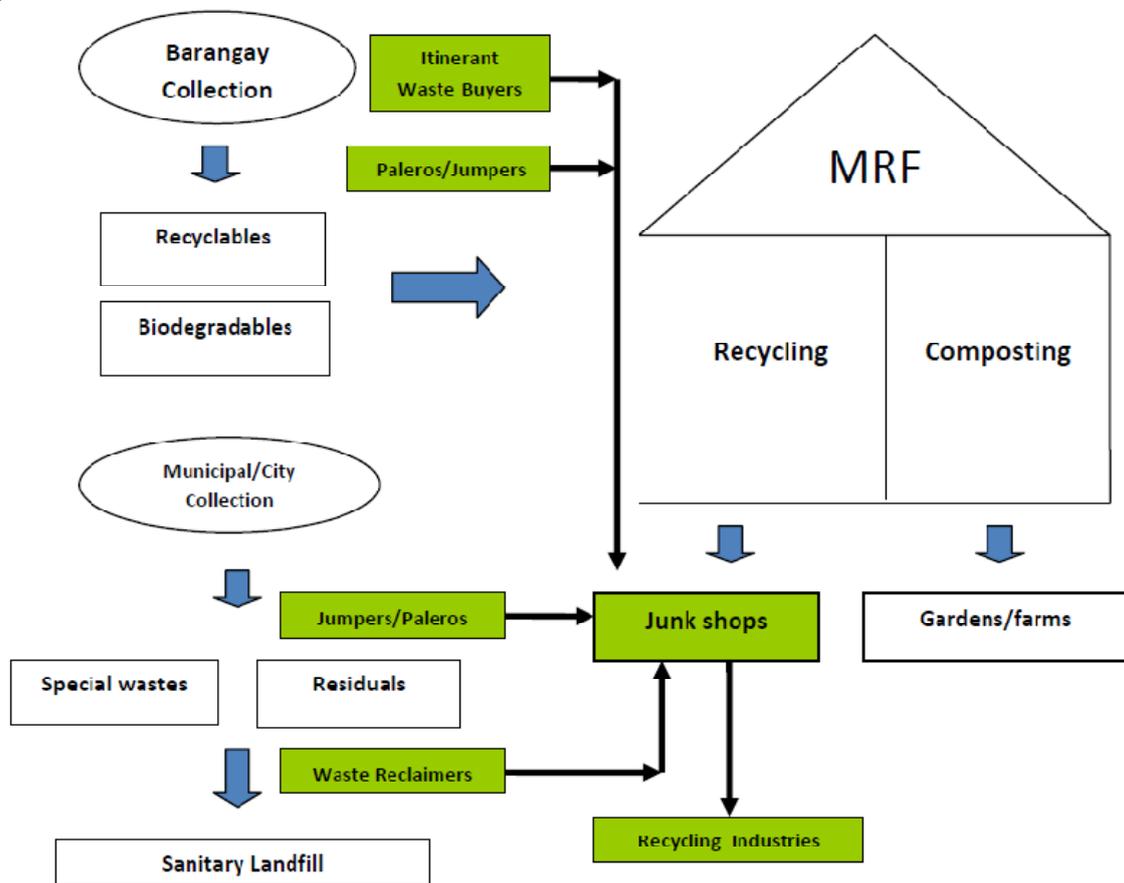
## **2.3 The Informal Sector in Waste Management**

The National Solid Waste Management Commission (2009) defines the informal waste sector “as individuals, families, groups or small enterprises engaged in the recovery of waste materials with revenue generation as the motivation either on a full-time or part-time basis”, and classifies them as follows:

1. Itinerant waste buyers (IWBs) - refer to waste collectors moving from house to house to accumulate sorted dry recyclable materials from households, which they buy or barter and then transport to a recycling shop of some kind
2. Jumpers - pertain to unauthorized persons recovering secondary raw materials from vehicles transporting MSW to disposal sites
3. Garbage crew - also known as “paleros”, perform similar tasks as jumpers. In contrast, they have consent from the government since they work with the LGU. To facilitate recovery, wastes are separated while en route to disposal facilities and sold upon reaching a specific junkshop.
4. Waste reclaimers at disposal facilities - individuals or groups living in close proximity to dumpsites that sort and recover recyclable materials from the dumpsite. They settle near the dumpsites to minimize transportation costs and utilize discarded wastes to construct their homes.
5. Junkshops - the buyers of the recyclables from aforementioned constituents of informal sector. These are the middlemen who connect lower hierarchy informal recyclers to consolidators who sell recovered materials to local recycling industries or exporters. Small, medium, and large scale junkshops exist whereby small scale junkshops operate without any business permits.

Despite their informality, the services the informal waste sector offer are quite organized.

Figure 7 provides a diagram showing the informal waste recycling system and the specific stage each of the five classifications of informal sector contributes to. In general, the informal sector refers to scavengers involved in the extraction of recyclable and reusable materials from mixed waste, some working for licensed waste-related enterprise, but not legally employed by the owner of the enterprise (Wilson, Velis, & Cheeseman, 2006; Aguinaldo, 2009). In the Philippine context, the formal sector involved in waste management includes the LGUs, the eco-aides and relevant workers involved in the collection of waste who are employed by the government or other entities. Table 7 summarizes the contribution of the formal and informal sectors in waste recovery and recycling. Waste collectors are differentiated as formal (street collectors and garbage crew) and informal (scavengers); the latter may also include those members of the informal sector who scavenge for sellable waste in the streets and not just the landfills or disposal sites.



**Figure 7. Role of Informal Waste Sector in the Conceptual Framework of RA 9003**  
Source: NSWMC, 2009

**Table 7. Collection of recyclable materials by primary collectors (kg/person/day)**

Recyclable Material	Primary Collector	MM	Metro Cebu	Southern Mindanao
Paper	Street Collectors	3.18	3.59	2.45
	Collection Workers	21.83	1.81	0.62
	Scavengers	22.01	8.21	12.86
Aluminum	Street Collectors	0.76	0.35	0.40
	Collection Workers	0.78	0.13	0.02
	Scavengers	2.50	0.05	1.79
Other Metals	Street Collectors	1.39	5.04	14.76
	Collection Workers	12.35	0.94	0.64
	Scavengers	16.75	6.34	13.75
Plastic	Street Collectors	1.63	3.94	3.50
	Collection Workers	9.79	0.50	0.63
	Scavengers	20.32	4.48	25.00
Glass	Street Collectors	0.85	0.58	6.65
	Collection Workers	6.58	0.26	0.94
	Scavengers	9.96	0.32	49.64

Source: JICA, 2008

The informal recycling sector has been found to significantly contribute to the higher recycling rates especially in MM (Wilson, Arabab, Chinwah, & Cheeseman, 2008). Even the NSWMC acknowledges that much of the 20% recovered recyclable materials are contributed by the operation of the informal waste sector (NSWMC, 2009). Recyclables collection done by scavengers in disposal sites are more than those collected by street collectors and collection workers in selected sites in MM, Cebu and Southern Mindanao as given in Table 7 (JICA, 2008, as cited in NSWMC, 2009). Undoubtedly, the informal sector has made a living out of collecting and selling recyclables. According to Amin (2005), the excess supply of manpower in urban areas has prompted these populations to offer services and create their own jobs.

The same situation can also be observed in rural areas where industrialization has sprung since the late 1980s. The lack of institutionalization of waste management has become an incentive for informal sector to source their living. Among others, they became jumpers and waste reclaimers. However, a more common sight in the provinces is the operation of IWBs who push their wooden carts from house to house collecting or buying recyclable wastes.

A majority of the organized informal waste sector groups are based in MM where the most widespread cooperative of junkshops is supported by a Nongovernment Organization (NGO), Linis Ganda (Clean and Beautiful Program). Similarly, associations of waste reclaimers are established in many disposal facilities within and beyond the outskirts of MM. Other organizations such as religious and private ones considerably help support informal waste recyclers.

## **2.4 Linis Ganda: Creating Opportunities in Recycling Household**

### **Wastes**

The significant role of IWBs on recycling rate in MM can be attributed to the support program known as “Linis Ganda” (Wilson, Arabab, Chinwah, & Cheeseman, 2008). Although its scope spans nationwide, it is deemed most active in the capital. Linis Ganda was established in 1983 with a focus on resource recovery and waste recycling programs (Bennagen, Nepomuceno, & Covar, 2002). In its Communication on Progress Report in 2004 for the United Nations Global Compact, Camacho (2004) traces the roots of this all-women organization starting out by collecting recyclables in households in San Juan (a city in MM) and conducting seminars to housewives to organizing junk shops and employing eco-aides. The organization was able to formalize some informal recyclers (termed as eco-aides) and organize cooperatives from waste dealers. Specifically, it is dedicated to formalizing the collection and disposal of recyclables from households back to its source or recycling facilities by coordinating with waste dealers, recycling institutions, waste pickers and government (Best Practices - "Linis Ganda" Program: Recycling Household Waste in Metro Manila; Metro Manila Linis-Ganda, Inc., 2008).

Linis Ganda generally promotes waste segregation at source, minimization of disposed garbage including street and river dumping as well as end disposal to landfills, and improvement of social acceptability and living conditions of junkshop owners and waste pickers (Bennagen, Nepomuceno, & Covar, 2002). Their key initiatives include (Wilson, Arabab, Chinwah, & Cheeseman, 2008):

1. Improving and strengthening link between middle dealers and itinerant buyers
2. Organizing recycling groups into cooperatives
3. Formalizing scavenging and encouraging participation among schools and households in waste segregation
4. Extensive information campaigns supporting their movement
5. Providing funding assistance for the informal sector

Linis Ganda provides livelihood to the underground economy, supplies raw materials to industries and artisans at a more affordable price, and ultimately reduces end garbage volume for disposal (Metro Manila Linis-Ganda, Inc., 2008; Troschinetz & Mihelcic, 2009; Camacho). Since its conception, their collection of recyclables has steadily increased through the aid of various stakeholders. Critical success factors to the movement lies on the leadership of Ms. Leonarda Camacho, founder of Linis Ganda, who gathered high level societal and political support. Problems encountered include the decline in prices for recovered materials in 1998 due to imported recyclables and tenure for middle dealers (Wilson, Arabab, Chinwah, & Cheeseman, 2008). Nevertheless, Linis Ganda proved to be a success providing recognition for the informal recycling sector. In addition, this organization proposed to a bill on segregating kitchen wastes in

1990 which was never taken up by the legislative body. They pursued until with enough political endorsement, in part due to the growing garbage crisis and Payatas tragedy in 2000, the bill was finally ratified (Camacho, 2005).

### **3. Opportunities and Issues in Formalizing the Informal Sector**

Around 50% to 80% of waste generated in developing countries are estimated to be collected with open dumping being the only disposal method seemingly available (Medina & Dows, 2000). MSWM in developing countries is commonly operating at low standards characterized by being unreliable with inadequate coverage and conflicting interests to other urban services (Wilson, Velis, & Cheeseman, 2006). This situation often results in uncontrolled and improper waste collection and disposal which invites informal sectors to facilitate waste recycling through scavenging or waste picking. Implementation of the ESWMA in the Philippines showed extensive contribution from the informal waste sector in enhancing recycling rate in the country while at the same time serving as source of income for those unemployed.

Local level implementation has seen various initiatives by barangays in compliance with their role. Although employment and revenue were generated from these barangay projects, profitability need to be significant for such efforts to be sustained because of the limited government funds allotted for waste management. In addition, some programs implemented were found to be inappropriate given the local conditions. Hence, there appears to be a skills gap among local constituents that needs to be addressed by the national government, or the National Ecology Center as mandated by the ESWMA. This failure may also imply the need to be critical in adopting solutions that appear to be successful in some barangays or in other countries. Conforming solutions fail when one fails to consider differences as that of the developed and developing countries solid waste management dilemma (Medina, 2000).

Developed and developing countries are at far significantly different as evidenced by income generated, standard of living, unemployment rate, consumption pattern, capital availability, and institutional capacity (Medina, 2000). Accordingly, apparent distinction exists between the solid waste management recycling system of developed countries and that of developing countries (Troschinetz & Mihelcic, 2009). Contrasts surface from research thrusts down to programs implementation as indicated by current operational status and prospective initiatives. Disparity may be attributed to developed countries having the capability to operate smoothly given adequate support, allocated funding, and well-designed systems.

#### **3.1 Decent Employment Opportunities from 3R Initiatives**

In general, all the barangays implementing solid waste management programs reported numerous benefits, spanning environmental, social and economic aspects parallel to the AP promulgated by the 3R Initiative:

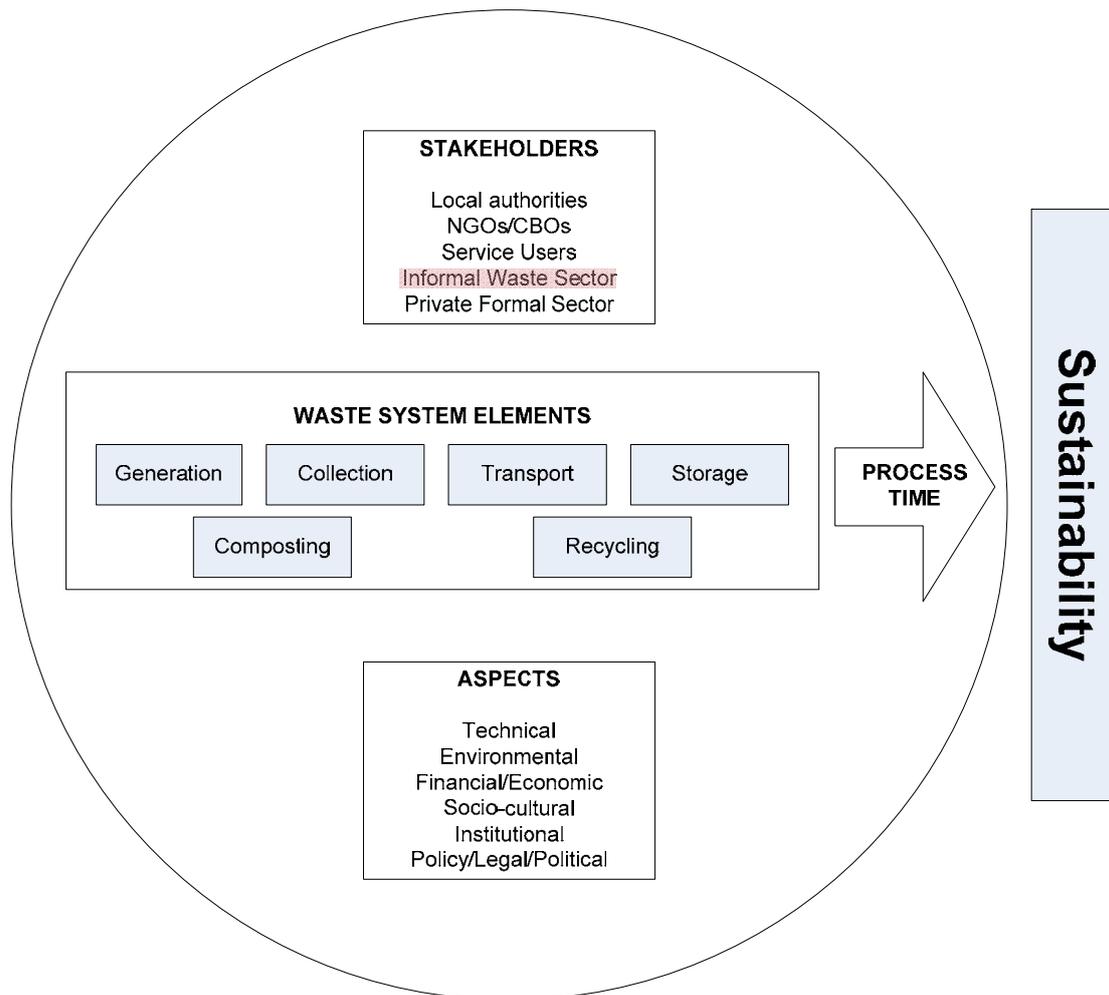
1. Conservation of natural resources
2. Waste reduction
3. Avoidance of illegal dumping practice
4. Team and skill capacity building and social network
5. Additional revenues from recycled materials and eco-project outputs (e.g. agri- / agro-)
6. Avoided disposal cost
7. Generation of decent employment with better health and hygiene working condition
8. Coordinated (facilitated) job division and income allocation through fair pricing

### **3.2 Integration of Informal Sector to Solid Waste Management**

Informal waste recycling sector appears to be an adaptive response to financial scarcity by disadvantaged populations (Wilson, Velis, & Cheeseman, 2006) in many third world countries where low-income neighborhoods, in particular informal settlements, abound. This expands throughout urban areas of developing countries estimated to support about 2% of the population in Asian and Latin American cities by means of selling collected items, in particular, recyclables (Medina, 2000). In actuality, this informal employment answers the daily living requirements of the poor as well as the limited cooperation in waste segregation by households and lack of effective municipal waste management program. Despite the significant contribution of the informal sector to waste recovery and trading of recyclables, there was a lack of policy and standards to their operation within the framework of RA 9003 until recently.

Recognizing the significance yet neglected existence of the informal waste sector, the NSWMC submitted a proposal to UNEP Regional Resource Center for Asia and the Pacific to support the development of a national framework on the management of the said sector under the Advanced Waste Management Project funded by the Japanese Government and the Institute for Global Environmental Strategies, Japan (Aguinaldo, 2009). This undertaking aims to develop and enhance the National Strategy and Action Plan to promote 3R and provide best practices of different countries from Southeast Asian region as a benchmark. Dimensions of the informal waste management system in the Philippines were assessed using the ISWM framework (Figure 8), developed by WASTE (a Dutch NGO) and its partners. The three dimensions evaluated include the stakeholders, waste system elements and sustainability aspects.

As a result, the NSWMC developed the National Framework Plan for the Informal Waste Sector in Solid Waste Management in May 2009 which is set for implementation in the current year. At present, sites for pilot implementation are being selected (Tandug, 2010).



**Figure 8. Integrated Solid Waste Management Framework developed by WASTE**  
Source: NSWMC, 2009

Under National Framework Plan, several key issues and challenges confront the informal waste sector (IWS) as identified by the SWM stakeholders. Economic problems top the list of concerns of the sector, but sub-sectors could have differing issues which may be any of the following:

1. Decreasing livelihood/ income as public awareness of the economic value of recyclable waste increases because waste generators sell recyclables directly to itinerant waste buyers and/or junkshops
2. Illegality of waste picking under RA 9003
3. Lack of secured access to sources of waste materials for IWBs
4. Lack of capital for the small and medium junkshops
5. Price fluctuations and the lack of intervention from authorities
6. Competition among stakeholders
7. Direct impact on the informal sector of market demand for post-consumer materials by recycling industries in the country and abroad

8. Effect of the concentration of recycling industries in a few cities in the country on the buying and selling prices of post-consumer materials
9. Occupational safety and environmental issues
10. Lack of recognition by the formal sector of the informal sector
11. Weak enforcement of relevant provisions of ESWMA
12. Lack of policy to regulate informal sector activities

Considering these issues, the vision for the informal waste is to be recognized as a partner of public and private institutions, organizations and corporations in the promotion and implementation of the 3Rs with the end in view of alleviating poverty. Hence, the informal sector needs to be integrated in the SWM system by providing them with a favorable policy environment, skills development and access to a secured livelihood, employment and social services. As part of the country's National Framework Plan, the goals for this sector include the following:

1. Formulate and enforce policies that enable integration of the informal waste sector in the formal SWM system,
2. Provide the informal waste sector access to employment and alternative livelihood opportunities through skills development, and protection from occupational hazards and risks,
3. Grant the informal waste sector social services including sanitation and health, education and housing,
4. Facilitate and strengthen informal waste sector partnership with the local governments, private sectors, non-government sectors, and other civil society, and
5. Enforce the laws on child labor in relation to waste management activities.

Based on the National Framework Plan for the Informal Sector in SWM, interventions in support of the goals for the informal sector have also been drafted (NSWMC, 2009):

1. Supporting waste reclaimers to enter new service roles and niches in separate collection, recycling and composting,
2. Assuring structural access to sorting space at transfer stations, MRFs, composting facilities and sanitary landfills,
3. Opening channels of communication with formal stakeholders and decision-makers and into the planning process,
4. Supporting better market leverage and/or diversification of activities through cooperatives and associations
5. Improving the work conditions through the implementation of environmental and occupational safety practices and systems.

### **3.3 Waste Reduction VS Income for Informal Waste Sector**

While waste management projects implemented in the different barangays generated employment and revenues, a reduction in the quantity and quality of the recyclables brought to the dumpsite could lead to a reduction in the income of waste scavengers at disposal sites. Job and revenue opportunities created in the barangays or cities divert the income that can be otherwise earned by informal waste sector. Scavengers are at the bottom of the hierarchy of informal waste sector (Wilson, Velis and Cheeseman, 2005) which implies that they are the least paid and more vulnerable among the group. Waste management measures such as strengthening implementation of waste segregation at source and employment of eco-aides to collect recyclables from households can easily threaten the daily subsistence of the waste pickers.

Although waste picking contributes to survival of the informal settlements, a more important consideration should be the health risk accompanying it due to exposure to different toxic and hazardous wastes and the lack of protective equipment. However, these risks are not a priority among these underprivileged communities. In addition, there have been plans to relocate the scavengers living in dumpsites by relevant government units thereby threatening their livelihood in the short run. While it is likely that these relocated community of scavengers can keep coming back to the disposal facility to earn a living especially if they still see potential earnings from collecting garbage, providing them with alternative skills to enable them to perform new roles in the waste management sector can benefit them from decreased occupational hazard.

On a different note, scavengers may also end up having decreased earnings due to government regulation and incentive in favor of upstream recycling. Movement towards promoting products manufactured in a less polluting manner or those that come in less packaging has been the focus in recent years. However, consumption pattern will also have an effect on the amount of waste generation and not just the production process. If consumers will think of an environmentally sustainable product in terms of its packaging, and decide to consume more of that good, then more waste will be left of it. On the other hand, the promotion of more sustainable production processes can increase the demand for green jobs. Although this is not comparable to the skill level of scavengers, investing on not only training the older waste picker population for additional skills, but also on education of the younger population can serve as an alternative livelihood program for those population that will be displaced.

## 4. Conclusion and Recommendations

Waste is one of the things on earth that are inevitable, and like the concept of industrial metabolism “what goes in must come out”. In most cities and municipalities in the Philippines, waste management is becoming an urgent environmental problem as highly visible wastes linger on street corners and even sidewalks. As a developing country, other needs may have to be met first before environmental concerns. To have a solution, then, suggests that environmental measures or projects be less expensive or profit-oriented, and that which would encourage the people to participate.

More than 3.45 billion pesos is spent annually for waste collection in MM (Westfall & Allen, 2004), yet the informal waste sector is found to contribute significantly in waste diversion and recycling at no cost to the LGU. The passage and implementation of the ESWMA pushed LGUs to design and execute their own programs and projects. While some have been successful as proven by waste diversion rates of more than the target of 25% owing to the contribution of the informal sector, a number of LGUs lag behind. To add to the insufficient implementation of guidelines, the ESWMA remains to be anonymous to majority of the population due to a lack of dissemination.

The recent recognition of the NSWMC of the informal sector’s contribution to waste management had it recommending a national framework incorporating the informal sector in SWM. Linis Ganda has accomplished some success in organizing cooperatives of junk shops and formalizing work of eco-aides. Considering socio-economic aspects such as work safety and security, and social services, formalizing this informal waste sector could potentially achieve these basic rights, but without disadvantage to probably a significant portion of the sector. As emphasized in the study of Agarwal, et al. (2005) on the economics of organizing the waste collecting activities of the informal sector in Delhi, around 68,000 jobs out of the estimated 89,600 members of the sector will be lost in the process despite its financial viability. Hence, taking advantage of the “organized” services of the informal sector affords the government the benefits of enhanced recycling rates and waste diversion at a lesser cost because of diverted cost of waste collection for the formal sector, but the government must be careful in providing alternatives for the displaced informal sector as socio-economic consequences are apparent in their context.

Existing policies and action programs under ESWMA illustrate challenges and issues in implementation. With the lack of funding, progress has also been slow. Westfall and Allen (2004) argue that the law has potential to address the waste management problems of the country. Hence, strengthening implementation should be prioritized by the government in addition to the inclusion of informal sector services. Because at the heart of the ESWMA is the concept of 3R, other issues can also be included in future research:

- A. *Lack of explicit vision and mission statements.* Vision and mission statements were not explicitly made in most of the strategies, especially for social benefit and its quantification. This could be a strong basis for subsidy and funding allocation if appropriate cost-benefit analysis (CBA) is in place. Moreover, too much priority is placed on the ecological benefit.
- B. *Clear sustainability targets on decent jobs.* There is a lack of monitoring multi-target values and indicators corresponding to these targets: (i) economic values of job creation, (ii) data were not systematically collected and if surveyed through interview, the informal sector could not readily provide quantified figures, and (iii) a short-term longitudinal work over the period of several projects conducted (e.g. Payatas) could have plotted the economic benefits through job generation, among others. The two cases of entrepreneurship might be sufficient in qualitative but insufficient for quantitative justification, these targets should be properly communicated and identified to the stakeholders.
- C. *Lack of financial mechanism to sustain the logistics needed for the 3Rs.* There is a need to strengthen the financial mechanism to sustain most of the local government efforts, especially in operating the MRF and the infrastructure supporting the logistics, e.g. eco-bike, eco-truck, road access, among others. Economic benefits derived from the cases mentioned were minimal and not enough to support waste management and the 3R activities of the barangays. While volunteerism in the barangays is commendable, the program could have investigated on more efficient logistics and higher value conversion of the waste to pave way for a sustainable 3R action program.
- D. *Missing accreditation in the upstream efforts.* Efforts have been placed heavily on the post-consumption recycling. While recognition on eco-design of product is present, there is a need to upscale both eco-labeling (e.g., increase eco-product list from a dozen to thousand products as accomplished in many neighboring developed countries) and operationalization of the green public procurement law. Job creation in these two upstream programs should be credited to the 3R strategy.
- E. *Facilitate a behavioral change on consumption patterns.* Although sustainable production patterns are often presented as the most important need for economies, there is an equal need to promote sustainable consumption patterns. This is relevant both for individual consumption decision of citizens and for corporate and public consumption decisions. Although it may be noted that complete closing of loop might sound sustainable, there is still a lack of technological capability to up-cycle the loop-closing nature of material flow, and the enormous amount of energy to circulate the material flow

in the closed-loop would require a low-carbon emission type of emerging energy source. Hence, there is a need to consume smartly wherein the pattern is associated with low-carbon dematerialized features. Job creation at LGUs and through 3R promotion in schools could be effective and would need further enhancement.

- F. *Policy on poverty elimination to supplement at post-recycling era.* There is a need for national and local government to look beyond the post-recycling era. The decreasing trend on waste collection at landfill could be due to more awareness of population in recycling activities. Hence, diversification of peripheral 3R supportive programs should be pre-planned. Poverty elimination should be an ultimate goal, and new job creation and skills enhancement could accommodate the vast population of the informal waste picking sector.

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