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BREAKTHROUGHS IN SOLID WASTE MANAGEMENT: LESSONS FROM SELECTED MUNICIPALITY AND BARANGAY IN THE PHILIPPINES

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Introduction

The problem of managing solid waste has started many decades ago. “Human activities create waste and it is the way these wastes are handled, stored, collected and disposed of, which can post risks to the environment and to public health” (Zurbrugg 2002: 1). Waste can be a resource if only we could learn how to manage it properly, “but since the 1960s the problem of disposing of our mixed waste has reached crisis proportions” (Ancheta 2004:308). The affluent lifestyle brought about by modernization and development aggravates the problem of waste management. The rise of mega-cities² in the 1990s has also contributed to the growing problems of waste.

Given limited technology and resources, developing countries are more severely affected by waste management problems compared to developed countries which have the privilege of employing advanced technologies. Inefficient waste collection and the lack of disposal facilities are a common problem in developing countries. Even though solid waste management has been the object of many studies and policies in the past decades, still up to the present time these solid waste management problems have continued to be a burden in many cities and municipalities especially in developing countries.

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² Mega Cities are cities having 10 million population or more.

Thus, this paper focuses on how to address the solid waste management problems in developing countries with insufficient resources. It aims to present sound solid waste management strategy with relatively low cost but with a high level of efficiency. This paper highlights the lessons derived from the study of cases in the Philippines. It deals with the processes and mechanisms involved in the governance of solid waste management specifically on how appropriate technologies and approaches can be identified.

Solid Waste Management: Its Issues and Concerns

As defined in the RA 9003, ecological solid waste management refers to the “discipline associated with the control of generation, storage, collection, transfer and transport, processing, and disposal of solid wastes in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics, and other environmental considerations, and that is also responsive to public attitudes” (Republic of the Philippines RA 9003, Article 2, Section 3). Zurbrugg (2002) notes that solid waste management is “definitely not only a technical challenge” (Zurbrugg 2002: 11). On the other hand, Ancheta (2005: 136) argues that “solid waste disposal is a behavioral problem but commonly studied from a quantitative perspective.” She further states that one of the reasons why most waste management strategies are not sustainable is because they try to offer “technical solutions” and do not really address the “root cause” of the problem which is the disposal practices of the waste generators (Ancheta 2005).

Another important consideration in finding an appropriate solution or strategy to address the solid waste management problem in developing countries is to understand the characteristics of the solid waste generated and the conditions in the surrounding area. In most developing countries, the municipal solid waste stream is “dominated by organics.” This means that the use of incineration is difficult, that the use of composting is necessary; and that industrial hazardous waste is commonly mixed with municipal solid waste. There are also a huge number of people in the informal sector who are actively involved in waste collection, separation, and recycling. There is often a shortage of capital and human resource to manage the waste; and there is a lack of physical infrastructure in urban areas to make the waste collection more efficient, and therefore the situation calls for “low-tech” solutions (UNEP-IETC 1996).

In this paper, I will discuss the issues of solid waste management by looking at the environmental governance of solid waste management, the relationship of the different sectors of the society and the processes involved in identifying technologies in solid waste management that will be appropriate in developing countries. Thus in this paper, environmental governance refers to the processes and mechanisms that integrates the different elements of solid waste management such as the policy regulators (national government and local government units [LGUs]), the different organizations (NGOs, people’s organizations [POs], business sectors), the community (local people), and the required technology towards the implementation of a sound solid waste management in developing countries, particularly in the Philippines.

The Solid Waste Management System in the Philippines

As a developing country, the Philippine government is also facing several issues and concerns in solid waste management. According to the IBRD/WB (1999) report, the Philippines is one of the Asian countries which is facing the greatest waste management challenge based on the country's projected rate of waste generation and the resources available to dealing with the problem. Rapid population growth and urbanization contribute to the country's problem of waste. The Philippines' population exhibited a huge increase from 27 million in the 1960s to 88.57 million in 2007 (Espaldon and Baltazar 2004; NSO 2008). The annual population growth rate is 2.04 % for the period 2000-2007 (NSO 2008). Out of the country's population of 82.8 million in 2005, about 63% (51.8 million) lived in urban areas (Mangahas 2006).

This tremendous increase in population contributes to the increased generation of solid waste in the country. It is estimated that one person generates about half a kilo of waste per day and the variety of waste is increasing due to modern lifestyles (Philippines Canada-LGSP 2003). The country's waste generation per day is 19,700 tons and it is projected that there will have been an increase of 47 percent by 2010 (*Philstar*, 24 May 2007).

To address the huge problem of solid waste management in the country, the Philippines RA 9003³, known as the "Ecological solid waste management act of 2000", was enacted on January 26, 2001. The law mandates all, and specifically the LGUs "to adopt a systematic, comprehensive and ecological solid waste management program"

³ For more details about RA 9003, please see the National Solid Waste Management Commission (NSWMC) official website at <<http://eia.emb.gov.ph/nswmc>>

(Republic of the Philippines, RA 9003). The act prohibits the establishment and operation of new open dump sites upon the act coming into force. It further states that open dump sites should be converted into controlled dumpsites by February 2004; and those converted dumpsites should be closed by February 2006. As an alternative, sanitary landfills should be developed as a final disposal site but they should be operated in accordance with the guidelines presented in the act. It also promotes waste minimization through recycling, resource recovery, reuse, and composting (*Ibid*).

With all these responsibilities entrusted to LGUs and given the constraints of financial and technical capabilities, many of the municipal mayors are bewildered about how to comply with the law. Thus, even with the deadline set by the National Solid Waste Management Commission (NSWMC) still many municipalities have failed to implement the law in their areas. Peña reported that some of the mayors have already been prosecuted for not implementing the law (*Sunstar Pampaga*, 13 May 2005). The high cost needed for the closure of dumpsites and for the establishment of alternative disposal facilities, and the lack of technical and human resources are the common constraints for complying with the law. However, there are some municipalities that, despite some hurdles, have been able to implement solid waste management programs successfully in their localities.

Discussion of Selected Successful Cases: The Breakthroughs

In the following pages, I will discuss the experiences of the Municipality of Los Baños, Laguna, and Barangay Bagumbuhay of Quezon City, on how they have been able to

address the problems on solid waste management in their localities even with limited resources. The cases are selected based on their successful implementation of innovative solid waste management strategies in terms of effectiveness, sustainability and replicability.

Breakthroughs in Solid Waste Management Through Participation and Community Mobilization: The Experience of Los Baños, Laguna, Philippines

The Municipality of Los Baños, a small urban area in the province of Laguna is situated 63 kilometers south of Manila, and has a total land area of an approximately 5,650 hectares. It is composed of 14 barangays⁴ with a total population of 92,071 (Perez 2006). In recognition of its role as a center for research into agricultural development and environmental preservation, Los Baños was declared a “Special Science and Nature City of the Philippines” on 7 August 2000 through Presidential Proclamation No. 349. (Wikipedia 2006). Aside from the town’s significant academic role in science and research, Los Baños is also known for its hot spring resorts which attract many tourists, especially during weekends and the summer season. According to Perez, there are about 2,500 commercial establishments, two public markets, and 17,030 households in the municipality that contribute to the generation of approximately 33-35 tons of solid wastes per day (Perez 2006).

⁴ Barangay is a smallest political unit in the Philippines

The Former Solid Waste Management System in the Municipality

The influx of people and booming of commercial establishments in Los Baños in the past decades caused an increased generation of solid waste in the municipality. Open dumping was the common practice by the community previously, and there was no clear solid waste management system in the municipality. People had no discipline in managing their own wastes. Solid wastes were indiscriminately thrown everywhere without consideration to their negative effects on the environment and health of the community. Open dumps were also visible along the riverbanks and in flat areas near bodies of water.

In addition, Mount Makiling, which was one of the most popular places for ecotourism activities, became the location of the municipality's dumping site. This open dumpsite became an eyesore to the municipality and a threat to the health of the nearby community due to leachates and the noxious gases from the burning of wastes. This condition urged the local government and other sectors of the municipality work together in the pursuit for a "better, cleaner, and healthier community" (Perez *et al.* 2002: 15).

Major Breakthroughs in Solid Waste Management

The Conversion of the Formerly Open Dumpsite into an Ecological Waste Processing Center (EWPC)

The problems of solid waste in Los Baños started more than 20 years ago. However, it was only in the year 2001 that these issues were given much attention when Mayor Caesar Perez took office as the Mayor of Los Baños. He started his programs on solid waste management with the implementation of the Municipal Ordinance 2001-08 of 17 August 2001, the “Anti-littering and waste segregation program.” This ordinance enforced the strict implementation of the waste and segregation scheme, the collection schedule for the biodegradable and non-biodegradable wastes, and the penalties for non-compliance (Municipality of Los Baños, Laguna 2001).

The local government also created a technical working group to study and discuss different issues and concerns in solid waste management and to develop a viable solid waste management strategy suited to the community. The Municipal Solid Waste Management Board and the Anti-littering Task Force were also created to assist the implementation of the municipal ordinances. The board is chaired by the Municipal Mayor Caesar Perez with members composed of representatives from the government organizations and private sectors (Perez 2002), while the task force is composed of citizen volunteers, barangay officials, UP Police Force, civic organizations, government employees, and any legitimate Los Baños residents” (Municipality of Los Baños, Laguna 2001).

After years of labor, the town's former open dumpsite commenced its conversion into an ecological waste processing center (EWPC) on June 14, 2004. This EWPC was categorized as an MRF by the Department of Environment and Natural Resources. In the EWPC, the operations included the following procedures: segregation at source, unloading of bio-wastes, final sorting of bio-waste, composting, and shredding of residual wastes, specifically plastics.

Establishment of the Los Baños Solid Waste Organization (LB-SWO)

The informal sector here refers to the group of individuals whose main source of livelihood is scavenging and selling wastes. This sector contributes a lot in the reduction of solid waste in the municipality. However, their contribution is not even recognized, but instead they are often mistreated and demeaned, or worse they are sometimes mistaken as thieves. With the implementation of the Philippine Society for the Study of Nature, Inc. (PSSN)- Philippine-Australia Community Assistance Program (PACAP)'s project, entitled "*Enhancing the role of the informal sector in solid waste management in Los Baños, Laguna,*" this sector was formed into a people's organization and their significance to the community has been recognized. This project was implemented by PSSN in collaboration with the School of Environmental Science and Management- University of the Philippines Los Baños (SESAM-UPLB) and the Local Government of Los Baños. It was funded by the Australian Agency for International Development through PACAP.

After the necessary processes and criteria for selection, 54 beneficiaries became members of the LB-SWO. The members also elected a set of officers from among

themselves. LB-SWO officers and members were formally introduced to the different sectors of the municipality (LGUs, households and homeowners, commercial, religious, schools, transportation, etc.). They were given an official ID signed by Mayor Perez and the LB-SWO president and they were formally proclaimed as the official waste collectors of the municipality. Human resource development (HRD) and training for the officers were also conducted by the Project Management team and other volunteers to equip them for their roles and responsibilities. The project also gave seed money, official uniforms, and pedicabs to the members of the LB-SWO. Members of the PO were given the right to borrow a certain amount from the seed money as starting capital for trading in wastes. Through this activity, they were able to increase their income and they are now active partners of the local government in the implementation of the solid waste management programs in the municipality.

Factors Contributing to the Breakthrough of Los Baños, Laguna in Solid Waste Management

Figure 1 shows how a participation and community mobilization approach contributed to the Los Baños breakthrough on SWM. This success can be attributed to the following factors (Atienza 2007):

People-orientation and strong political leadership. One of the important characteristics of Mayor Perez's leadership is the importance of instilling discipline among his constituents. He says that, "No amount of so-called high technology and financial

capability can solve the garbage problem without discipline” (Perez 2006: 60). He further adds that, “discipline is the road to progress” (*Ibid*).

Strong collaboration among the different sectors of the community. Governance does not mean government alone. It means collaboration among local people, businesses, citizens, NGOs, and administrative authorities. Thus, the local government of Los Baños conducted a multi-sector dialogues, forums, and series of meetings with different sectors of the community in the search for, and implementation of, an effective SWM management programs in their locality.

Figure 1 Participatory and Community Mobilization as an Approach in Search of an Effective SWM System

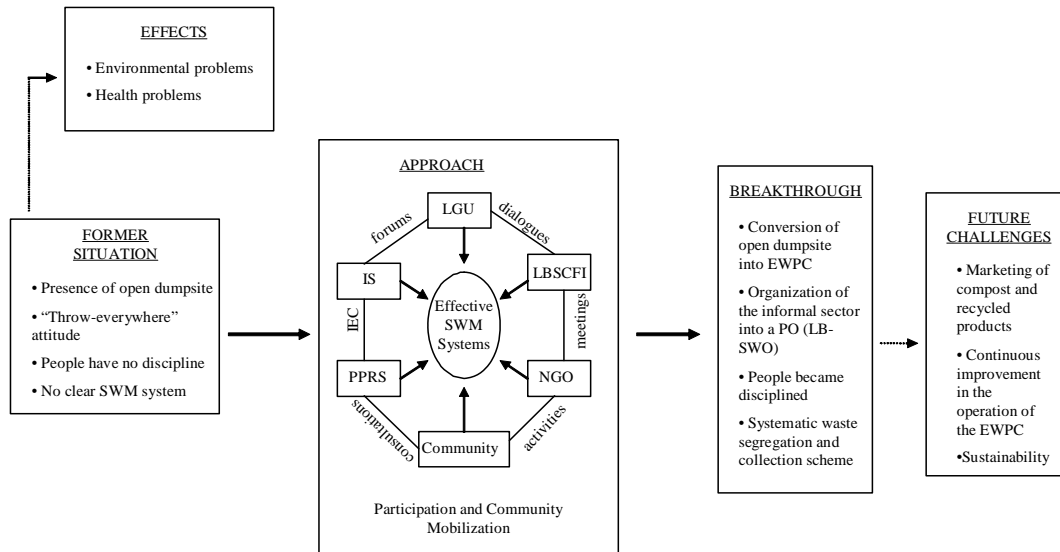


Figure 1. Participatory and community mobilization as an approach in search for an effective SWM system

Legend: LGU- local government unit

IS – informal sector

PPRS – public, private, religious sectors

EWPC- Ecological Solid Waste Processing Center

IEC – information, education, and communication

NGO- non-government organization

LBSCFI- Los Baños Science Community Foundation, Inc.

LBSWO - Los Baños Solid Waste Organization

PO – People's organization

Source: Atienza 2007. *Ritsumeikan Journal of Asia Pacific Studies*.

Massive information, education, and communication (IEC) campaign. The local government of Los Baños, in cooperation with the different sectors of the community, conducted massive information, education, and communication (IEC) campaigns to build the right attitudes among members of the community towards environmental issues and thus made them more cooperative in SWM activities and practices. They also launched an IEC campaign to minimize the use of plastic bags and to promote the use of the biodegradable packaging materials instead such as *bayong* (baskets made from coconut fiber), *telang supot* (bags made from cloth) and paper bags. The “non-use” of

plastics, styrofoam, and disposable plates and cutlery in restaurants and fast food chains is also encouraged.

Successful implementation of solid waste management at the barangay level through the use of low cost and local technology: The Experience of Barangay Bagumbuhay, Quezon City

Barangay Bagumbuhay belongs to District 3 of Quezon City and it has a total land area of 23.5 hectares with a population of 6,507 (Quezon City 2007; Mother Earth Foundation n.d.). Quezon City is located in the Northeastern part of Metro Manila. It is the biggest among the National Capital Regions's 17 LGUs with a total land area of 16,112.12 hectares which is almost one-fourth of the National Capital Region (NCR). In terms of population, Quezon City is also the largest city in the Metro Manila region with about 2.17 million people spread over four districts and 142 barangays (Quezon City 2007).

The former problem of solid waste management

Prior to the implementation of the SWM program in 2001, Barangay Bagumbuhay had a problem in managing their waste. The garbage trucks did not come regularly to pick up garbage and at the same time they could not enter most of the streets because they were too narrow and there were low electric overhead cables in the way. Only waste from four out of 23 streets in the barangay was being collected properly, and thus

they were piles of garbage all over the area. The initial fund of the barangay to start the solid waste management program at that time was only ₱45,000. But it did not hamper them in implementing the program but rather it gave them a way to search for more innovative ways to solve the solid waste management program in the barangay.

Strategies in addressing the problems of solid waste management

Creation of ordinances, conducting a strong IEC campaign, and participation by the different sectors of the community. The first thing that Chairman Datiles did was to make a field visit to a barangay which had been practicing solid waste management already. After seeing how other barangays had been managing their waste, he tried to implement what he learned from them into his own barangay. Since their initial budget of ₱45,000 was already spent in the preparatory activities like cleaning the abandoned land to be developed into the MRF and for the installation of water and electricity, they entrusted the construction of the MRF to the *barangay tanods* (village auxiliary security force). They were also able to get drums where they put the biodegradable waste to decompose and make into compost. The Mother Earth Foundation and the NSWMC assisted them in the implementation of the waste management activities in the barangay.

To strengthen the implementation of RA 9003, the barangay officials also formulated a Barangay Ordinance Number 5-S-2003 (Barangay Bagumbuhay 2003) promoting the proper segregation and disposal of waste, and laying down corresponding penalties for non-compliance. They also tapped the resources of the private organizations and

NGOs, religious groups, and other organizations to help the barangay officials in the house-to-house IEC campaign and general assembly. However, in spite of these efforts there were still others who did not want to collaborate with the program. So, they drew on the help of the senior citizens because since they had lived longer in the community, everyone knew and respected them. To reinforce the program, they also created an “ecology police” who are hired by the barangay to make daily rounds every morning and afternoon to make sure that the residents were complying with the ordinance. They give citation tickets or notices of violation to those who had not obeyed the ordinance.

Application of low cost and local technology

a. Composting of biodegradable waste and selling recyclable waste. Barangay Bagumbuhay was able to construct their own MRF in cooperation with the members of the community. Even using one composting drum turned manually and a small area for storage of recyclable materials, the barangay managed an initial stage compliance rate of between 10 and 15% (MEF n.d.). When the staff from the Department of Environment and Natural Resources (DENR) visited their eco-center, they gave the barangay a two-ton composting drum. Through this, they were able to compost more waste more efficiently and later they earned more money and bought another two two-ton composting drums. They also have obtained three shredders to make the operations of the eco-center more efficient.

b. Making paving tiles from residual waste. Due to lack of resources, they could not afford to buy a pulverizing machine for plastics. Thus, they drew on help from the

“indigent sector” which includes some of the poorest families in the community. Thirty families from the indigent sector have been given the job of collecting the residual waste, cleaning it and cutting it into small shreds. Then, they bring the shredded waste (mainly plastics) to the barangay and sell it for P25-P30 per kilo. The barangay mixes the shredded residual waste with other materials and manufactures tiles. Some of their tiles were use for the beautification of sidewalks and pathways along Aurora and P. Tuazon Avenues, Quezon City.

c. “*Basura Mo, Ipalit Mo*” (Waste-for-Goods Exchange) Program. In this program, residents gain a certain points every time they give their biodegradable and recyclable waste to the eco-aides and they can exchange their points to the barangay hall for other items that they need like rice, medicines, laundry soap, and shampoo, among others. Through this program the residents have been encouraged to segregate their waste and have learned to value it, and therefore they do not just dump it anywhere.

Benefits of the Effective Implementation of the Solid Waste Management Program

Reduced volume of waste and financial savings. Through composting and recycling, Barangay Bagumbuhay was able to divert 65% of their waste from the dump. In just three years, they were able to reduce the number of trips of trucks to collect garbage from 10 trips to 1.5 trips in one week and therefore, the barangay has saved a lot in the hauling services for their garbage. Thus, they received in 2006 an incentive rebate from

the City Government amounting to ₱1.2 million cash to continue the operation of the eco-center.

Increased income for the barangay and the community. With the establishment of the LB-SWO in Los Baños, the members of the organization were given their own capital to buy waste. Unlike before that they had to sell their collected waste to the junkshops from which they borrowed capital in a price which was normally cheaper compared to that of other junkshops or other big companies, they could now sell their collected waste in any junkshops offering higher prices and therefore they increased income.

In Barangay Bagumbuhay, the barangay has earned extra income by selling compost, recyclables and paving tiles. The barangay can produce about 800-1000 kilos of compost per week and they sell it to Manila Seedling Company for ₱5 per kilo. They also sell about 70-80% of their biodegradable waste (kitchen waste) to the piggery as food. Since the members of the eco-police are low ranking and low paid, they have been given a share of the income from the scheme. Thus the profits from the compost and recyclables are divided between the barangay (50%) and the eco-police (50%). The local community also earns by selling its waste to the barangay through the *Basura Mo, Ipalit Mo* Program. The indigent sector also earns some money by cutting residuals into small shreds and selling them to the barangay as materials to be manufactured into paving tiles.

Upliftment of the informal sector. Aside from the financial benefits, the recognition of the contribution of the informal sector particularly the members of the LBSWO has allowed

this group to develop a “sense of pride” in their work. They are now active partners of the local government in the implementation of the solid waste activities in the municipality.

Healthier and cleaner community. Contrary to the former situation, the Municipality of Los Baños is now very clean and no visible garbage is present, even on road sides. The dump is also clean and odor-free. Products from recyclable materials like school chairs and desks made from recycled plastics, and compost products can also be seen in the EWPC. The community has become disciplined and more conscious about litter. With its successful implementation of solid waste management programs, Los Baños became one of the model towns in solid waste management in the Philippines. It received two awards in 2005, namely: 1) the Pollution Control Association of the Philippines (PCAPI) award; and the 2) *Gawad Galing Pook* award by the *Galing Pook* Foundation in recognition for the Los Baños Ecological Solid Waste Program as a “*Katangi-tanging Programang Pampamahalaang Lokal*” (Trailblazing Program) for the country as a whole for 2005.

Similarly, Barangay Bagumbuhay is also now very clean and more beautiful unlike before where there were piles of garbage in the surroundings. According to the report of the barangay health clinic, there is also a decrease of about 70-75% in the number of health patients suffering from diarrhea, typhoid fever, and other waste-related diseases after the implementation of the solid waste management program in the barangay (Telephone interview with Chairman Datiles, 10 June 2008). The barangay was also awarded the titles of the “Most Outstanding Barangay” in the whole of District 3, the “Most Outstanding Barangay” in Quezon City; and a “Model Barangay” nationwide.

Some Lessons

This paper shows that good governance as characterized by transparent and participatory decision-making and community mobilization can be an effective means to achieve sound solid waste management despite the lack of financial and technical resources. Some of the lessons derived from the cases studied include the following:

Lack of money and technical resources is not a hindrance to implement a solid waste management program. Based on the experiences of the two cases discussed, both of them were able to effectively implement their solid waste management programs with relatively low cost but with a high level of efficiency. Both cases have become innovative and they have learned to identify the appropriate technology based on the local condition and available resources in the area.

Strong political will of the leaders plays a very important role to successfully implement the solid waste management programs. From the experiences of the cases discussed, it showed that the political will of the leaders to strictly enforce solid waste management ordinances and to govern their constituents was an important element for successful implementations of the programs. “Responsible leadership is critical in providing direction and mobilizing resources to bring about results” (Mangahas 2006: 303).

The need for participation and community mobilization. With limited resources plus with the pressure of time, addressing the several issues in solid waste management is really

beyond the capabilities of the LGUs alone. In the cases discussed, it was evident that the participation of the different sectors of the society has played a very important role in the successful implementation of their solid waste management programs.

Application of low cost, local, and appropriate technology. The cases studied have learned that the simplest way to address the huge problem of waste was through waste reduction, recycling, reuse and composting. As shown in their experiences, both of them have also applied a low cost and local technology which is more appropriate in most developing countries like the Philippines.

Turning solid waste into a resource is a Win-win situation. Turning waste into a resource by using low cost and local technology is a “win-win situation” for the local government units, the community and to the society as a whole.

Conclusions and Policy Recommendations

From the experiences of cases studied, it shows that the with the strong political will of the leaders, the practice of participation and community mobilization, and the use of low cost and local technology, they have been able to address the problems on solid waste management with relatively low cost but with a high level of efficiency. Based on the study conducted by the USAID-assisted Philippine Environmental Governance (EcoGov) Project in 2003 in nine cities and 10 municipalities (outside of Metro Manila) in the country, about 60 percent of waste are biodegradable, about 20 percent are

recyclables and only 2 percent are special waste. This means that about 80 percent of waste generated need not be thrown to dumpsites and therefore only about 18 percent residual waste is left for the municipality to worry about (The Philippines' Brown Environment 2005).

As shown by the cases discussed, even some of the residuals like plastics could also be processed already into usable products like paving tiles, chairs, tables, among others. This proves that we really do not need expensive and advanced technology but instead, only the simple and cheaper technology. Also, application of this technology not only addresses the problems on solid waste management but it also creates additional livelihood opportunities to the members of the community. Thus, the application of this kind of technology does not only address the solid waste management problem but it also contributes in addressing the poverty problems in the country.

The results of this study also show that environmental governance is critical to the attainment of a sound solid waste management. Based on the experiences of the cases studied, it showed that good governance coupled with appropriate technology have led them to successfully address the problems on solid waste management despite of limited financial and technical resources.

It is hoped that this study has presented practical contribution on how to address the huge problem on solid waste management particularly in developing countries given with limited resources. In this era of limited financial resources, availability and sharing of information and learning from the experiences of each other is very important. According to Robert Davies, without sharing of information, "these innovations will remain islands of excellence in a sea of poverty" (Badshah 1996:172).

Based on the experiences of the successful cases, this paper presents the following policy recommendations: strengthening enforcement capabilities, promotion of participation and community mobilization, increasing awareness and education, provision of administrative capability support for LGUs, upliftment of the informal sectors, application of innovative and appropriate technology, and regular monitoring and evaluation of solid waste management policies and activities.

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